UNIVERSITY of HAWAI'I SYSTEM

Office of Capital Improvements

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January 12, 2009

Ms. Katherine Puana Kealoha, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

Subject: Finding of No Significant Impact (FONSI)
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i, Mānoa Campus
TMK: 2-9-004:005 por., Honolulu, O'ahu, Hawai'i

Dear Ms. Kealoha,

The Office of Capital Improvements at the University of Hawai'i has reviewed the comments received during the 30-day public comment period which began on November 23, 2008. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the next available OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form, one copy of the document in PDF format, two copies of the Final EA, and the project summary on disk.

Please call George Atta, Group 70 International, Inc. at (808) 523-5866 if you have any questions.

Sincerely,

Brian Minaai
Associate Vice President
for Capital Improvements

c: Maynard Young

1960 East West Road, Biomedical Sciences B-102
Honolulu, Hawai'i 96822
Telephone: (808) 956-7935
Fax: (808) 956-3175
An Equal Opportunity/Affirmative Action Institution

CENTER FOR MICROBIAL OCEANOGRAPHY RESEARCH AND EDUCATION BUILDING

TMK 2-8-23:003
Mānoa Valley, Oʻahu, Hawaiʻi

Final Environmental Assessment

Applicant:
Facilities Management Office
University of Hawaiʻi at Mānoa
2002 East-West Road
Honolulu, HI 96822

Prepared by:
Group 70 International, Inc.
Architecture • Planning & Environmental Services • Interior Design • Assets Management
Honolulu, Hawaiʻi

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TMK 2-9-004:005 por.
Mānoa Valley, Oʻahu, Hawaiʻi

Final Environmental Assessment

This environmental document is prepared in accordance with the requirements of Chapter 343, HRS and Hawaiʻi Administrative Rules, Title 11, Department of Health.

Applicant:
Facilities Management Office
University of Hawaiʻi at Mānoa
2002 East-West Road
Honolulu, HI 96822

Approving Agency:
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January 2009

TABLE OF CONTENTS

SECTION **PAGE**

List of Figures iii
List of Tables iii
List of Appendices iv

1.0 INTRODUCTION 1-1
1.1 Project Information Summary 1-1
1.2 Project Site 1-2
1.3 Overview of Proposed Project 1-2
1.4 Purpose of Environmental Assessment 1-3
1.5 Agencies, Organizations and Individuals Contacted during the Pre-Consultation Period 1-4

2.0 PROJECT DESCRIPTION 2-1
2.1 Purpose and Need 2-1
2.1.1 C-MORE Program 2-1
2.1.2 Implementation of the UHM Long Range Development Plan (LRDP) - 2007 Update 2-2
2.2 Project Location and Characteristics 2-4
2.2.1 Project Area 2-4
2.2.2 History of the Project Area 2-6
2.2.3 Existing Uses of the Project Site 2-7
2.2.4 Existing C-MORE Program 2-9
2.3 Description of the Proposed Project 2-9
2.3.1 Proposed Design Elements 2-18
2.3.1.1 Sustainable Design 2-18
2.3.2 Utilities and Infrastructure 2-20
2.3.3 Construction Characteristics 2-21
2.3.4 Access, Parking, and Pathways 2-22
2.4 Project Cost and Schedule 2-24
2.5 Required Permits and Approvals 2-24
2.5.1 Other Permits Required for Construction 2-24

3.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES 3-1
3.1 University of Hawai'i, Mānoa Campus Enrollment 3-1
3.2 Topography 3-2
3.3 Geology and Soils 3-2
3.4 Climate and Rainfall 3-5
3.5 Flood and Natural Hazards 3-5
3.6 Air Quality 3-7
3.7 Noise 3-8
3.8 Flora and Fauna 3-8
3.9 Utilities and Infrastructure 3-12
3.9.1 Potable Water System 3-12
3.9.2 Wastewater System 3-14

3.9.3 Drainage System 3-16
3.10 Hazardous Waste 3-18
3.11 Electrical and Communications 3-19
3.12 Traffic 3-20
3.13 Parking 3-21
3.14 Socio-Economic Characteristics 3-22
3.15 Public Services 3-22
3.16 Archaeological Resources 3-25
3.17 Historic Resources 3-30
3.18 Cultural Resources 3-34
3.19 Aesthetic Resources 3-37
3.20 Potential Cumulative and Secondary Impacts 3-38

4.0 ALTERNATIVES TO THE PROPOSED PROJECT 4-1
4.1 No-Action Alternative 4-1
4.2 Alternatives Locations for the Proposed Project 4-1
4.3 Alternative Design Themes 4-2

5.0 APPLICABLE LAND USE PLANS AND POLICIES 5-1
5.1 Hawai'i State Land Use Districts Boundaries 5-1
5.2 Hawai'i State Plan 5-1
5.3 Hawai'i State Functional Plans 5-4
5.4 Hawai'i Coastal Zone Management Program 5-5
5.5 2050 Sustainable Plan 5-5
5.6 City and County of Honolulu General Plan 5-6
5.7 City and County of Honolulu Primary Urban Center Development Plan 5-8
5.8 City and County of Honolulu Land Use Ordinance Guidelines 5-9
5.9 Plan Review Use 5-11
5.10 The University of Hawai'i Strategic Plan (2002-2010) 5-11
5.11 Long Range Development Plan (LRDP), University of Hawai'i at Mānoa 2007 Update 5-12
5.11.1 Major Themes of the LRDP 5-12
5.11.2 LRDP Plan Book B: Upper Center Campus 5-14

6.0 FINDINGS SUPPORTING ANTICIPATED DETERMINATION 6-1
6.1 Anticipated Determination 6-1
6.2 Reasons Supporting the Anticipated Determination 6-1
6.3 Summary 6-4

7.0 LIST OF REFERENCES 7-1

8.0 LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS RECEIVING COPIES OF THE EA 8-1

LIST OF FIGURES

FIGURE PAGE

1-1 C-MORE Project Location with UH Mānoa Campus System 1-5
1-2 C-MORE Project Location in Tax Map Key (2-9-004:005 por.) 1-6
1-3 Zoning Map 1-7
1-4 Special Management Area Map 1-8
1-5 Existing Site Conditions of the Proposed C-MORE Building Project 1-9
1-6 Concept Rendering of the Proposed C-MORE Building Project 1-9
2-1 University of Hawai'i, Mānoa, Long Range Development Plan Map 2-3
2-2 Ahupua'a Boundary Map 2-5
2-3 Existing Biomedical Science Building 2-6
2-4 Existing Site Plan 2-8
2-5 Vicinity Site Plan 2-11
2-6 C-MORE Building Site Plan 2-12
2-7 C-MORE Building First Floor Plan 2-13
2-8 C-MORE Building Second Floor Plan 2-14
2-9 C-MORE Building Roof/Penthouse Plan 2-15
2-10 C-MORE Building Elevation Study – North and South Elevation View 2-16
2-11 C-MORE Building Elevation Study – East and West Elevation View 2-17
2-12 C-MORE Building 3-D Study Views 2-19
2-13 University of Hawai'i, Mānoa, Gateways, Malls, Path and Pathways Circulation Plan ..2-23
3-1 UH Mānoa Enrollment Projections 3-1
3-2 USGS Topography Map 3-3
3-3 Soil Classifications 3-4
3-4 Flood Insurance Rate Map 3-6
3-5 Landscape Remediation Plan 3-11
3-6 Potable Water Exhibit 3-13
3-7 Wastewater Exhibit 3-15
3-8 Drainage Exhibit 3-17
3-9 Archaeological Map in Mānoa Ahupua'a 3-26
3-10 Project Location Identified on 1882 Alexander Survey Map, Mānoa Valley 1882 3-29
5-1 State Land Use Designation Map 5-2
5-2 Primary Urban Center Development Map, Department of Planning and Permitting City and County of Honolulu, June 2004 5-10
5-3 UH LRDP Upper Campus Master Plan 5-15

LIST OF TABLES

TABLE PAGE

2-1 Proposed Space Program for the C-MORE Building Project 2-18

LIST OF APPENDICES

A Comment Letters and Responses

B Utility Systems Report, University of Hawaiʻi at Mānoa Long Range Development Plan 2007 Update (Category I)

C Chemical Inventory: Existing C-More Laboratories at the University of Hawaiʻi Mānoa Campus

D Traffic Impact Analysis Report, University of Hawaiʻi at Mānoa Long Range Development Plan 2007 Update (Category I)

E Filed Request for State Historic Preservation Review (October 2008) and Archaeological Literature Review and Field Inspection Report for the University of Hawaiʻi at Mānoa Long Range Development Plan Project (May 2008)

F Cultural Impact Assessment for the University of Hawaiʻi at Mānoa Long Range Development Plan Project

1.0 INTRODUCTION

1.0 INTRODUCTION

This Draft Environmental Assessment (EA) has been prepared in accordance with the requirements of Chapter 343, HRS and Hawai'i Administrative Rules, Title 11, Department of Health, which set forth the requirements for the preparation of environmental assessments.

1.1 PROJECT INFORMATION SUMMARY

Type of Document:	Environmental Assessment (EA)
Applicant:	Facilities Management Office University of Hawai'i at Mānoa 2002 East-West Road Honolulu, HI 96822
Accepting Authority:	Office of the President University of Hawai'i System 2444 Dole Street Bachman 202 Honolulu, HI 96822
Project Name:	Center for Microbial Oceanography Research and Education (C-MORE) Building
CH. 343, HRS Trigger:	Use of State Land
Project Location:	Mānoa Valley, Honolulu, Island of O'ahu *(Figure 1-1)*
Tax Map Key:	2-9-004:005 por. (*Figure 1-2)*
Landowner:	State of Hawai'i, University of Hawai'i at Mānoa
Project Area:	28,004 square feet (sf)
State Land Use District:	Urban
City & County Development Plan:	Primary Urban Center, Public Facilities
City& County Zoning:	Residential R-5 (*Figure 1-3)* Plan Review Use (PRU) Resolution 89-411, Resolution 92-286, and Resolution 06-255
SMA:	Not in SMA (*Figure 1-4)*
Flood Zone:	Zone X (500 Year Flood)

Existing Approvals:	Board of Regents Approved University of Hawai'i Long Range Development Plan (LRDP) (2007) City and County of Honolulu Planned Review Use (PRU) Permit (2008)
Anticipated Determination:	Finding of No Significant Impact (FONSI)

1.2 PROJECT SITE

The University of Hawai'i, Mānoa Campus (UHM) occupies some 304 acres on land in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mō'ili'ili and McCully communities. Its principal physical borders are the Mānoa residential community on the ma uka side, Wa'ahila Ridge on the Koko Head side, H-1 Freeway on the ma kai side and the lower Mānoa and McCully residential communities on the 'Ewa side. The Mānoa Campus is comprised of four campus designations: Central, Upper Central, Makai, and Mauka (*Figure 1-1*).

The existing Biomedical Science Building (also known as the Life Science Building) at UHM is the location for the proposed Center for the Microbial Oceanography Research and Education (C-MORE) Building. This building is located on the ma uka portion of the Mānoa Campus, adjacent to the Pope Laboratory, Sherman Laboratory, Auxiliary Services, and Agricultural Science Institute within TMK 2-9-004:005 por. (*Figure 1-2*). C-MORE will be an addition within the south entrance courtyard of the Biomedical Science Building among the existing life science buildings in this part of campus (*Figure 1-5 and 1-6*).

Primary vehicular access to the project site is from the H-1 Freeway, University Avenue, Dole Street and Old Wai'alae Road. Public transportation is provided by the City and County of Honolulu bus services on King Street, University Avenue, Dole Street and Metcalf Street. The bus service includes routes through the campus via East-West Road and Maile Way. The Mānoa Campus is also served by direct express bus service from the outlying communities. Campus shuttle services provides transportation throughout the entire campus and for specific routes to Mānoa and Mō'ili'ili neighborhoods.

1.3 OVERVIEW OF PROPOSED PROJECT

The University of Hawai'i at Mānoa is proposing a new research and education facility to support the expanding needs of the C-MORE program. C-MORE is a recently established Science and Technology Center within the School of Ocean and Earth Science and Technology (SOEST), designed to facilitate a more comprehensive understanding of the diverse assemblages of microorganisms in the sea. The range of study includes the genetic basis of marine microbial biogeochemistry including the metabolic regulation and environmental controls of gene expression, to the processes that underpin the fluxes of carbon, related bioelements and energy in the marine environment.

The new C-MORE Building will house the Center's research and educational component and will be part of the existing Biomedical Science Building. The existing building is currently used for life science studies and supports several faculty, students, and staff.

Current enrollment is at UHM is approximately 20,000 students. In addition to student enrollment, faculty and staff number almost 6,000. The daytime population is about 30,000. The C-MORE program currently has approximately 29 faculty and staff, 6 education and outreach team members, and 33 graduate and postdoctoral students participating with the program.

The new 28,004 sf C-MORE Building project will be a two-story structure and consist of research laboratories, offices, classrooms, meeting spaces, laboratory support and building support spaces. ~~The project may also include refurbishment of the existing courtyard and the development of a new landscape design to promote outdoor meeting and gathering spaces~~. Planned project design for the C-MORE building will provide a fundamental connection between the surrounding life science buildings and the UHM Campus.

C-MORE will design and conduct innovative research, broker new partnerships, increase a diversity of human resources, implement new education and outreach programs, and utilize a comprehensive collection of information about microbial life in the sea. The Center will bring together teams of scientists, educators and community members to communicate, collaborate, and design creative solutions to long-term ecosystem problems. The Center's activities will be integrated among five partner institutions: Massachusetts Institute of Technology, Woods Hole Oceanographic Institute, Monterey Bay Aquarium Research Institute, University of California at Santa Cruz and Oregon State University.

C-MORE is identified as a short-term project in the recent 2007 update of the Long Range Development Plan (LRDP) prepared for the University of Hawai'i, Mānoa Campus. The LRDP was updated to reflect current and upcoming educational priorities by planning for future buildings and projects anticipated for development within the next 5-10 years.

1.4 PURPOSE OF ENVIRONMENTAL ASSESSMENT

In accordance with the requirements of Chapter 343, Hawai'i Revised Statutes, a Draft EA is being prepared as the proposed project utilizes state funds and is located on state lands at the Mānoa Campus of the University of Hawai'i. The Draft EA will be published in the Office of Environmental Quality Control Environmental Notice, which will commence a 30-day public review period.

The Draft EA is presented in eight sections and includes the following: a detailed summary and project description; a list of necessary approvals; a description of the environmental setting; a section that identifies potential impacts and proposed mitigative measures on identified natural, cultural, and socioeconomic resources as well as existing infrastructure; a description and analysis of alternatives; a discussion of the project's relationship to State and County land use designations and regulations; the anticipated determination and reasons for its believed outcome; an updated list of agencies, organizations, and individuals that participated in the pre-consultation phase of the Draft EA; and a list of references cited or used in developing the Draft EA. After the 30-day review period of the Draft EA has concluded, public comments received will be considered and addressed to the extent feasible within the project scope and evaluation. A Final EA will then be prepared, highlighting key areas of the document that were revised, updated, or modified based upon information received during the public comment period.

Upon acceptance of the Final EA, a Finding of No Significant Impact (FONSI) is anticipated. Construction would begin immediately after the issuance of the required building permits and other ministerial permits.

1.5 AGENCIES, ORGANIZATIONS AND INDIVIDUALS CONTACTED DURING THE PRE-CONSULTATION AND DRAFT EA PROCESS

A Pre-Consultation Memo and Participant Letter was sent in September 2008 to initiate the environmental review process. These are included as *Appendix A.*

A list of agencies and other parties that were presented notice of the proposed project or were contacted during the pre-consultation period of the Draft EA is provided below. A listing of those agencies, organizations and individuals that will be provided an opportunity to review the Draft EA is provided in Section 8.0 of this document.

State of Hawai'i Agencies
Department of Business, Economic Development & Tourism (DBEDT), Office of Planning
DBEDT, Strategic Industries Division
Department of Health
Department of Land and Natural Resources (DLNR)
DLNR, State Historic Preservation Division
Office of Environmental Quality Control
Office of Hawaiian Affairs

City and County of Honolulu Agencies
Board of Water Supply
Department of Design and Construction
Department of Planning and Permitting
Department of Environmental Services

Community Groups and Associations
Neighborhood Board No. 7, Mānoa
Mālama O Mānoa

Figure 1-1 C-MORE Project Location with UH Mānoa Campus System

Figure 1-2 C-MORE Project Location in Tax Map Key (2-9-004:005 por.)

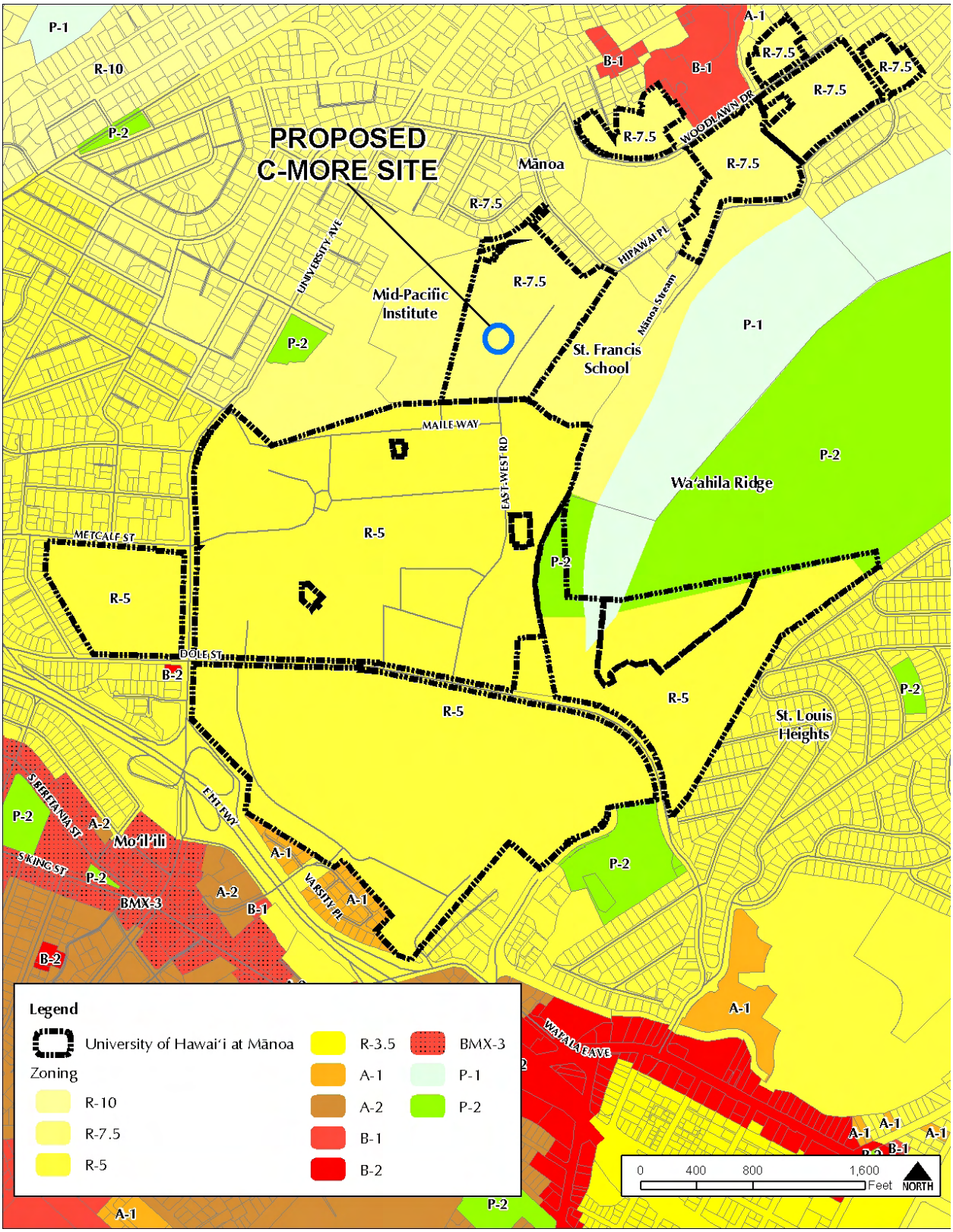

Figure 1-3 Zoning Map

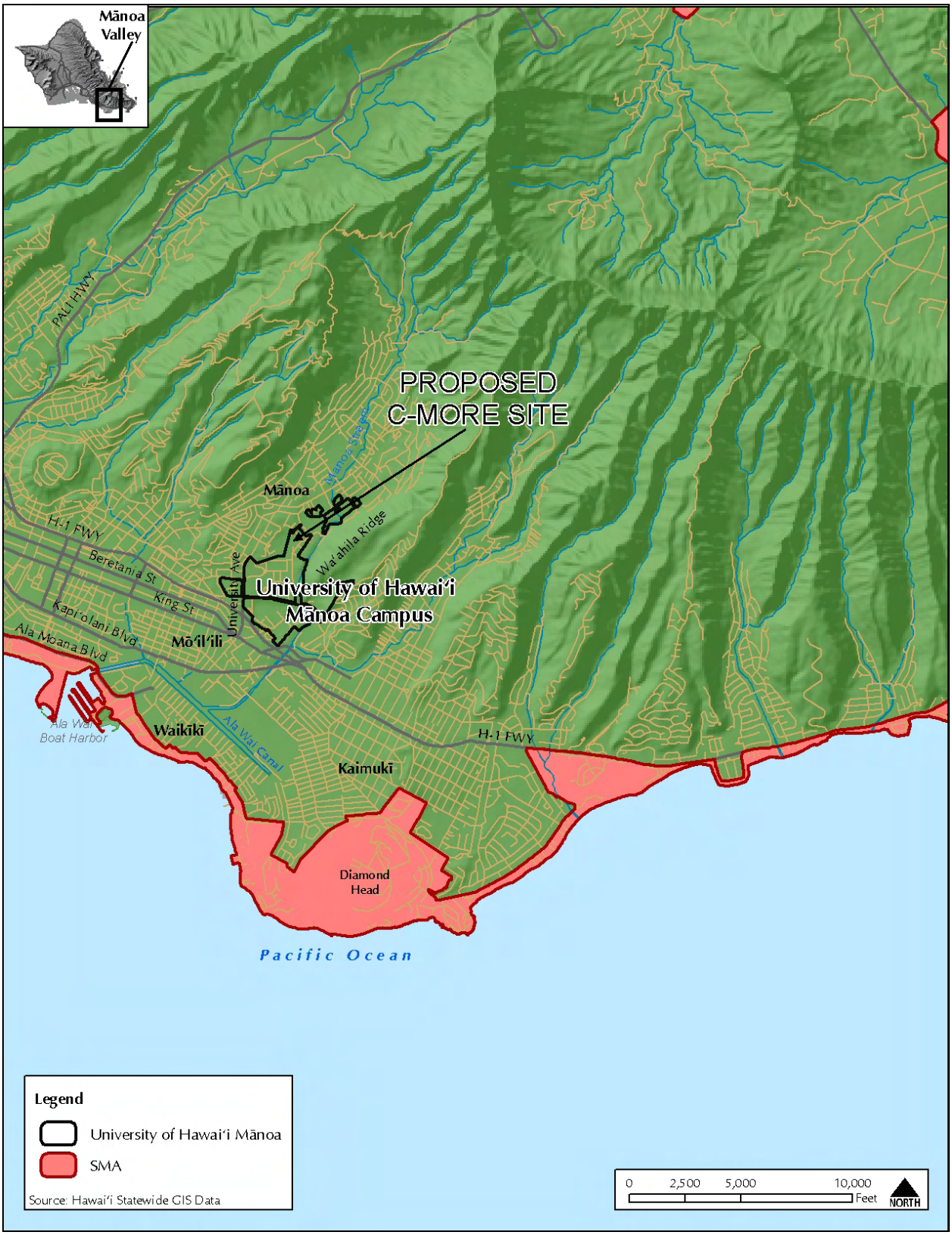

Figure 1-4 Special Management Area Map

Figure 1-5 Existing Site Conditions of the Proposed C-MORE Building Project

Figure 1-6 Concept Rendering of Proposed C-MORE Building Project

2.0 PROJECT DESCRIPTION

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2.1 PURPOSE AND NEED

The University of Hawai'i at Mānoa (UHM) is ranked as one of the top public universities for engineering and science and is one of only 13 institutions in the nation to hold the unique distinction of being a land, sea, and space grant research institution. UHM with its large upper-division and graduate programs, successful professional schools and promising research programs are anticipated to grow in-place as indicated in the recently updated UH Long Range Development Plan (LRDP). The purpose of the LRDP is to provide an organizing vision for the campus and to guide development based upon current and upcoming educational priorities.

UHM's challenge is to use the opportunity afforded by this growth and overall success to achieve higher levels of quality in its physical and academic environment. As such, UHM has become focused on supporting research and graduate education programs, such as the Center for Microbial Oceanography Research and Education (C-MORE), as space needs continue to grow requiring new laboratories, offices and general resources.

C-MORE is a recently established National Science Foundation-sponsored Science and Technology Center. Located on the UHM campus, the proposed research facility for C-MORE will provide expanded research and educational opportunities to the campus. The Center will bring together teams of scientist, educators and community members to communicate, collaborate and design creative solutions within the science of microbial oceanography.

Currently, the Laboratory for Microbial Oceanography conducts basic research on microbial inhabitants of the sea and is a research unit within the School of Ocean and Earth Science and Technology (SOEST) at the UHM. The Laboratory was founded in 1978 by Dr. David Karl and has grown significantly in size and in diversity of scope. The C-MORE Building project will provide new research space and function as an instructional lab. The project will support the mission of the Laboratory for Microbial Oceanography and the C-MORE program and potentially support the expansion of other health-related and biological sciences in the Biomedical Sciences Building (BSB).

Today, UHM is a multi-dimensional institution of higher learning conducting education, research and public service programs for the state, the nation and the world community. Support for programs such as C-MORE is critical to the continued success of the University and its ability to provide world class research and education. The University has committed to the C-MORE program by establishing the proposed project as a priority in the its 2007 LRDP.

2.1.1 C-MORE Program

Established in 2006, C-MORE was designed to facilitate a comprehensive understanding of the diverse groups of microorganisms in the sea, ranging from the genetic basis of marine microbial biogeochemistry to the processes that affect changes in carbon, related bioelements and energy production in the marine environment. Further, recent advances in the application of molecular techniques have provided an unprecedented opportunity to further study the structure, diversity

and possible function of sea microbes. By combining these and other novel approaches with more well-established techniques in microbiology, oceanography and ecology, C-MORE believes that it may be possible to develop a meaningful predictive understanding of the ocean with respect to energy transduction, carbon sequestration, bioelement cycling and the probable response of marine ecosystems to global environmental variability and climate change.

The Center's research is organized around four interconnected themes: (Theme I) microbial biodiversity, (Theme II) metabolism and centerpoint (CNP) energy flow, (Theme III) remote and continuous sensing and links to climate variability, and (Theme IV) ecosystem modeling, simulation and prediction. Each theme coordinates the development of research programs and facilitates interactions among the themes.

The new C-MORE Building project will help the Center design and conduct novel research, broker new partnerships, increase a diversity of human resources, implement new education and outreach programs, and utilize a comprehensive collection of information about microbial life in the sea. The Center will bring together teams of scientists, educators and community members to communicate, collaborate, and design creative solutions. C-MORE will partner with five other institutions including the Massachusetts Institute of Technology, Woods Hole Oceanographic Institute, Monterey Bay Aquarium Research Institute, University of California at Santa Cruz and Oregon State University. The strength of the C-MORE program resides in bringing together world class experts thereby facilitating the creation and dissemination of new knowledge on the role of marine microbes in global habitability.

The education and outreach component of the Center focuses on pre-college curriculum enhancements, in service teacher training and formal undergraduate/graduate and post-doctoral programs to prepare the next generation of microbial oceanographers. The Center maintains creative outreach programs to help share the new knowledge gained in the lab with the general public. The program partners with a number of education groups such as the Waikiki Aquarium, the Hawai'i Institute of Marine Biology and the Pacific Internship Programs for Exploring Science.

2.1.2 Implementation of the UHM Long Range Development Plan (LRDP) - 2007 Update

The LRDP was first adopted by the Board of Regents in 1987 and has since served as the guiding document for campus development. Updates to the plan have been carried out responding to changes in academic priorities, Capital Improvement Program (CIP) priorities, enrollment, environmental issues, funding, changes in the campus and other major factors including campus development. Updates to the LRDP are also necessitated by the City and County of Honolulu's Plan Review Use (PRU) approval prior to the issuance of building permits.

The recent 2007 LRDP update includes future buildings and projects planned for development in the next 5-10 years. Projected future projects anticipated for development are listed in the comprehensive LRDP Site Plan (*Figure 2-1*). Major themes were developed in consultation with the Mānoa Campus administration and constituent bodies, including students, faculty members, administrators, and community representatives are also incorporated into the update of the plan. These major themes are discussed in greater detail in *Section 5.9* and for reference include:

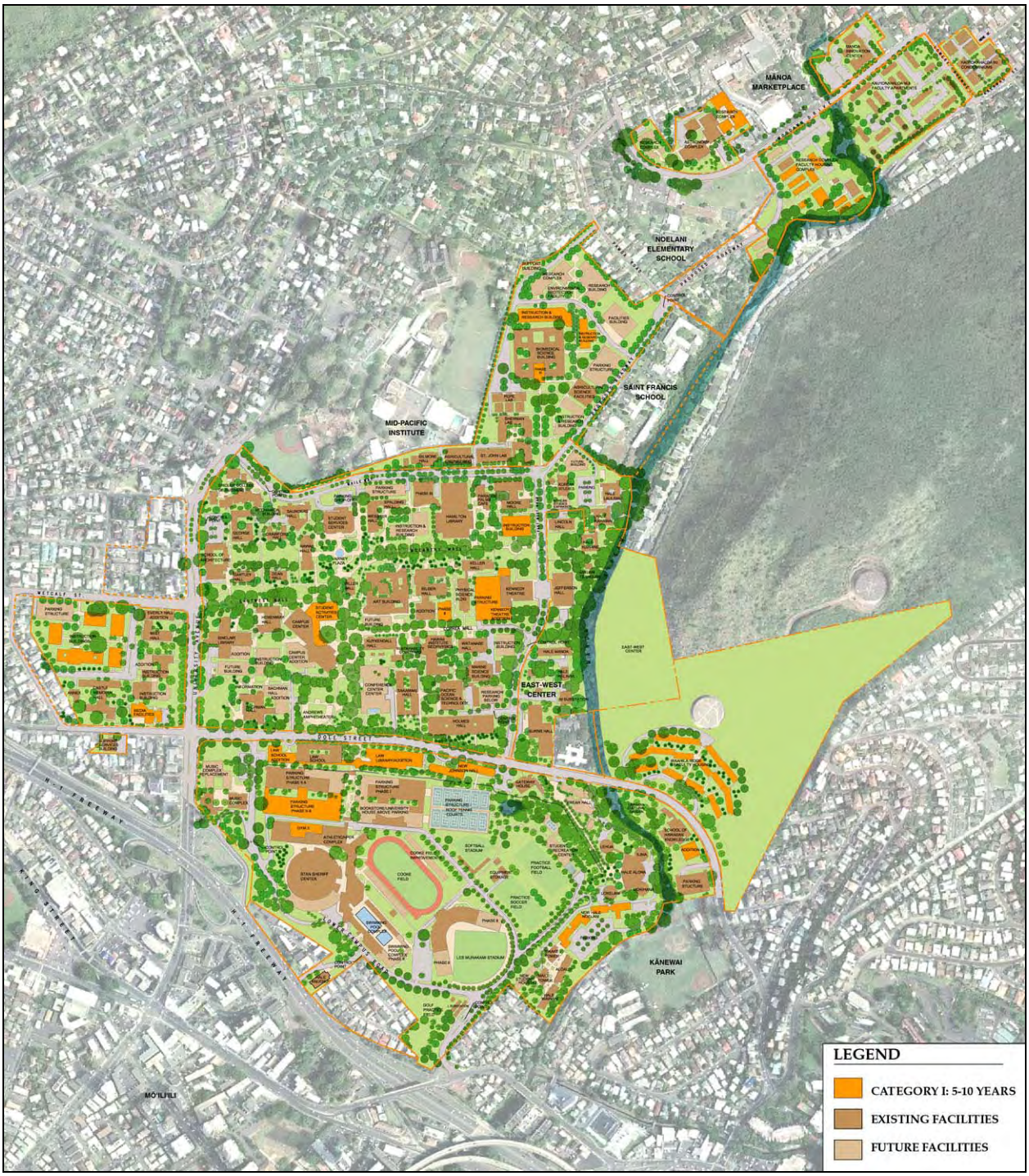


Figure 2-1 University of Hawai'i, Mānoa, Long Range Development Plan Map

- A Globally Connected Hawaiian Place of Learning, Leadership and Service
- A Livable Urban Campus
- Outdoor Spaces for Living and Learning
- Leader In Environmental Sustainability

The projects listed in the 2007 LRDP Update address current space and activity needs on campus. Requirements for additional graduate and research space have continued to fuel growth and are projected to do so in the future. In a pattern typical of other major universities, research and administrative support facilities are directly related to the availability of research funding. Overall extramural funding at UH has increased by 50% over the past ten years. The National Science Foundation ranks UH Mānoa in the top 30 public universities in federal research funding and 50th overall. New laboratories, offices and library resources will continue to be required to support evolving graduate work and research activities.

In addition to setting current and upcoming educational project priorities, the UHM LRDP includes a physical vision of the campus and an organizational schematic program that defines future uses of the campus. Within the LRDP, PlanBooks separate the campus into four distinct areas (Central, Upper Central, Makai, and Mauka) illustrating the design considerations for projects within these areas. The LRDP identifies building blocks, such as Arrival Areas, Gateways, Malls and Pathways, Plazas, Buildings, Landscaping, and Sustainability and Design Guidelines to define the overall relationship of the campus. Each of these building blocks are key elements intended to provide a complete campus experience.

2.2 PROJECT LOCATION AND CHARACTERISTICS

2.2.1 Project Area

The UHM campus is the ~~major~~ flagship campus of the UH multi-campus system which conducts educational, research, and public service programs for local, national, and international communities. The UHM Campus is located in the traditional moku of Kona and in the ahupuaʻa of Waikīkī (*Figure 2-2*). The entire campus occupies some 304 acres on land in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mōʻiliʻili and McCully communities. Its principal physical borders are the Mānoa residential community on the ma uka side, Waʻahila Ridge on the Kokohead side, H-1 Freeway on the ma kai side and the lower Mānoa and McCully residential communities on the ʻEwa side (refer to *Figure 1-1*).

The project area for the proposed C-MORE Building is located on the ma uka portion of UH on the Upper Central Campus. The site is on the ma kai side of the existing Biomedical Building, within a relatively level area consisting of an interior courtyard area, concrete walkways, landscaped areas and a portion of the asphalt concrete pavement parking lot. The 28,004 square feet (gsf) project will be part of the existing Biomedical Science Building (BSB), which is also known as the Life Science Building and is adjacent to the Pope Laboratory, Sherman Laboratory, Auxiliary Services, and Agricultural Science Institute (*Figure 2-3*). C-MORE will be an addition within the south entrance courtyard of the Biomedical Science Building among the existing life science buildings in this part of campus. The project is an infill of the existing open space and will be an ~~significant~~ important feature in development of the Upper Central Campus.

Figure 2-2 Ahupua'a Boundary Map

Figure 2-3 Existing Biomedical Science Building

2.2.2 History of the Project Area

The University of Hawai'i began in 1907 as a land-grant college of agriculture and mechanical arts called the College of Hawai'i. The first classes were held at a temporary site in downtown Honolulu. In 1912, the school moved to its permanent site in Mānoa Valley and as other campuses were added, the original Mānoa Valley site became identified as UH Mānoa.

With the addition of the College of Arts and Sciences in 1920, the school became known as the University of Hawai'i. The campus grew slowly until the late 1950's. Through the 1960's, enrollment rose rapidly to a peak of 22,371 students in 1972. Since then, enrollment has fluctuated to a current level of approximately 20,000 students. In addition to student enrollment, faculty and staff number almost 6,000.

The existing Biomedical Science Building was designed by renowned architect Edward Durell Stone in the early 1960's. Original construction drawings date back to October 1967 and the initial tenants assumed the use of the building in 1971, thereby making the building approximately 37 years old. Some of Edward Durell Stone's most famous and notable buildings include Radio City Music Hall (New York, 1932), the United States Embassy (New Delhi, India, 1958), and the Kennedy Center for the Performing Arts (Washington, D.C., 1971).

The Biomedical Science Building was originally designed as a 7-story tower building that is centered and surrounded by an exterior facade that creates the illusion of enclosed fort. Six courtyards originally filled the space between the outer perimeter and allowed for internal circulation and connection between the structures. Four courtyards were cited in each major corner of the squared design. Each cardinal side of the building also had a primary entry leading to its own courtyard. Specific scoring patterns were utilized throughout the design of the concrete walls and walks, emphasizing a sense of linear balance and connectivity between the tower and the courts.

2.2.3 Existing Uses of the Project Site

The existing Biomedical Science Building is currently used for life science studies and supports several faculty, students, and staff (*Figure 2-4*). The existing Biomedical Science Building served as the primary center for the UHM John A. Burns School of Medicine (JABSOM), which began operations at the Biomedical Science Building in 1971. In September 2005, JABSOM relocated to its current Kakaʻako facility. Since then, the Biomedical Science Building is currently used for life science studies and supports several faculty, students, and staff in remaining departments within JABSOM, the Pacific Bioscience Research Center, the College of Social Sciences, and the Office of Research and Graduate Education. Additionally, in September 2000, the Biomedical Science Building welcomed a new tenant with the opening of a new research facility for the Institute for Biogenesis Research (IBR).

The Institute for Biogenesis Research was built in honor of one of the university's most distinguished scientists, Dr. Ryuzo Yanagimachi, whose forty year career included many significant advances in reproduction. The purpose of the Institute for Biogenesis Research is to be a world class center for the study of reproductive biology that builds upon the legacy of Dr. Yanagimachi's work. To support the needs of the Institute for Biogenesis Research, several alterations and modifications of the existing Biomedical Science Building were necessary. These alterations included enclosing the two east end courtyards, the removal of portions of the existing entry on the east side of the building and the addition of a new enclosed glassed entry. This portion of redevelopment of the Biomedical Science Building created an additional 14,898 sf and modified approximately 8% of the existing building. In total, approximately 18% of the existing building has been altered from its original design and intent.

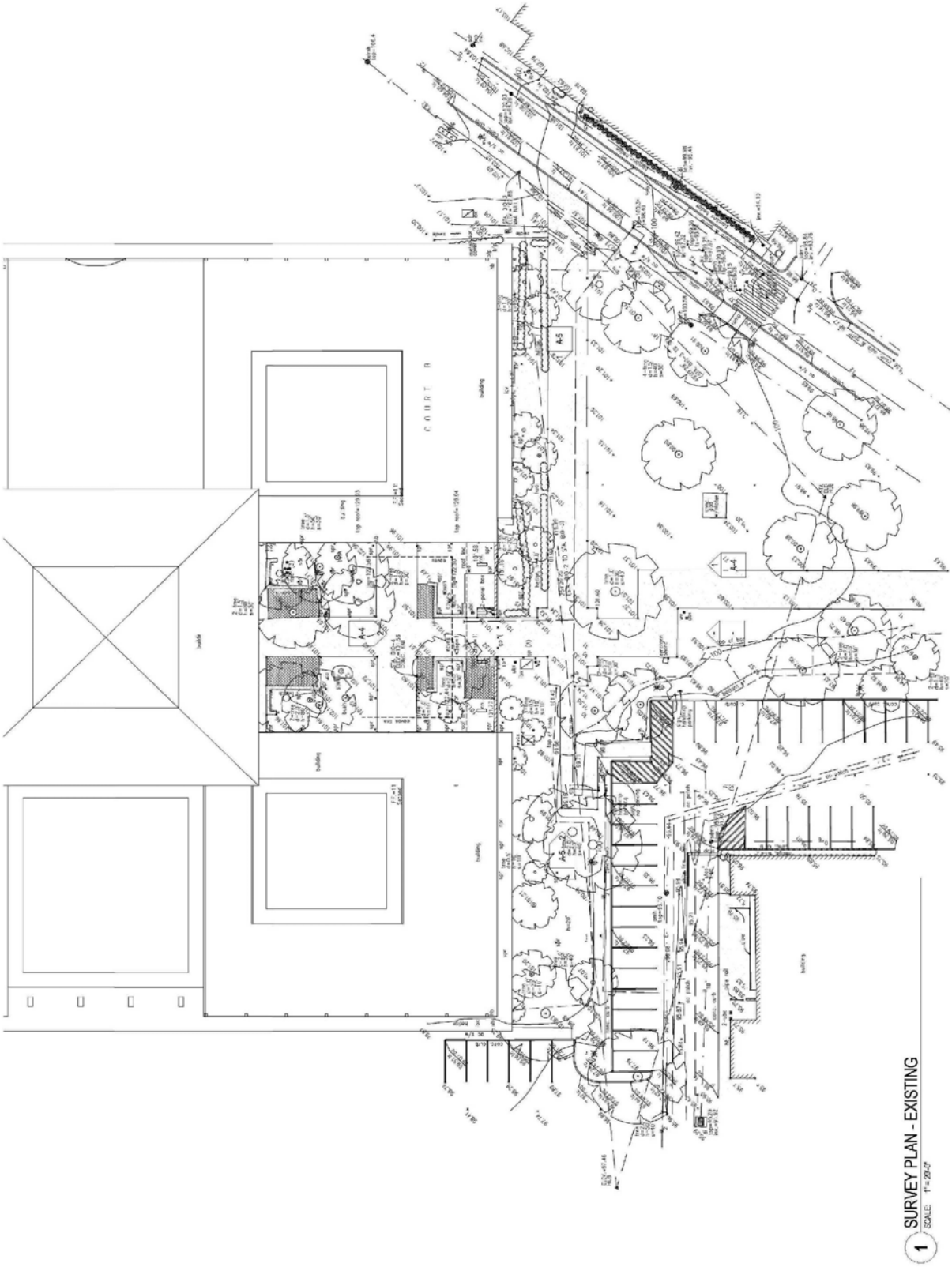


FIGURE 2-4 Existing Site Plan

2.2.4 Existing C-MORE Program

C-MORE is currently using the Oceanography Department's facility located in the Marine Science Building at UHM. The existing space for the Laboratory for Microbial Oceanography is currently inadequate because of the programs expansion over recent years. As C-MORE continues to grow and advance into the future, the facility will need additional resources, such as state of the art equipment, and a modern and innovative research laboratory, to accommodate and support the continued success of the program.

Additional plans for future expansion of the program are expected as grant funds are acquired to support education and research in this field. C-MORE involves more than one hundred scientists and educators located at six partner institutions. The C-MORE Team consists of approximately 23 research and teaching faculty at the six partner institutions, six administrative staff and six education and outreach team members at UHM, 13 current and former postdoctoral scholars at five partner institutions, and nine current and former graduate students at three partner institutions.

2.3 DESCRIPTION OF THE PROPOSED PROJECT

The proposed C-MORE Building is intended to accommodate the needs of on-going microbial oceanography research and education. Located within the south entrance courtyard of the existing Biomedical Science Building, the C-MORE Building will be expanding the capability of the health and biological sciences facilities (*Figure 2-5 and 2-6*). The building will consist of research laboratories, offices, classrooms, conference rooms, meeting spaces, laboratory support and building support spaces. Total occupancy of the new C-MORE building is 337 persons as specified by the building code, and 132 persons as specified by the room criteria established by the program.

The project may include the renovation of the existing courtyard with landscape pavers and a variety of new planting to create a welcoming and pleasant outdoor meeting, study, and informal gathering space. In the future, food service is expected to be provided on the ground floor, making the refurbished courtyard an excellent space for casual dining in a café like setting for students, faculty and visitors. The proposed structure will create a new gateway to the Biomedical Science Building fitting with the surrounding life science buildings in the Upper Central area of the campus.

Consisting of 28,004 square feet, the proposed C-MORE building will be a two-story structure with a roof that contains a penthouse area for mechanical equipment. The two-story limit on the building height meets the design criteria standards set in the 2007 LRDP Update. The building would be sited fronting the south entry of the existing Biomedical Science Building. The design is intended to create a distinctive but respectful contrast to the existing architecture. The proposed building is designed to visually maintain an appropriate sense of scale along its base but articulates a contrasting yet integrating design vocabulary to the existing Biomedical Science Building building through it a purposeful and predominant use of transparent curving glass walls that lends to the sustainable nature of the design. Layouts for each level of the facility has been planned to provide a space that adequately accommodates the needs of the Center and is complimentary to their research goals and objectives. The space program for the C-MORE Building project is

detailed below in *Table 2-1*. Floor plans are shown in *Figure 2-7 to 2-9* and elevation plans are shown in *Figure 2-10* to *2-11*.

Foundation

The foundations for the C-MORE addition will consist of spread and continuous footings. The depth of the footings will vary. The top of the foundation footings will be 16″ below the slab on grades and the footings thickness will vary from 16″ thick to 30″ thick. The bottom of the footings adjacent to the existing Biomedical Science Building will match the existing footings.

First Floor Plan

The Outreach Program will be located on the east side of the first floor consisting of offices and an open reception space. Visitors, guests, and school students will be received here and educated about various C-MORE research activities. Transparent curving glass walls will be used to capture the Outreach Program spaces enhancing media boards, interactive displays and other display technologies. Design elements of the Outreach Program space in the C-MORE Building will be inviting and visible for those walking in the area. The first floor will also consist of the back-of-house areas for loading and receiving research materials such as samples and equipment. A walk-in-refrigerator and freezer, a large classroom, and other miscellaneous support spaces will be located here as well. Outside of the building is the main passage and existing access to the Biomedical Science Building. The passageway, approximately 25 feet at its narrowest point, is envisioned as a spacious circular plaza that reinforces the geometry of the C-MORE Building addition. This space will be the welcoming entrance to the life science buildings, and will be used as an outdoor classroom and gathering space for students, faculty, and guests (*Figure 2-7*). Estimated capacity for the first floor is 210 persons.

Second Floor Plan

The second floor consists of mostly laboratories, and some office spaces, such as the Technical/Student/Post-Doctorate offices, which are planned as an open office arrangement for flexibility and efficient use of space (*Figure 2-8*). The offices will be located on the southwest and southeast sides to take advantage of views and natural light. Labs located on both the south and north sides of the second floor will consists of 58% of the total floor area of the second floor. The shared lunch room and balcony are also on this floor providing social area for relaxation and informal meetings. The balcony, located on the west wing will have informal seating arrangements and planting, helping to animate the northwest stairway. Estimated capacity for the second floor is 127 persons.

Roof/Penthouse Plan

The roof/penthouse area will be utilized as a green roof, incubator area, and mechanical penthouse (*Figure 2-9*). The roof/penthouse will include the use of clerestory windows with integrated photovoltaics. This floor will be minimally used by the Center, however, its inclusion into the design elements of the project help to promote the supporting themes and goals of sustainable design and energy efficiency.

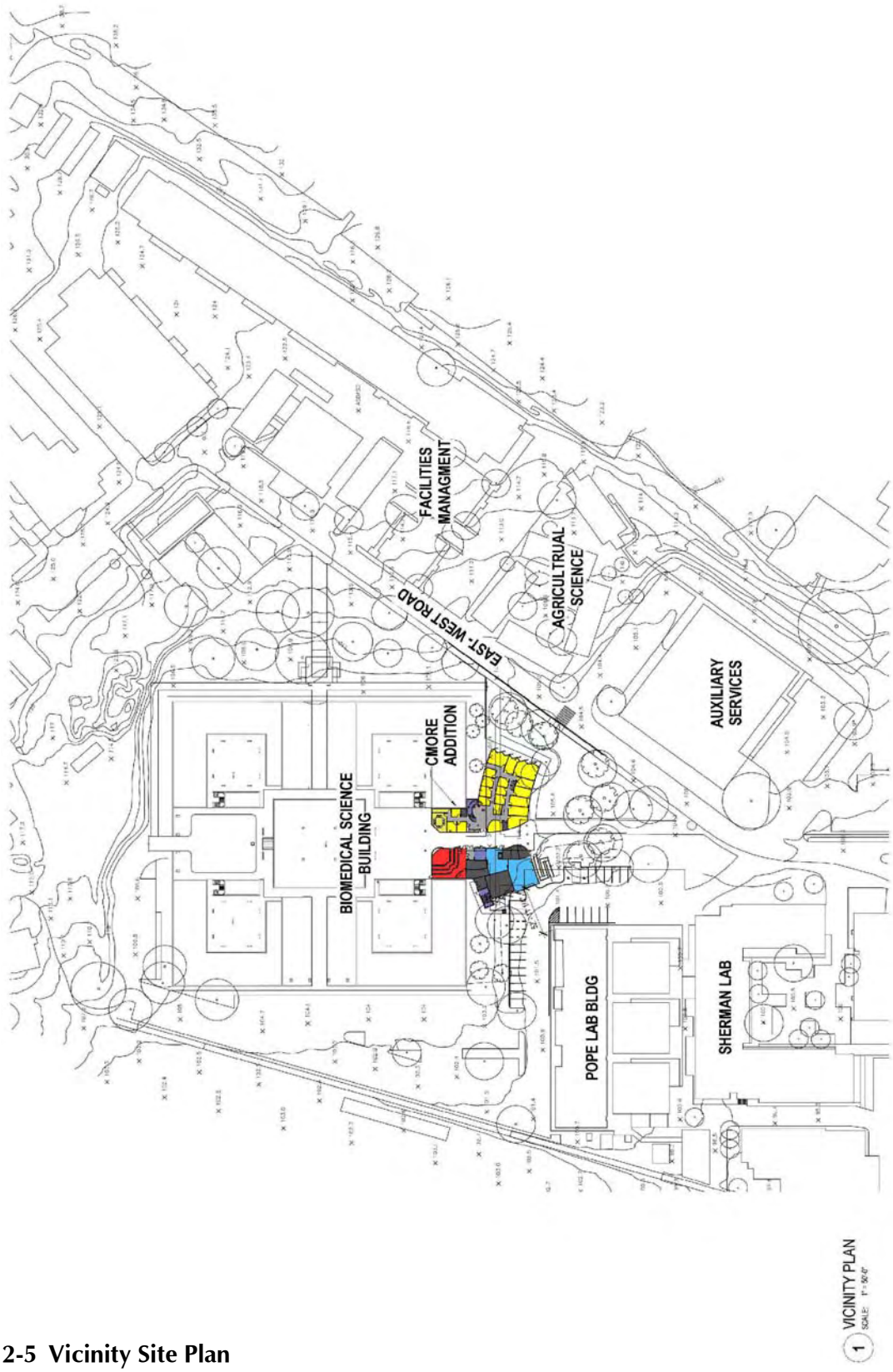


FIGURE 2-5 Vicinity Site Plan

FIGURE 2-6 C-MORE Building Site Plan

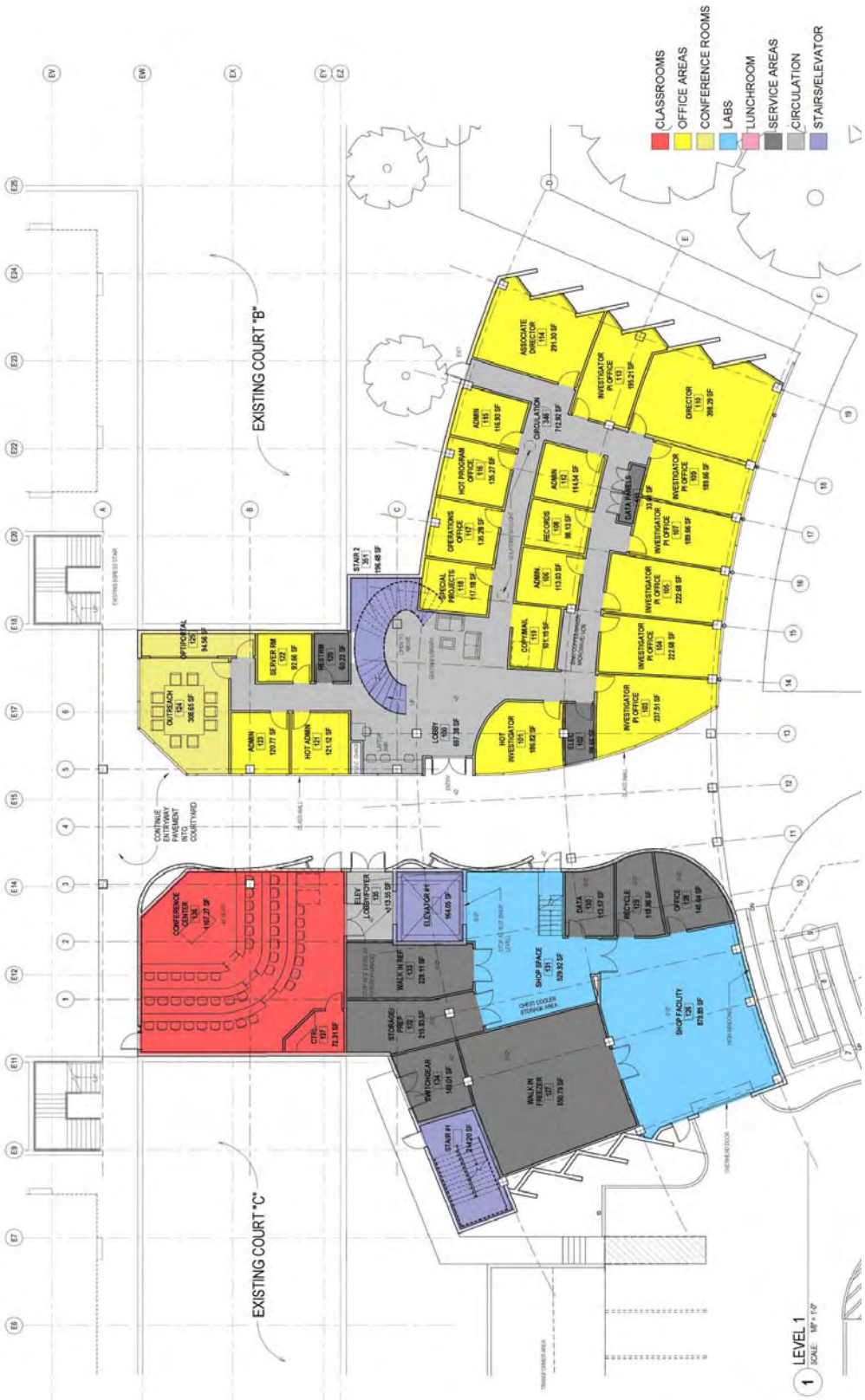


FIGURE 2-7 C-MORE Building First Floor Plan

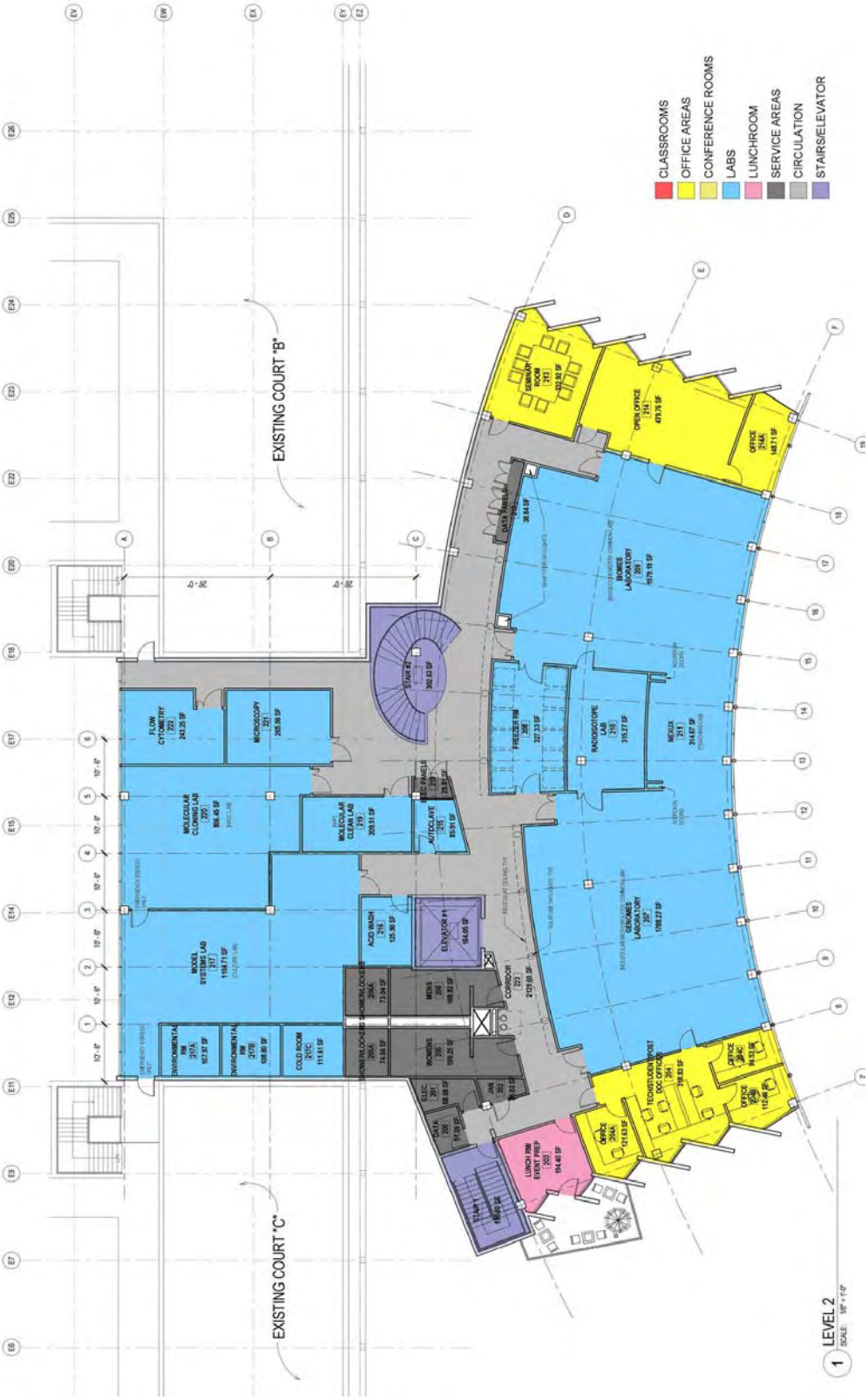


FIGURE 2-8 C-MORE Building Second Floor Plan

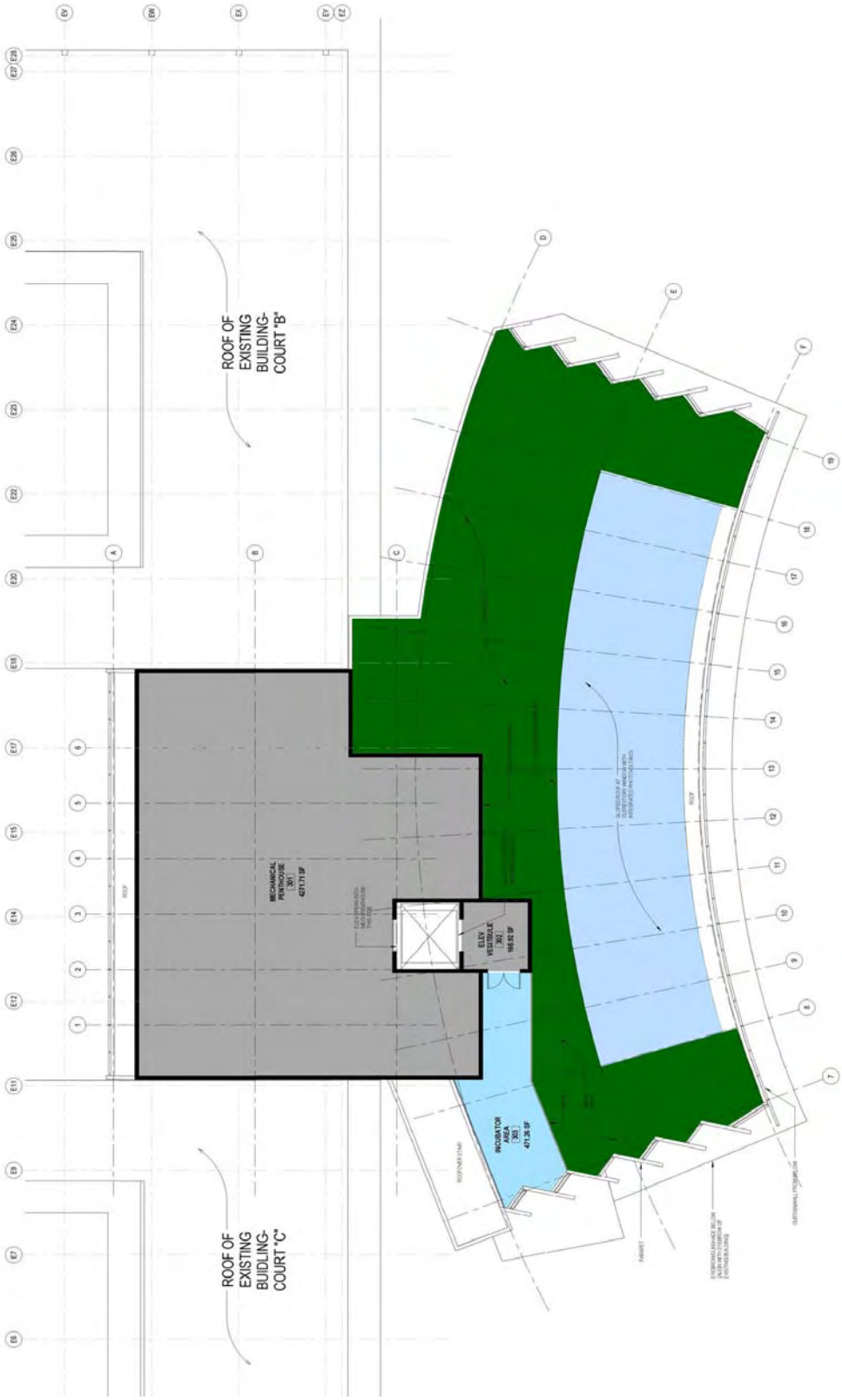


FIGURE 2-9 C-MORE Building Roof/Penthouse Plan

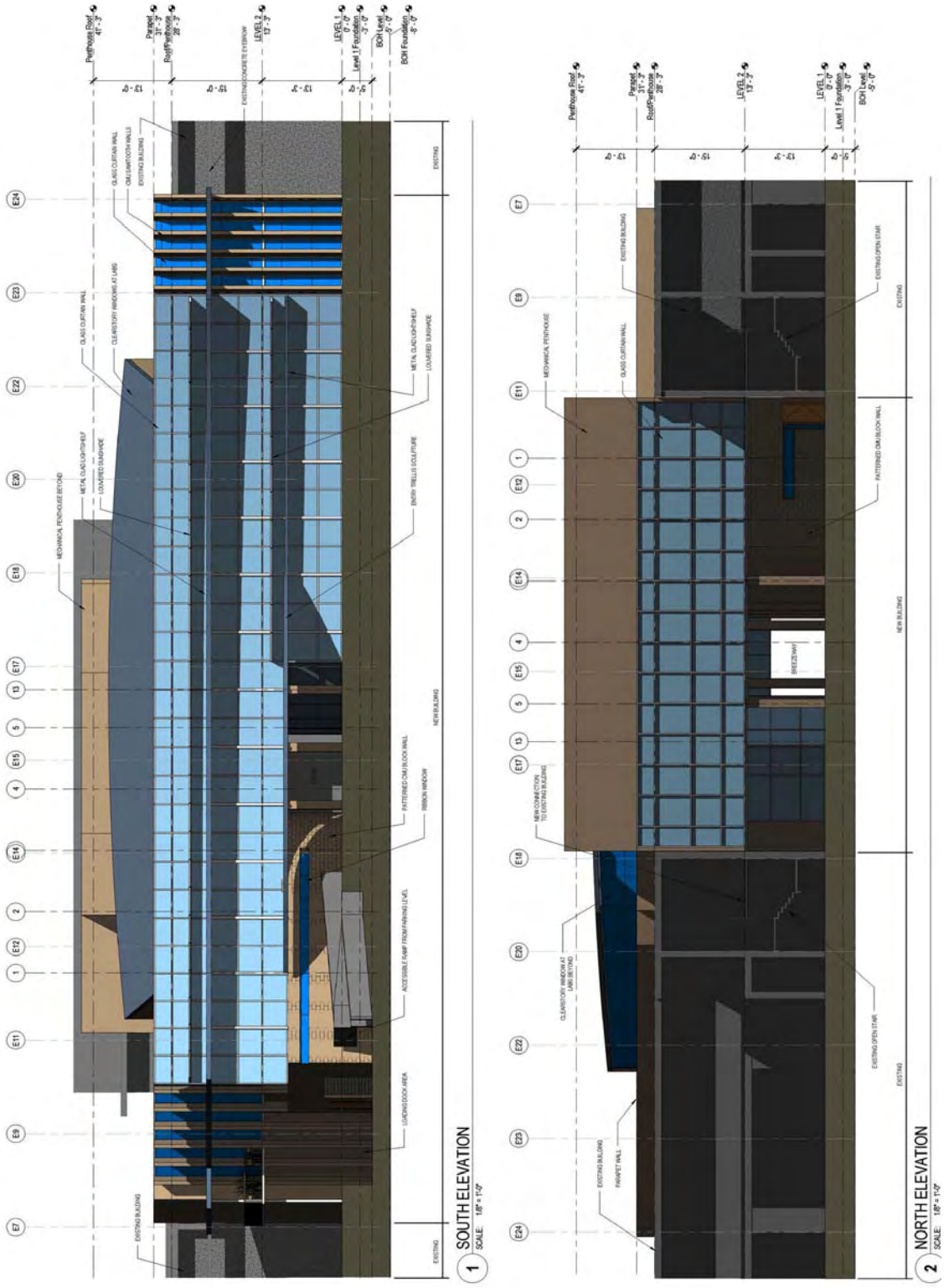


FIGURE 2-10 C-MORE Building Elevation Study – North and South Elevation View

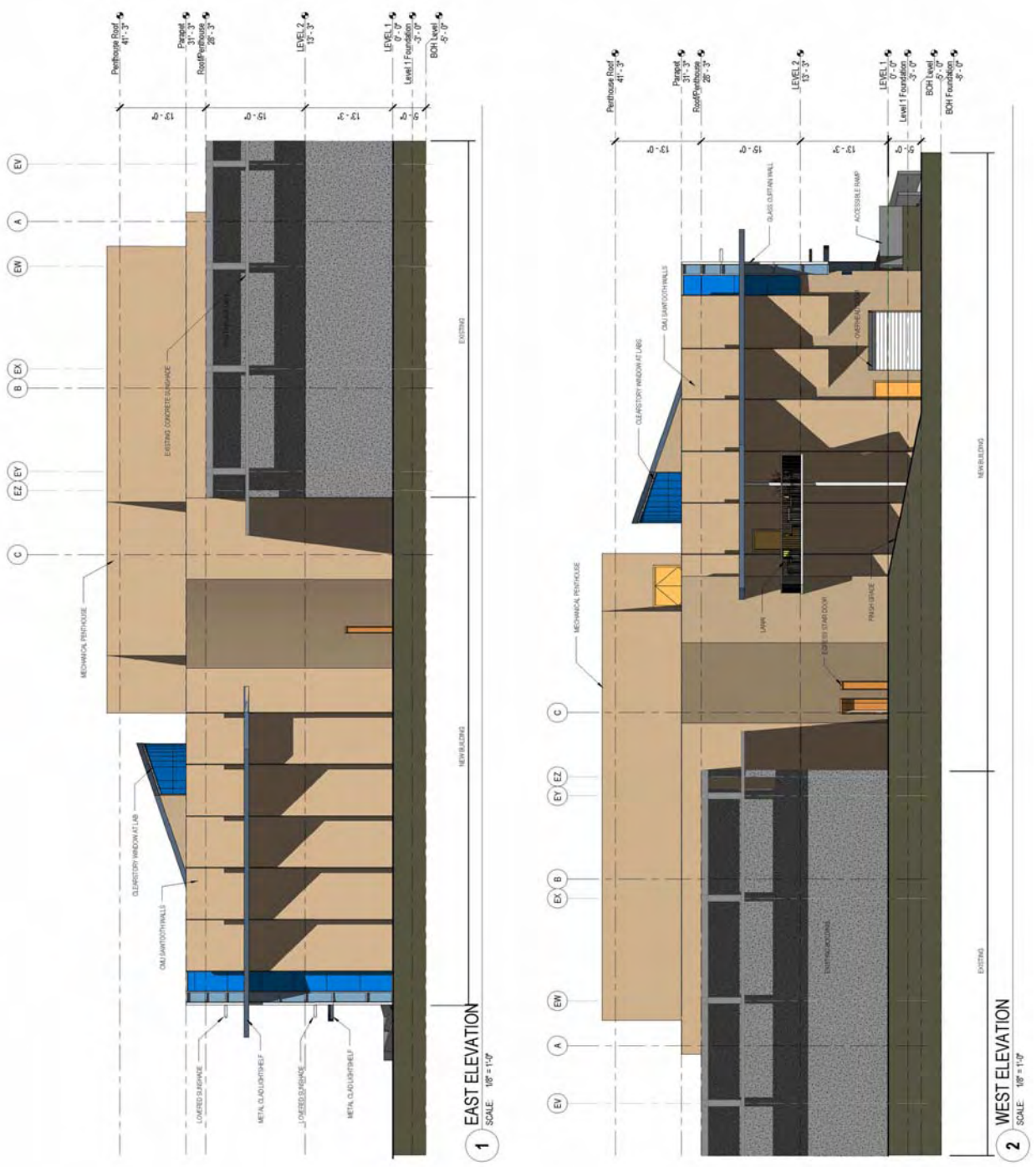


FIGURE 2-11 C-MORE Building Elevation Study – East and West Elevation View

Table 2-1 Proposed Space Program for the C-MORE Building

C-MORE Building Project Components	1st Floor (sf)	2nd Floor (sf)	Roof/ Penthouse (sf)	TOTAL (sf)
CLASSROOMS (Conference Center)	1,180			1,180
OFFICE AREAS	3,397	1,609		5,006
CONFERENCE ROOMS	404			404
LABS	1,410	7,494	472	9,376
LUNCHROOM		195		195
SERVICE AREAS	1,775	736	4,439	6,950
CIRCULATION	1,524	2,130		3,654
STAIRS/ELEVATOR	575	664		1,239
TOTAL	**10,265**	**12,828**	**4,911**	**28,004 sf**

2.3.1 Proposed Design Elements

This infill project will create a new gateway to the Biomedical Science Building and provide a signature identity for the C-MORE program. Proposed project design elements will meet the design criteria specified in Plan Book B (Upper Central Campus) of the UH LRDP (see Section 5.11.2 for further discussion). The proposed facility will be consistent with the existing building designed by Edward Durell Stone using building materials such as stone and/or precast concrete to match exiting building materials. The project will be only two-stories in height with a roof/penthouse area, respecting the existing building (*Figure 2-12*).

The south facade of the building is envisioned as a slightly curved glass wall to reflect the landscape of the welcoming plaza adding a more contemporary appearance. The glass will be made from high-performance glazing for energy efficiency and lowered heat gain. An abstracted design of a wave on the glass wall is a possible artistic element to reflect the marine-based research inside, also providing additional shading coerfficient to the glazing. The plaza will be welcoming and inviting as an outdoor space for living and learning, maintaining the existing pedestrian entry to the complex. New landscaping elements will blend with the existing landscape creating a sense of place and connection of the life science buildings to the rest of the Mānoa Campus.

2.3.1.1 Sustainable Design

The C-MORE Building project is intended to be a model for laboratory design having sustainable, energy efficient laboratory facilities. Sustainable building design considerations reflect the care and attention being taken by the Center and the University to be good stewards of the environment by reducing energy consumption, reducing water usage and run-off, and utilizing renewable energy technologies.

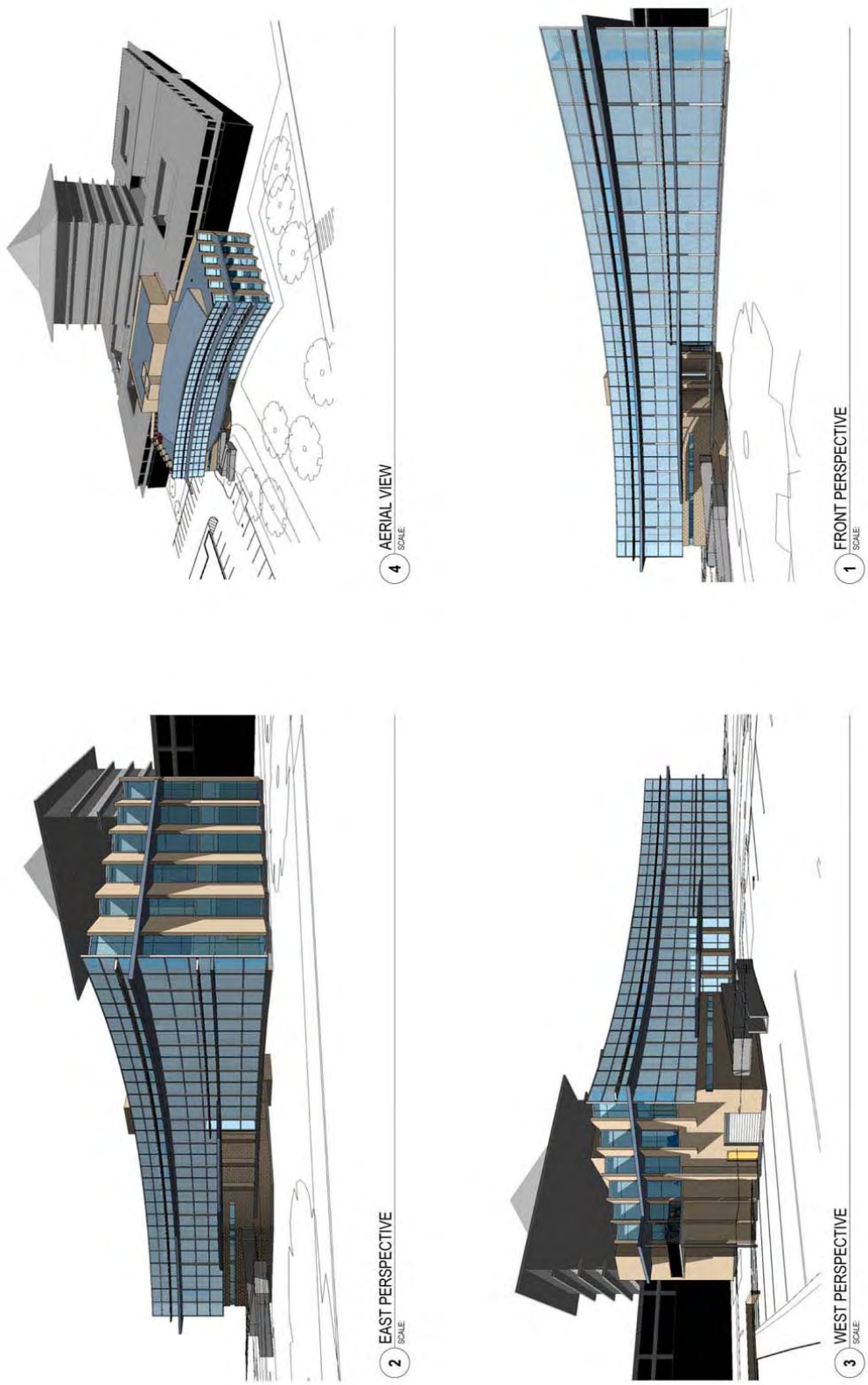


FIGURE 2-12 C-MORE Building 3-D Study View

Elements of the project design are intended to meet Laboratories for the 21st Century (Labs 21) guidelines, Leadership in Energy and Environmental Design (LEED), and other aspects of lab safety and flexibility. Labs 21 facilities represent an expanding growth opportunity for advanced and environmentally preferred building technologies that essentially improve the energy efficiency and environmental performance of facilities from a "whole building" perspective. LEED certification displays a building projects ability to meet some of the highest green building and performance measures. LEED is a nationally recognized certification program that demonstrates elements of a building as environmentally responsible and a healthy place to work and live.

The project incorporates green building design using energy saving features such as access to natural light, high efficiency lighting and solar/occupancy sensors in all offices and labs throughout the building. Additionally, photovoltaic panels and a green roof will be placed on the unused spaces of the roof/penthouse. The project is expected to achieve a minimum level of LEED Silver for the new C-MORE Building.

2.3.2 Utilities and Infrastructure

A Utilities Systems Report for the University of Hawai'i at Mānoa Long Range Development Plan (LRDP) which includes the C-MORE Building project was completed by Austin, Tsutsumi & Associates, Inc. and is provided as *Appendix B*. Overall existing conditions, impacts, and mitigation measures for utilities are discussed in *Section 3.0* of this document.

The existing Biomedical Science Building where the infill project will be located has water and electric services, sewer connections, and solid waste collection services. The following section describes the physical characteristics of these site utilities with the addition of the new facility.

Water
Existing potable water service is provided by the Board of Water Supply (BWS). The project will tap directly into the existing water main for their potable water demand. Several water meters connect Mānoa Campus to the BWS system. *Section 3.9.1* presents an analysis of the water supply for the project.

Wastewater
Wastewater collection, treatment, and disposal for the UHM campus, including the existing Biomedical Science Building, are serviced by the City and County of Honolulu. Sewer connections will be provided to the new C-MORE Building from the existing 8" sewer main along East-West Road. Although there are a few areas around the campus with potential for capacity problems as noted in *Appendix B*, none of these areas are specific to the Biomedical Building or the proposed project facility. Existing lines will be able to handle the waste generated on-site. *Section 3.9.2* presents a wastewater analysis for the project.

Drainage System
The City and County of Honolulu's drainage system on the UHM's campus handles most of the off-site drainage from portions of Mānoa and Mid-Pacific Institute (MPI). UHM's storm drain system connects to the City's drainage system located on University Avenue and Dole Street. There are two existing concrete interceptor ditches, one ditch runs long the property line just ma uka of Maile Way and the other of the ditch runs along the property line beginning near the

Biomedical Science Building and ending near the Agricultural Engineering Building. A portion of UHM's drainage system ties into the concrete ditch near the Biomedical Science Building.

Although the project site sits in a 500-year flood zone, in October 2004, there was a 25-year storm event that flooded a portion of the upper UHM Campus, including the Biomedical Science Building. According to the report, the flooding was caused by blockages in the upper Mānoa Stream portions and an inadequate capacity of the concrete ditch near the Biomedical Science Building. Drainage improvements near the Biomedical Science Building will take place in the near future. Improvements will be designed in accordance with the City and County's Rules Relating to Storm Drainage Standards (2000).

Solid Waste Disposal

Solid waste from the project site will be disposed of at an approved City and County of Honolulu refuse disposal site by either a private refuse collection company or UHM workers. The proposed C-MORE Building project will not generate a significant amount of additional solid waste. Recycling programs have been implemented on a building by building basis.

2.3.3 Construction Characteristics

The proposed project does not require that any of the surrounding buildings be demolished for the new project. The project site will require some vegetation clearing, grubbing, minor grading and excavation (cut and fill), general construction, and planning and landscaping.

Vegetation Clearing, Grubbing, and Grading

The site will be cleared, grubbed and graded to develop the new facility and landscaped areas. During the construction of C-MORE, sidewalks will be relocated and fifteen (15) parking stalls will be eliminated, requiring some removal of the existing asphalt. The project will require a planned relocation and removal of trees and shrubs as practical and as determined by the Facilities Management Office. The undeveloped portion of the site has eucalyptus and other canopy trees with turf grass groundcover as landscaping.

Excavations

The project site is generally level as the facility will be an infill to the south courtyard of the existing Biomedical Science Building. The area is currently used as concrete walkways, asphalt concrete parking lot, and landscaped areas. Modification to the topography will minimal consisting of fine adjustments to site grades to allow for the building, pathways, drainage, and landscaping features. Only minor excavation activity is anticipated.

General Construction

The general construction of the facility will include the formation and placement of concrete foundations, the installation of mechanical equipment and electrical wiring and equipment, general carpentry work, painting and many other trades and work associated with typical construction activities.

Planting and Landscaping

The C-MORE Building project will foster landscape design by offering a cultural overlay to the landscape. Tropical landscaping and native plant species will be used to as an educational tool

for the campus while enhancing the features of the project area. A preliminary landscaping design has been completed for the project; however, due to funding constraints, the applicant is unable to move forward on a landscape master plan. As funding is secured, additional details related to planting landscaping will be completed.

None of the existing trees surrounding the proposed project site are considered to be endangered or threatened. Where possible, trees will be preserved in place and included into the planned landscape design. Healthy trees that cannot stay in their current location will be transplanted and continue to serve as on-site landscaping on the Mānoa Campus. As the proposed project progresses and additional funding is secured, a landscape master plan will be provided.

2.3.4 Access, Parking, and Pathways

Road and pedestrian access already exist in this area of the campus. The ma uka portion of the East-West Road penetrates the Upper Central Campus and forms a loop around the Biomedical Science Building. The East-West Road is the main access roadway to the project site. Parking lots are located on the north, south and west sides of the building. The three parking lot areas are accessible through both the north and south entrances off of East-West Road. The south entrance, however, is the main access to the parking areas as the north access contains other facilities such as the UH Federal Credit Union, UH Thrift Store, and housing for campus workers. While the project will add additional developed area to the University campus and eliminate a few existing parking stalls, additional parking will not be required. This determination is due to the planned use of the new C-MORE Building which will be to relocate existing personnel on campus. Access and pathways to the existing Biomedical Science Building is off of East-West Road with pedestrian walkways located on all sides of the building.

The proposed site improvements would include a new concrete walkway connecting to existing walkways and leading to the entrance of the building. The walkway will extend through the new building and connect to the interior courtyard area of the existing Biomedical Building. Fifteen (15) existing parking stalls will be removed; however, nine (9) will be replaced, including two (2) new handicap accessible stalls, resulting in a net loss of six (6) stalls. A concrete walkway and handicap ramp will connect the parking area to the entrance walkway. In addition, there will be a pavement connection from the existing parking lot for vehicular access to the loading area of the new building.

Future plans for the circulation, parking, gateways, malls and pathways are detailed in the recent update to the LRDP. *Figure 2-13* shows the proposed system as it relates to future projects like the Biomedical Science Building. As part of plans to enhance accessibility, the Upper Central Campus has been designed to provide a continuous system that further opens the campus to vehicular pedestrian and traffic. Potential plans in the LRDP include a re-alignment of East-West Road, terminating the ma uka-ewa corner of the building so that the loop connection no longer divides the campus. A gateway is also planned for development at the end of the present Pāmoa Road and to the proposed East-West Road realignment. The Upper Central Campus Gateway will open up to the future Pāmoa Mall which will connect to McCarthy Mall and function as an entryway and increase connectivity for the Ma uka Campus.

Figure 2-13 University of Hawai'i, Mānoa, Gateways, Malls, Path and Pathways Circulation Plan

2.4 PROJECT COST AND SCHEDULE

Project construction would start in February 2009 or immediately after issuance of necessary permits and approvals. Scheduled duration for construction is anticipated to be 15 months. Estimated costs for the proposed building are approximately $21 million.

2.5 REQUIRED PERMITS AND APPROVALS

In addition to the acceptance of the Final EA/FONSI, a PRU amendment is needed for the project. The C-MORE project is included in the overall PRU for the 2007 LRDP Update. A PRU with the City and County of Honolulu serves as a guideline for new facilities on campus. Updates to the UH LRDP are required for PRU approval prior to the issuance of building permits. The C-MORE Building project is listed as an educational priority in the recent 2007 LRDP Update for the UHM Campus.

2.5.1 Other Permits Required for Construction

Several other approvals will be required from the County and State to implement the proposed action, some of which will include:

- Building Permits (Buildings, Electrical, Plumbing), and Sidewalk/Driveway Work (DPP)
- Grading, Grubbing, Trenching and Stockpiling Permits (DPP)
- National Pollutant Discharge Elimination System (NPDES) Permit – Construction Storm Water (State Department of Health)
- Sign Permits (DPP)

3.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

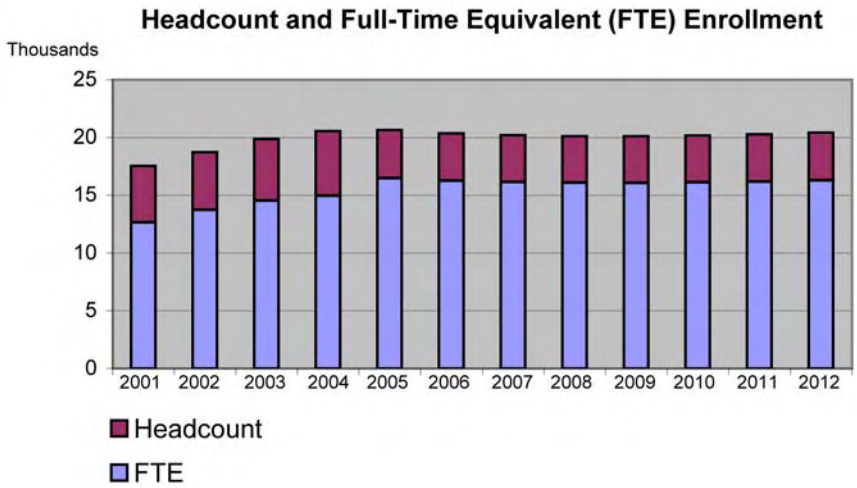
3.0 AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

3.1 UNIVERSITY OF HAWAI'I, MĀNOA CAMPUS ENROLLMENT

Existing Conditions – Enrollment at UHM was 20,644 students in the fall of 2007, and 18,818 in the spring 2008 semester. Enrollment is projected to remain relatively stable through 2012, as indicated by the University of Hawai'i's Institutional Research Office, 2007 (*Figure 3-1*).

Impacts – The projects detailed in the 2007 LRDP Update, which serves as guiding document for the C-MORE Building project, address current space and activity needs on campus. Anticipated enrollment does not affect the educational priorities of the LRDP. C-MORE Building project will not impact current enrollment given that students and personnel will be relocated from the existing spaces on campus. The opening of the new West O'ahu Campus is also anticipated to reduce the pressure on undergraduate enrollment, allowing the Mānoa Campus to focus on obtaining new opportunities in graduate research and education.

Mitigation - Graduate and research space needs will continue to fuel growth on the Mānoa Campus. New laboratories and office resources will be required to support evolving graduate work and research activities. No mitigation measures are necessary concerning enrollment since no significant increases or impacts are anticipated.



	2001*	2002*	2003*	2004*	2005*	2006	2007	2008	2009	2010	2011	2012
Headcount	17,532	18,706	19,863	20,549	20,644	20,350	20,186	20,109	20,102	20,158	20,268	20,424
FTE	12,624	13,720	14,517	14,925	16,452	16,243	16,126	16,070	16,057	16,088	16,160	16,264

* Actual

Source: Institutional Research Office, University of Hawai'i, February 2007

FIGURE 3-1: UH Mānoa Enrollment Projections

3.2 TOPOGRAPHY

Existing Conditions - In general, the UH Mānoa Campus is gently sloped ma uka to ma kai at about 5% between the Mauka and Upper Central Campus areas and the Central and Makai Campus areas. However, in some locations abutting Mānoa Stream, on the lower slopes of Wa'ahila Ridge, and descending into the Quarry, slopes are much steeper *(Figure 3-2).*

Impacts – The construction of the new C-MORE Building will not result in any significant changes to the area's existing topography on the UHM campus. Minor grading may occur to prepare and finish the sites.

Mitigation – Necessary permits for construction and grading will be obtained, and all conditions to minimize any anticipated impacts will be followed.

3.3 GEOLOGY AND SOILS

Existing Conditions - The Island of O'ahu is comprised of two major extinct volcanoes, Wai'anae and Ko'olau Volcano. The UH Mānoa Campus is located at the mouth of Mānoa Valley situated on the southeastern slopes of the extinct Ko'olau Volcano. The valley was a result of a rejuvenated stage of eruptions, known as the Honolulu Volcanic Series, over 100,000 years ago.

During the Honolulu Series eruption period, many of the vents erupted through a coral reef that surrounded the island on the south side. The cinder cones of Mount Tantalus, Punchbowl (Puowaina), and Rocky Hill at Punahou were formed during this period. The other flows that erupted inland were funneled down valleys, such as Mānoa, thereby creating flatter valley floors and bluffs. The flows and ashes of the Honolulu Volcano series have high contents of sodium and potassium and low contents of silica.

Soil types in the project area have been identified by the U.S. Department of Agriculture's 1972 Soil Conservation Service Soil Survey. As shown by *Figure 3-3*, the soil type in the project area is Makiki Stony Clay Loam (M1A), which is characterized by stony soils.

Impacts – The C-MORE Building project will not result in any significant change to the existing soil conditions within the project area. As noted above, since minor grading may occur to prepare and finish the sites; all necessary permits will be obtained and all conditions will be followed.

Mitigation – Strict adherence to Best Management Practices for construction and grading and erosion control measures will implemented to minimize the potential impact of silt runoff from construction areas during a major storm.

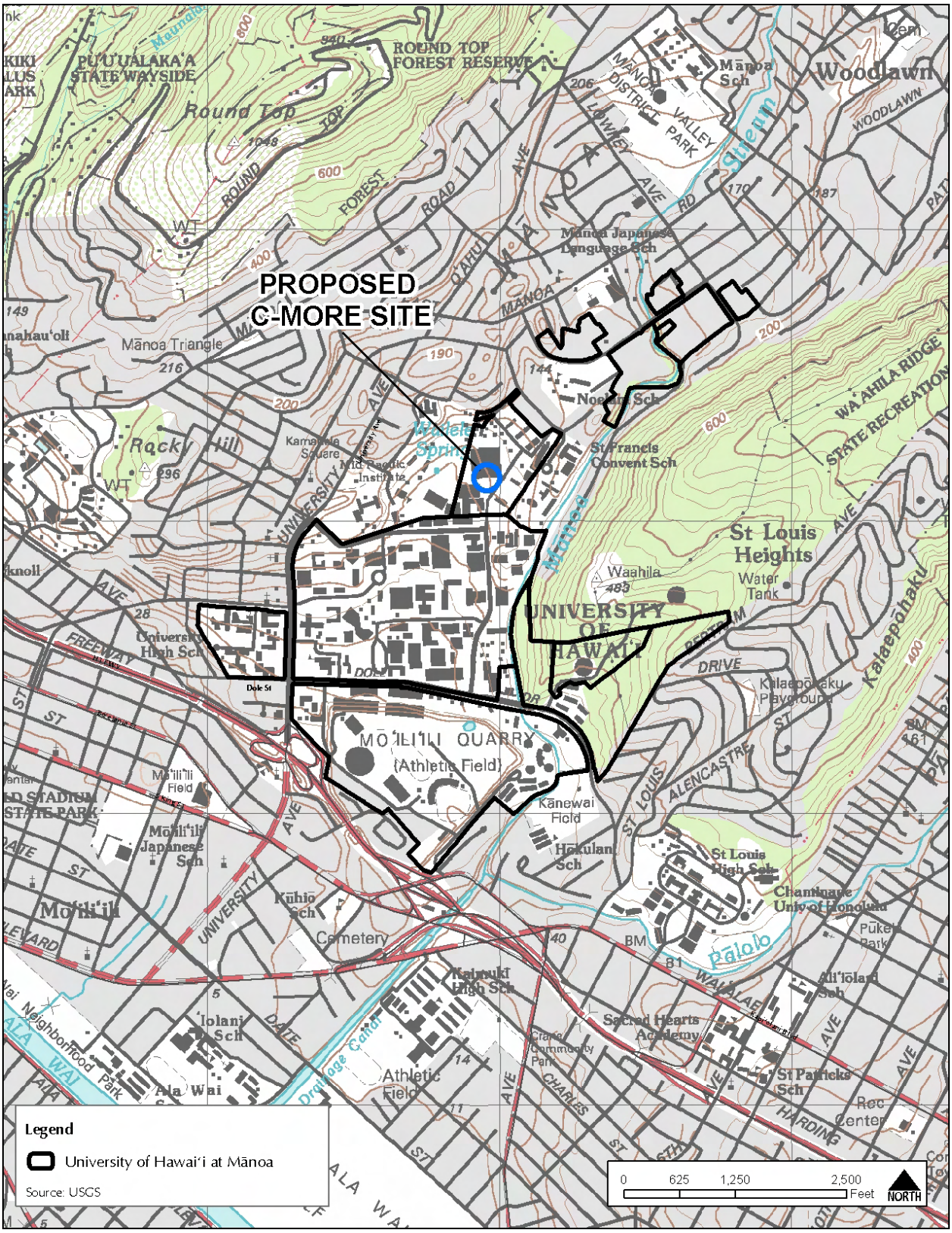


FIGURE 3-2: USGS Topography Map

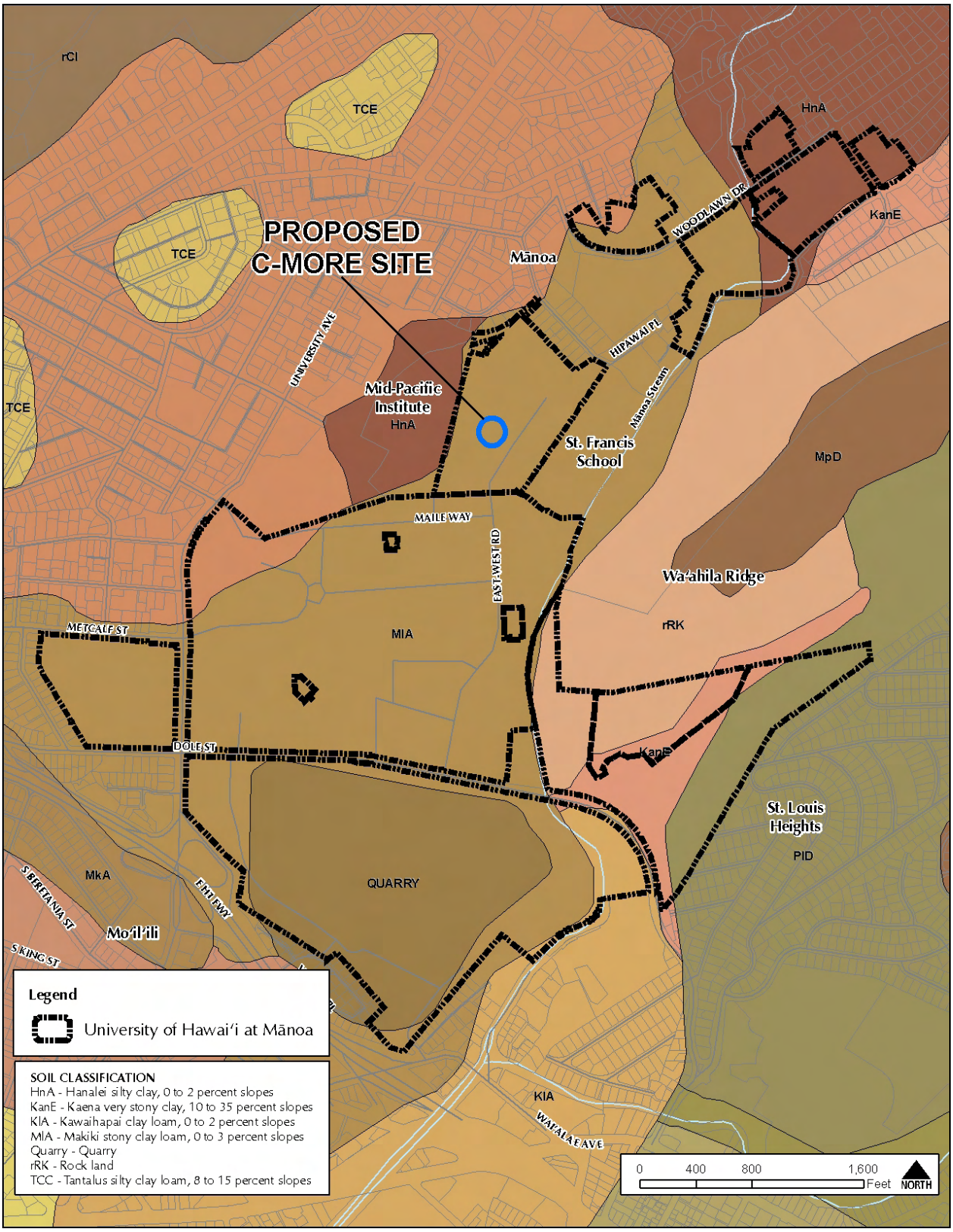


FIGURE 3-3: Soil Classifications

3.4 CLIMATE AND RAINFALL

Existing Conditions - The UHM Campus is located in the middle and lower regions of Mānoa Valley on Oʻahu. Nestled within the flanks of the Koʻolau Mountains, Mānoa Valley is exposed to lower temperatures than the downtown area of Honolulu. Average daily minimum and maximum temperatures typically range from the low 60s (degree Fahrenheit) to the low 90s, depending on the time of the day and the season. Daily temperatures vary by about 7 degrees between winter and summer seasons, and 15 to 20 degrees between day and night.

Northeasterly trade winds prevail much of the time throughout the island of O'ahu. These trade winds vary in frequency. Often times they last for weeks on end. Other times they are virtually absent. This is the general result of the location of the North Pacific high pressure system. During the spring and summer months, this system is larger, stronger and shifts farther to the north and produces more persistent trade winds. In the fall and winter months, this high pressure system degrades and shifts to the southeast, at which time the general wind patterns become weaker and more variable. Typical wind velocities range between 8 and 15 miles per hour.

Rainfall in Mānoa Valley varies considerably between the upper and lower areas; therefore the upper-most and lower-most districts of the UHM Campus receive different amounts of rainfall. On average, annual precipitation values of approximately 30 inches can be expected, with most rainfall occurring in conjunction with discrete winter storms between December and April. However, during the spring and summer months, moisture-laden trade winds regularly produce passing showers that contribute significantly to the annual rainfall total.

Impacts - The project is not anticipated to have a significant adverse impact on climate conditions.

Mitigation – The new C-MORE Building will incorporate measures to reduce impacts to global climate change. Techniques such as the use of photovoltaic panels and natural day lighting will be included in addition to a green roof, contributing to UHM becoming an "urban park" and reducing the heat island effect. To reduce the impacts of rainfall, the project will consider the use of materials and techniques, such as green roofs, that support on-site rainwater collection and re-use for landscaping on the project site.

3.5 FLOOD AND NATURAL HAZARDS

Existing Conditions – The project site lies within the 500 year flood zone designated as Zone X in the National Flood Insurance Rate Map (FIRM) dated September 30, 2004, as shown in *Figure 3-4*. While the project site lies in an area that is highly unlikely to experience a flood, in October 2004, there was a 25-year storm event that flooded a portion of the upper UHM Campus, including the Biomedical Science Building. According to the U.S. Army Corps of Engineers "Hydrology and Hydraulics Study, Flood of October 30, 2004, Mānoa Stream" dated November 15, 2006, the flooding was caused by blockages in Mānoa Stream and an inadequate channel capacity between Kahaloa Drive and Woodlawn Drive.

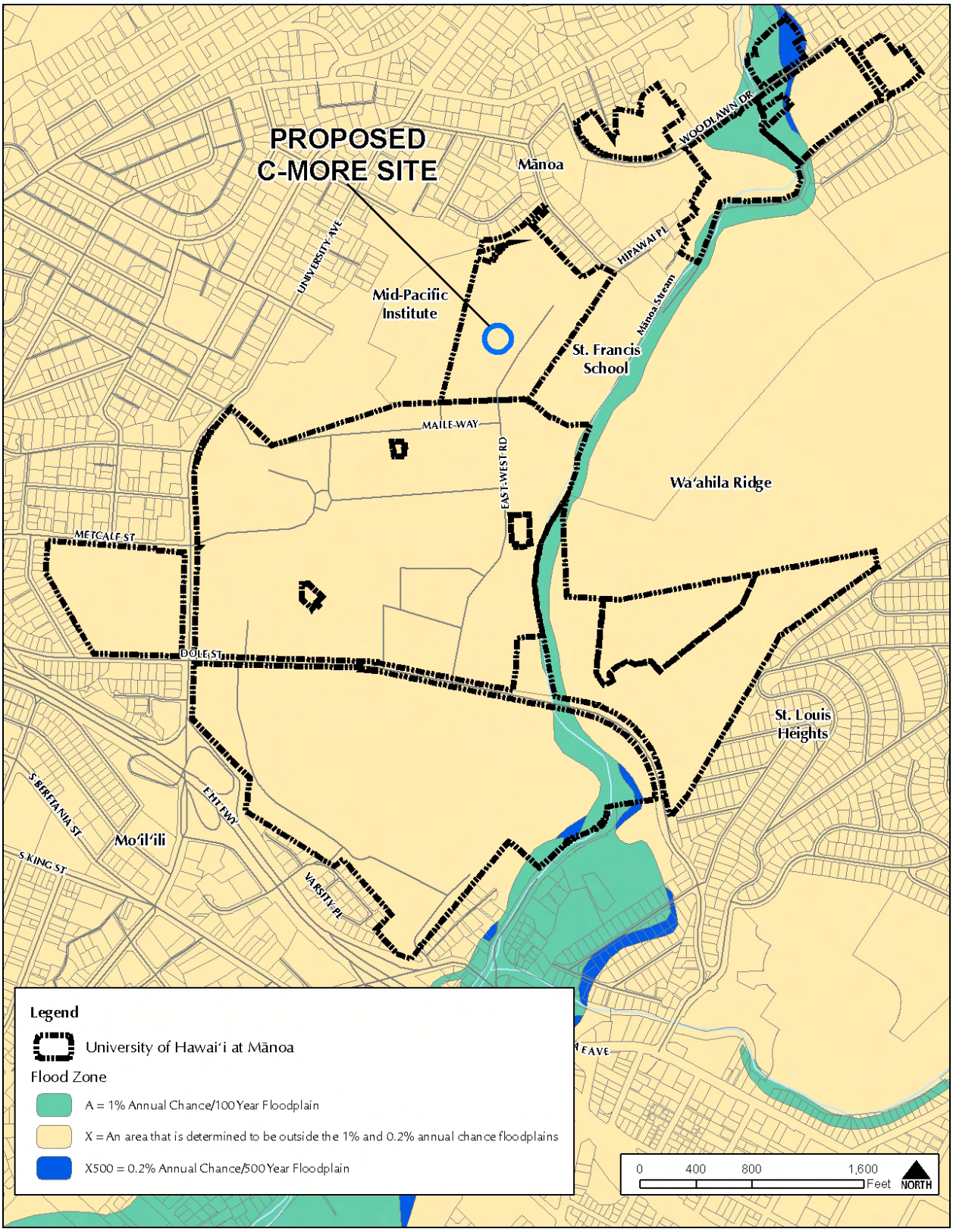


Figure 3-4 Flood Insurance Rate Map

Hurricanes are tropical storms that attain a minimum speed of 74 mph. The general season for hurricanes is between the months of June to December. The movement pattern of these systems can be erratic and unpredictable. The major hazards posed by a hurricane include violent winds, torrential rainfall, flooding, storm surge, and high surf.

The majority of earthquakes in Hawai'i are directly related to volcanic activity on the Island of Hawai'i. The entire City and County of Honolulu lies in a seismic zone designated as 2A. Under the International Building Code (IBC) seismic provisions, a Zone 2A area could experience seismic activity between .075 and .10 of the earth's gravitational acceleration (g-force).

Impacts – In general, tsunami and earthquakes impose no major constraints on the project. Floods are also unlikely to impact the project based upon the location of the project area within the 500 year flood zone. However, due to past experiences, we are aware that flooding of the area is possible if appropriate measures to the drainage facilities are not carried out to protect the Biomedical Science Building. The impacts of natural hazards such as earthquakes, high winds and hurricanes are addressed in the design and construction of the campus' facilities, all of which are in compliance with relevant building codes in force at the time of design and construction.

Mitigation – Risk from earthquakes, hurricanes, and floods will be mitigated through continued adherence to local building codes during design and construction. The University has adopted a System-wide Emergency Operations Plan to be implemented whenever a disaster strikes; the UH Civil Defense Coordinator is responsible for the implementation of this Plan. Additionally, with the Mānoa Watershed Project, the U.S. Natural Resources Conservation Service (NRCS) is investigating flood mitigation and stream restoration issues. The University will help to develop and review recommendations and to monitor implementation, and assist with coordinating improvements that would affect the UHM Campus and specifically the Biomedical Science Building.

Several floodwalls on the northern and eastern sides of the Biomedical Science Building are also being designed for the project to mitigate against potential floods. A concrete channel will be installed adjacent to the northern wall to direct the water flow to the existing concrete inceptor ditch on the Mid-Pacific Institute (MPI)/UH property line. This improvement will increase the capacity of this ditch ~~is more adequate~~ to serve the project until a drainage master plan and future improvements of the area are carried out.

3.6 AIR QUALITY

Existing Conditions - Consistent trade winds regularly blow from a northeasterly direction, creating conditions for excellent air quality over the islands because the prevalent wind directions moves generated air pollutants on land to the southwest out to the open ocean. Present air quality in the Mānoa Campus area is mostly affected by motor vehicles, with carbon monoxide being the most abundant of the pollutants emitted. Exhaust from laboratories, mechanical rooms, etc., are isolated and dispersed through systems that meet air quality standards.

Impacts – There will be two types of short-term air quality impacts that will result from the proposed construction project: 1) fugitive dust generation and 2) on-site/off-site emissions from moving construction equipment and commuting construction workers.

Mitigation – Air quality monitoring can be implemented if needed by the University, County or State to ensure compliance with State Ambient Air Quality Standards. Strict compliance with State and County pollution control requirements, such as dust-watering programs and covering dirt-hauling trucks will mitigate fugitive dust from construction activities. On- and off-site emissions from construction equipment and workers can be controlled, as appropriate, by the use of proper equipment and restricting working hours.

3.7 NOISE

Existing Conditions - The ambient noise levels around the Mānoa Campus and Biomedical Science Building are typically consistent with noise levels found in urbanized residential areas. A 1989 Noise Impact Study (Y. Ebisu & Associates, 1989) discussed existing and anticipated noise issues on the Mānoa Campus and found ambient noise levels did not exceed guidelines set by the Department of Health.

Impacts – The proposed C-MORE facility is not likely to result in an increase in ambient noise levels on the UHM Campus. However, significant amounts of noise will be generated during the construction period.

Mitigation – No extraordinary mitigation measures are proposed at this time since the noise generated by current and proposed activities is not expected to exceed allowable levels. Construction activities will be monitored by the University and State to comply with the provisions of the regulations for community noise control. The contractor will be required to obtain a noise permit if the noise levels from construction activities are expected to exceed the allowable levels. Heavy vehicles traveling to and from project sites will comply with the State's administrative rules for vehicular noise control.

3.8 FLORA AND FAUNA

Existing Conditions - The vegetation on the Mānoa Campus is almost entirely urban in character. There are, however, many endangered or threatened trees located around the campus. None of the existing trees surrounding the proposed project site are considered to be "significant" or endangered. Some of the existing trees include bamboo (*Phyllostachys Sulphurea*), hibiscus (*Hibiscus spp.),* eucalyptus (*Eucalyptus spp.),* allspice (*Pimenta dioica),* and a Lunalilo Yellow shower (*Cassia x nealiae*) tree. The shower tree is a designated University Memorial Tree, The existing landscape functions as a unifying element to the life science buildings and others areas around the campus.

The urban character of the campus does not provide~~s~~ ~~poor~~ a good habitat for wildlife. The predominant fauna are introduced species, including rats, mice and feral cats. Typical avifauna includes Common Indian Mynah, doves and sparrows. No rare, threatened or endangered species are known to exist on the project grounds.

Impacts – The construction of the C-MORE building will require a selected removal of approximately 17 trees, none of which are identified as endangered or threatened (*Figure 3-5*). One of the trees identified for removal and possible relocation is the Lunalilo Yellow shower tree. Although this tree was identified in 2004 on the UH-Mānoa Landscape Advisory Committee's

listing of memorial and exceptional trees, there was no specific information or plaque marker provided as to the associated memorial and year planted. Further, the only information that was highlighted as a question in the listing was the statement of whether this tree was planted by someone identified as "Mrs. Simone." Although unconfirmed, the identification of "Mrs. Simone" is possiblly in reference to Mrs. Carolie Simone, wife of Albert Simone, former UH-Manoa President in the late 1980s.

Mitigation – Coordination between the Facilities Management Office and University landscape architects will be required to determine the appropriate method and means for the selected removal and where feasible, siting possible relocation areas on-campus. Efforts will be made to preserve and protect mature trees in the surrounding area during construction. Specific mitigation measures for tree preservation during construction include:

- Existing trees should be monitoring weekly and irrigated as needed during construction.
- The root zone of all trees must be protected. The root zone is defined as five times the trunk diameter distance from the base of the trunk, or from the trunk to the tree dripline, whichever is greater.
- All trees to remain should have protective chain link or construction fencing on a secure footing placed 10' beyond the tree dripline wherever possible.
- A tree protection drawing should be submitted with project plans. The drawing should detail the protective fencing and identify the existing trees to remain, trees to be removed, and trees to be relocated, including species, trunk diameter and canopy diameter.
- A construction staging area should be specified. Construction materials/equipment/ personal vehicles should not be placed near the root zone of trees to avoid soil compaction. Additionally, construction debris and liquid materials should not be dumped around the root zones of existing trees and shrubs.
- No lime or other soil treatment should be applied without the consent of a University of Hawaii Landscape Manager.
- There should be no grade change within a minimum of ten feet of the trunk of the existing trees, and preferably none within the entire root zone.
- When trenching, roots larger than 2 inches in diameter should not be severed without first consulting a University Landscape Manager.
- Trenching under roots is preferable to root cutting. However, if cutting is necessary, roots should be cut cleanly and not torn.
- Trenching within a tree's root zone should be avoided. However, if it is necessary, hand digging should be used within the tree's root zone.

One of the key elements of the 2007 LRDP Update is the development of a Landscape Master Plan that provides guidelines for knitting together the campus into a unified whole. Accordingly, the vision of the Mānoa Campus is that of a tropical interpretive garden, which in addition to being educational:

- supports a Hawaiian sense of place, including views of the mountains as well as botanic and cultural native plants,
- provides a visually attractive, comfortable and functional environment for people walking and driving through the campus,

- includes a great collection of plants that utilizes the good soil and range of micro-climatic conditions at Mānoa, and
- makes a substantial contribution to environmental sustainability concerns, such as improving storm water management, reducing water demand and heat island effects, avoiding invasive species and utilizing integrated pest management techniques.

To implement this vision, the Landscape Master Plan establishes a variety of important principles, organizing the existing campus into a range of landscape "use" zones, and recommends a number of design guidelines. Through the development of a Landscape Master Plan, project designs like the landscaped plaza entryway and green roof planned for the new C-MORE Building will enhance the overall landscape and help to support the University's desire for an integrated and fluid landscape.

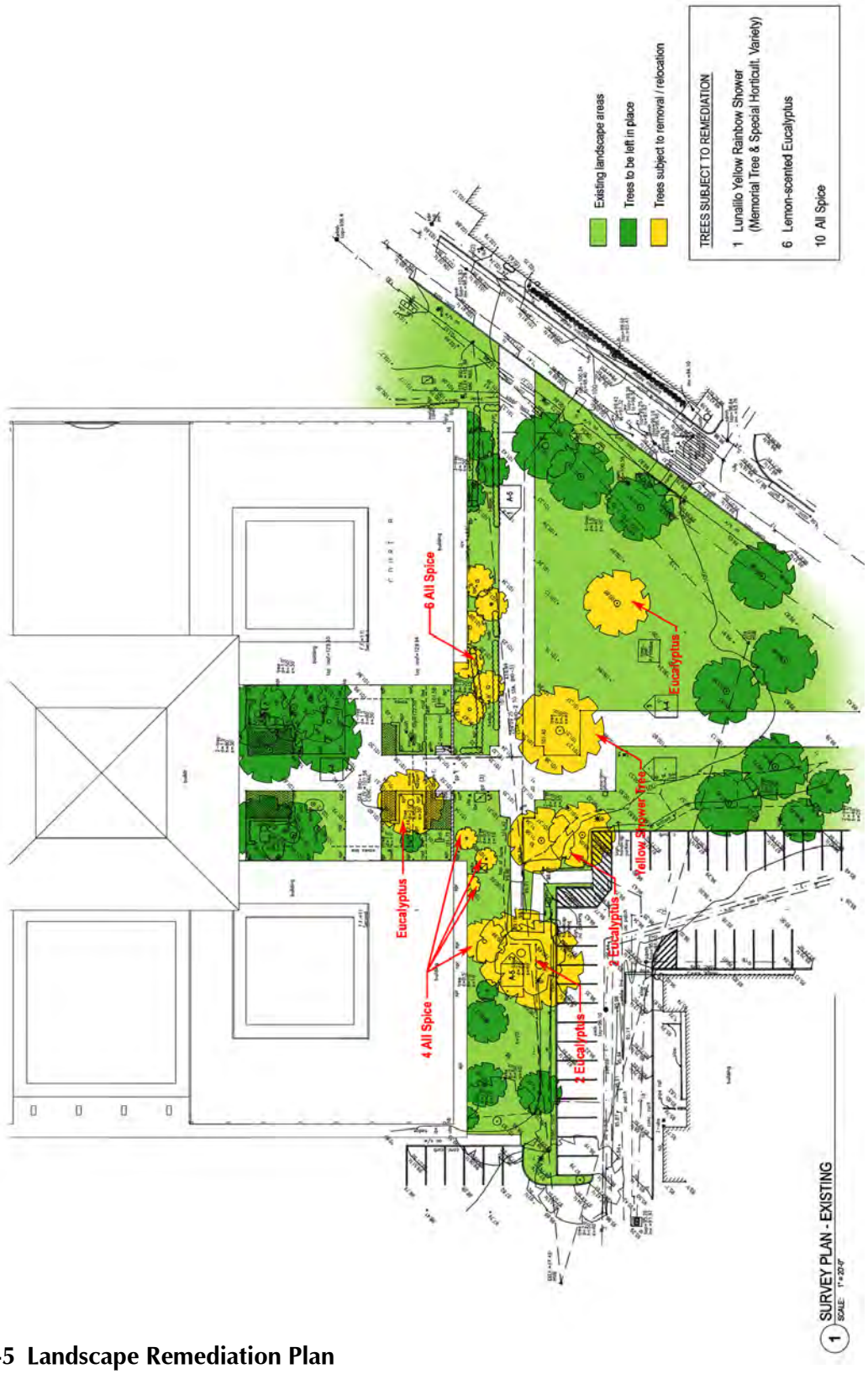


FIGURE 3-5 Landscape Remediation Plan

3.9 UTILITIES AND INFRASTRUCTURE

The following paragraphs discuss three important infrastructure systems, namely the drainage system, the wastewater system and the potable water system. A Utilities Systems Report (October 2007) was prepared by Austin, Tsutsumi & Associates, Inc. for the UH LRDP 2007 Update and is included in *Appendix B*.

3.9.1 Potable Water System

Existing Conditions – The UHM Campus is served by the City's Board of Water Supply (BWS) system. There are several water meters on campus that connect to the BWS system. The two main meters on the Central Campus are located near Burns Hall on Dole Street and just north of Kennedy Theatre on East-West Road. The existing water system for the Biomedical Science Building is connected to the master water meter near Kennedy Theatre. Existing water lines serving the project area can be seen in *Figure 3-6* and include:

- 6-inch lateral feeding from a 12-inch main in East-West Road.
- 2-inch lateral off of the 6-inch line, serving Pope Lab, southwest of the new building.
- 12-inch chilled water feed and return lines which run into the courtyard of the existing Biomedical Building.

Impacts – Average water demand based on a per capita of 336 persons is estimated to be 42 gallons per minute (gpm) with peak water demand estimated at 30,240 gpm. Although C-MORE will increase the overall water demand for UHM, there is adequate capacity and pressure in the existing BWS system to serve the project requirements.

Fire sprinkler connection and other fire protection requirements will be provided for emergency fire suppression. The required fire flow for a facility such as C-MORE is 2,000 gpm. The fire sprinkler system water demand for C-MORE will be approximately 700 gpm including hose stream allowance. This is based on the demand for Ordinary Hazard Group 2 occupancy (e.g. Mechanical Penthouse or Laboratory space) as defined in National Fire Protection Association 13 "Standard for the Installation of Sprinkler Systems". Additionally, a fire hydrant flow test was conducted in June 2008 to determine the available water supply. The results of the test showed static pressure at 111 pound per square inch (psi), residual pressure at 20 psi, yielding a projected flow at residual pressure at 3,800 gpm. The available water supply should be adequate to supply the anticipated fire sprinkler demands. A fire pump is not planned for the design.

Finally, water conservation efforts will be made by C-MORE and the entire UHM campus to meet sustainability goals and principles.

Mitigation – Necessary Improvements to support the increased demand of the proposed project include rerouting the existing water lines and laterals under the new building. The existing 6-inch lateral will be rerouted around the front of the new building and will connect into the building's water supply system from the west side. This line will serve both the domestic water system (as a 2-inch line) and the fire protection system (as a 6-inch line). Water structures such gate valves and boxes will be relocated to accommodate the new building. A 6-inch fire department connection will also run from the building to a connection standpipe near East-West Road.

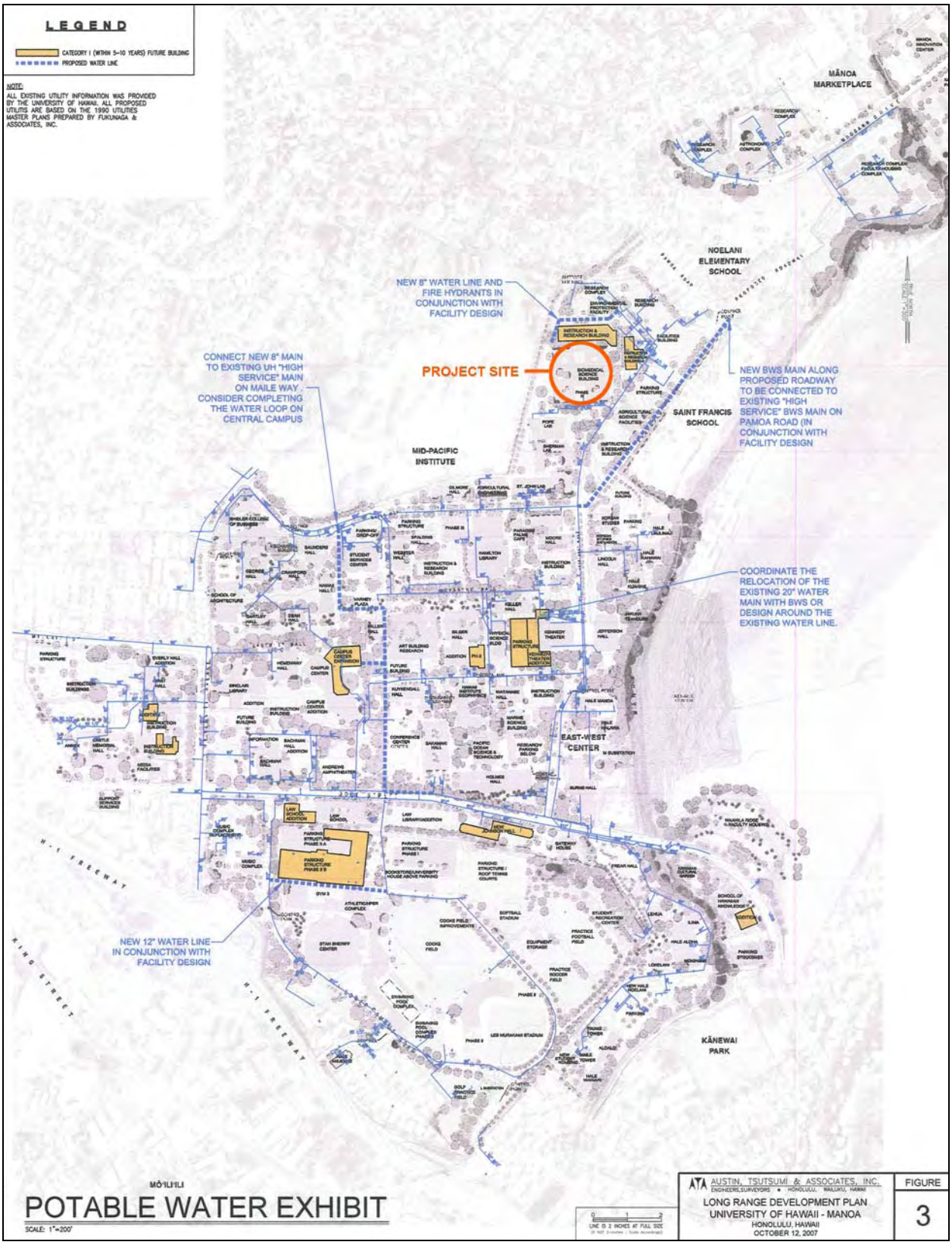


FIGURE 3-6 Potable Water Exhibit

A new 6-inch line will tap into this same 6-inch lateral and tie into the existing 6-inch supply lateral in the Biomedical Building courtyard, running down the new walkway corridor within the new building. A new 2-inch lateral will tap into the 6-inch lateral on the west side of the building and will reconnect to the existing 2-inch serving Pope Lab. The two (2) chilled water lines will also be rerouted through the new walkway corridor, tying into the existing feeds of the building's system within the courtyard area.

The project will provide a water supply approved by the county, capable of supplying the required fire flow for fire protection. On-site fire hydrants and mains capable of supplying the required fire flow will also be provided.

Campus wide improvements will be constructed in the next 5 to 10 years to improve overall water service to UHM. Additionally, a Water Management Plan will be developed to analyze the campus' existing water system and identify mitigation measures to reduce water use. Details of the Water Management Plan are discussed further in Section C of the Utility Systems Report located in *Appendix B*. Since 2002, the guiding principle of the University of Hawai'i has been "sustainability." The goal of the university is to reduce water consumption by 10% annually through water conservation measures that meet LEED and Lab 21 requirements, which will be further incorporated into development plans for the new C-MORE Building and other projects around the Mānoa Campus.

3.9.2 Wastewater System

Existing Conditions – The UHM Campus wastewater is disposed through the City's wastewater system that runs through the campus. According to UHM Facilities Management, the existing sewer lines owned and maintained by UHM have no known problems and should be able to handle the additional demand added by the new building. A new 6-inch lateral will run from the west side of the entrance to the new building and will run to an existing manhole in East-West Road. The lateral runs from this point to the existing 8-inch main in East-West Road.

Impacts – Anticipated wastewater generation based on a per capita of 336 persons is estimated to be 8,400 gallons per day (gpd). Pursuant to discussions with the City's Department of Environmental Services Wastewater Management Branch (WMB), only the dual sewer lines ma uka of the Agricultural Engineering Building has potential capacity problems that could affect the UHM Campus (*Figure 3-7*). These lines, owned by the City, serve the Mānoa area and the UHM Campus. The WMB will not be able to determine specific restrictions until they can assess future flows from UH and other upstream users.

Mitigation - Improvements to mitigate the increased demand include a new 6-inch lateral from the west side of the entrance to the new building and will running to an existing manhole in East-West Road. The existing 6-inch lateral that serves the Biomedical Building will be rerouted internally, and will reconnect to the existing 6-inch sewer lateral. UHM will work with WMB to discuss specific future building connections and a formal request to the WMD will be initiated by UHM. The Sewer Master Plan should evaluate whether future buildings in this area can be connected to the existing sewer line on East-West Road or any other location to provide relief for the City's dual sewer lines.

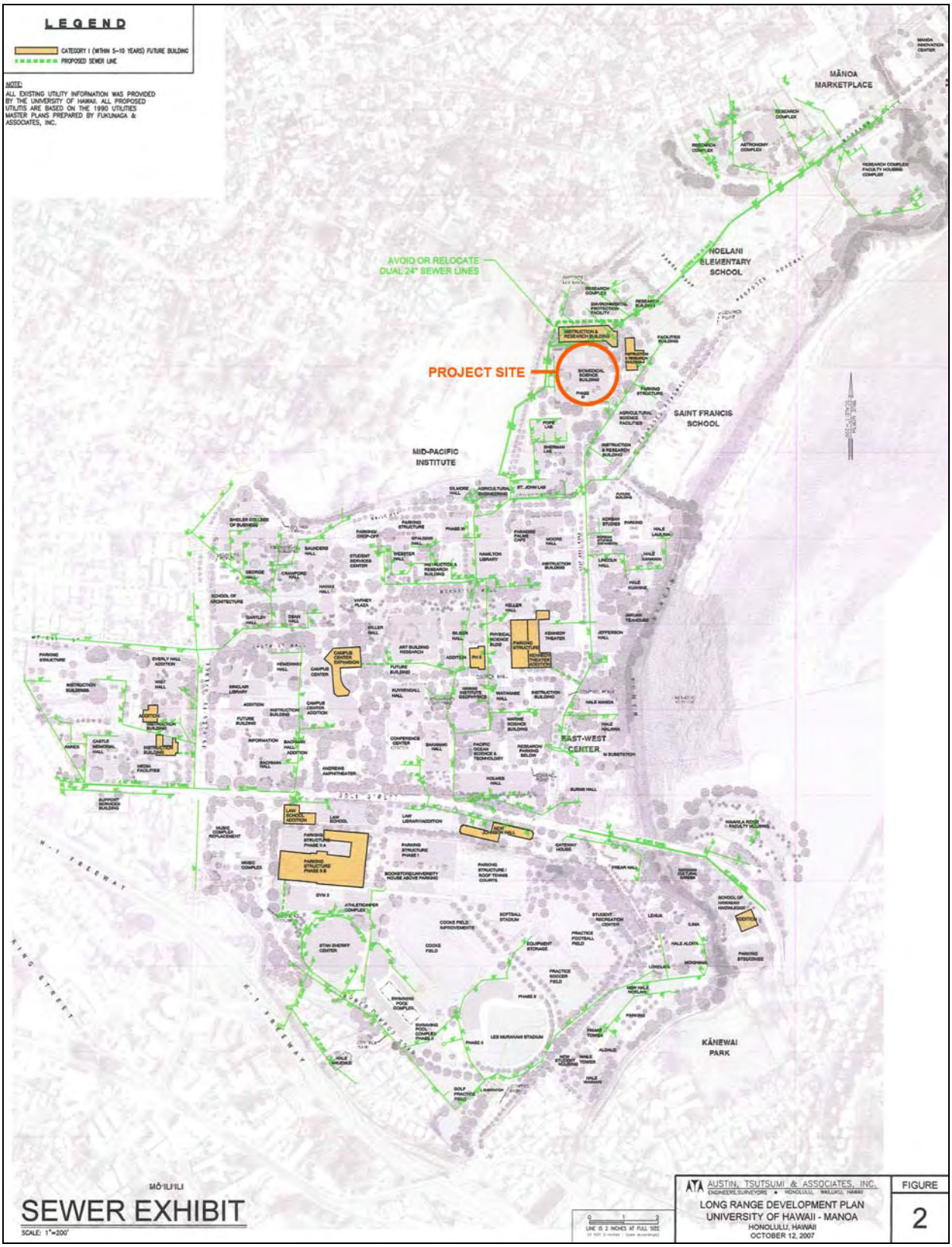


FIGURE 3-7 Wastewater Exhibit

Current plans are to provide sewer service for the Biomedical Science Building from the existing 8 inch sewer main along East-West Road. The sewer lateral stemming from the main to the new building will be 6 inches. Prior to finalization of development plans, WMB will be contacted on a project-by-project basis to ensure that the sewer system has available capacity to handle the planned campus improvement. If capacity is unavailable other system wide mitigation options will be evaluated. Elements of the project design intended to meet Labs 21 and LEED guidelines, such as low flow toilets and water use fixtures, will also help to mitigate additional wastewater generation.

3.9.3 Drainage System

Existing Conditions – The UHM Campus is part of the Mānoa watershed. A large amount of off-site drainage from portions of Mānoa Valley and MPI is conveyed through the City's drainage system through and around the UHM Campus. As depicted in *Figure 3-8*, UHM's storm drain system connects to the City's drainage system on University Avenue and Dole Street.

There are two concrete interceptor ditches outside of and along the University's common boundary with the MPI that converge just above the Agricultural Engineering Building. One of these ditches runs along the UHM property line just ma uka of Maile Way, while the other runs along the property line beginning near the Biomedical Science Building and ending near the Agricultural Engineering Building. A portion of UHM's drainage system ties into the ditch near the Biomedical Building. The capacity of this ditch is questionable, as it was overwhelmed in the October 2004 flood.

An existing 4-inch downspout drain, which is uncharted, runs from the courtyard area to an existing 18-inch drainline in the adjacent parking lot. The area west of the existing concrete walkway generally sheetflows towards the parking lot. The area east of the walkway sheetflows towards East-West Road. The peak runoff for existing conditions is estimated at 2.35 cubic feet per second (cfs) for the 10-year, 1-hour rainfall.

Impacts– The new C-MORE Building project is not anticipated to have significant long-term impacts on campus drainage. The majority of the new building will be in an area that is already paved; however new building area will result in more impervious area; therefore, the peak runoff rate for proposed conditions increases to 3.46 cfs, for the 10-year, 1-hour rainfall. Building slabs and paved areas will be set close to existing grades to minimize excavation and embankment, thus retaining the campus' existing drainage patterns. Proposed mitigation measures for the project and overall UHM Campus detailed below will help to prevent future flooding and impacts to the existing drainage system.

Mitigation - The Mānoa Watershed Project is investigating flood mitigation and stream restoration issues related to the October 2004 flooding. The University's involvement with this project to develop and review recommendations and to monitor implementation will help to coordinate improvements that may affect the UHM Campus.

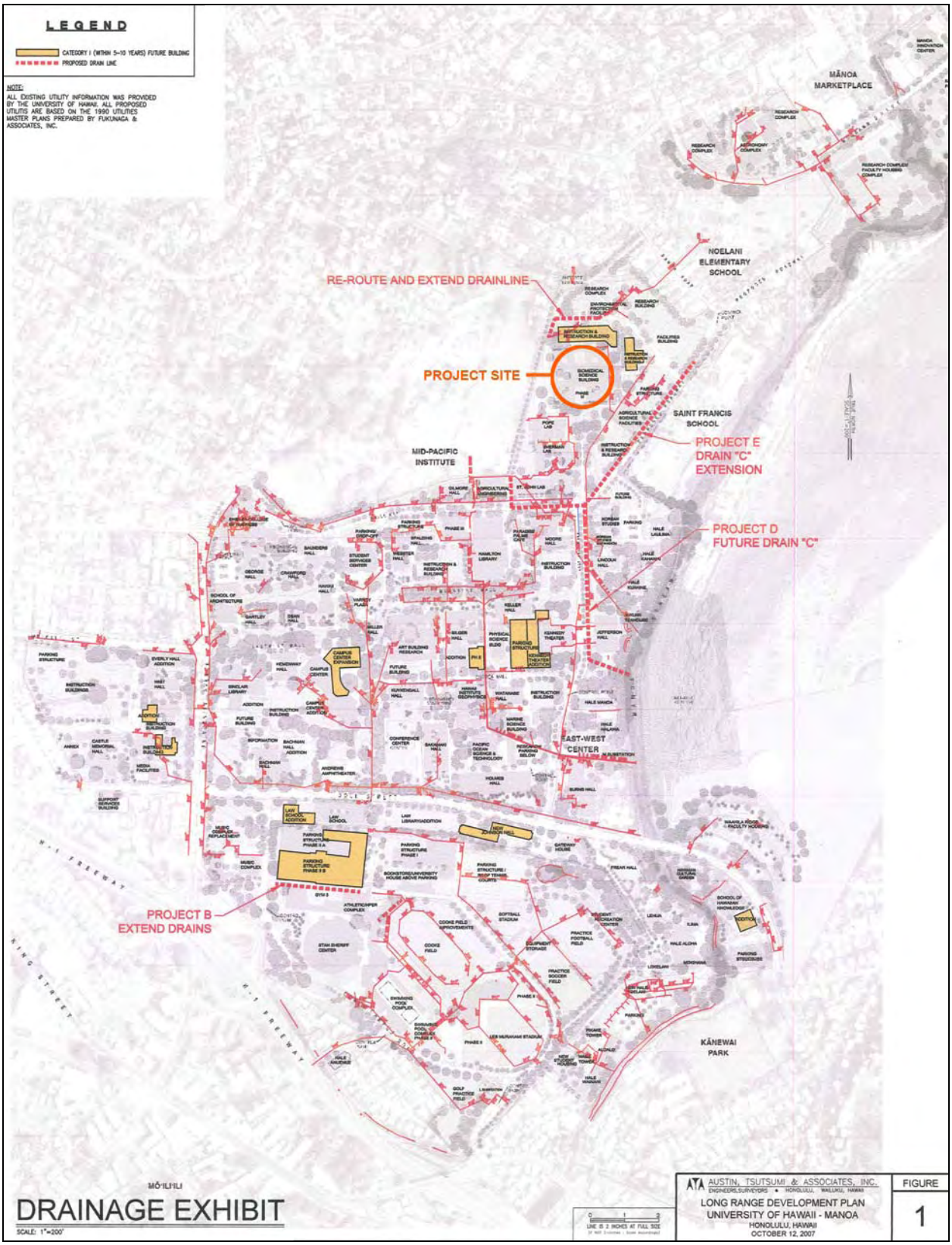


FIGURE 3-8 Drainage Exhibit

There are two major drainage improvements in the Central Campus that will be constructed in the near future to help protect UHM from future flood damage as sustained in the October 2004 event. One of those improvements is located at the Hamilton Library and the other is at the Biomedical Science Building, where the new C-MORE Building will be located.

The new drainage system will consist of a 12-inch drainline connection to the building's interior collection system. The existing 4-inch drainline from the courtyard will also tie into this system. To mitigate the increase in runoff and to improve the stormwater runoff quality, a new storm chamber detention system will be constructed fronting the southeast side of the building, with a capacity of 1,500 cubic feet. The overflow line from this system will tie into the existing 24-inch drainline in East-West Road.

To prevent future flooding of the existing Biomedical Science Building, several floodwalls on the northern and eastern sides of the building are being designed. A concrete channel is also being considered adjacent to the northern wall to direct the flow to the existing ditch along the property boundary with MPI. This flood-response project has direct connections with other planned LRDP mitigation projects, such as the three drainlines that need to be designed and constructed as part of the LRDP building and roadway improvements.

Other mitigation measures for the project are included in the building design and will help to offset the lack of capacity for the existing drainage system. The first floor of the new building will be designed to convey water out to the adjacent grassed areas via swale, piped system or equivalent to avoid flooding of the access way. Additionally, any roof water that is produced will outlet, surface-drain and infiltrate into the neighboring landscaped areas fronting the new building. Site erosion control measures and Best Management Practices will be implemented to reduce pollution from construction activities prior to entering the City's drainage system. Other permanent mitigation measures, such as vegetated roofs, porous paving and stormwater separators with media filters may also be used to reduce the amount of runoff and to improve stormwater quality.

A new Drainage Master Plan will be considered in the full scale master planning for the campus scheduled for commencement in 2009, in conjunction with the Mānoa Watershed Project and the City's future drainage improvements, since off-site improvements from these projects can greatly affect UHM's drainage infrastructure.

3.10 HAZARDOUS WASTE

Hazardous waste is defined as having a chemical composition or containing other properties that make it capable of causing illness, death, or some other harm to humans and other life forms when mismanaged or released into the environment (EPA, 2005).

Hazardous waste management for the University, including the existing C-MORE program, is governed by the Environmental Health and Safety Office (EHSO). To facilitate following all federal, state, and local rules and regulations, a Hazardous Materials Management Program (HMMP) outlines the requirements for the handling of hazardous materials and disposing of hazardous waste. Specific procedures are detailed in the HMMP Program, whereby the appropriate designation of the waste and subsequent treatment and disposal options are

determined. Additional procedures are also provided for specific cases for handling and cleaning up accidental spills. Under the HMMP Program, an inventory for stored hazardous material needs to be completed and incorporated in to the University Chemical Hygiene Plan (UCHP). A copy of the inventory must be made available at the laboratory/facility for review. The inventory also includes periodic inspections of the implementation of applicable safety, health and environmental polices.

Reporting of hazardous waste generation and disposal to the EPA is carried out biannually by EHSO. This is a collective report for the University and does not break down information by individual laboratory. Some of the hazardous materials commonly used at the existing C-MORE laboratories include elemental mercury, acids, hydraulic, propane, coolants, and oils. A chemical inventory of the existing C-MORE laboratories on the UHM Campus is provided in *Appendix C*. This inventory represents the many different types of research that C-MORE is currently conducting in Hawai'i. As new programs are expand and added into the new building, the same types of chemicals will be used.

Accumulation areas for the collection of wastes are identified for the program and the facility, and the there are limits on the amount of waste that can be accumulated at any given time. The amount equates to no more than 2,200 lbs (1,000 kg) or approximately five 55-gallon drums). The cost of hazardous waste disposal for the Mānoa Campus is borne by EHSO, with no charge to the generator of the waste. A licensed hazardous waste contractor is hired to transport the waste to an EPA permitted hazardous waste treatment, storage, and disposal facility as necessary.

Impacts – No impacts related to construction of the project are anticipated. The new C-MORE Building will not require the demolition and removal of the existing Biomedical Science Building facility, where hazardous materials are stored on-site.

Operations of the new building will result in minimal impacts as increased operations of C-MORE will include the necessity of additional designated hazardous materials to be used and stored on-site.

Mitigation - Prior to construction, proper abatement will need to be implemented to ensure all existing hazardous materials stored on-site is appropriately managed and stored while construction is on-going.

During operations, the existing policies and procedures of the HMMP will be implemented to ensure proper hazardous waste practices are carried out. C-MORE will establish a new waste management strategy specific to the programs operational needs. On-going coordination with the University's EHSO will be carried out to the program and new facility provides a safe and healthy environment for students, faculty and staff.

3.11 ELECTRICAL AND COMMUNICATIONS

Existing Conditions – Electrical service for the project area is provided by Hawaiian Electric Company (HECO). Hawaiian Telcom provides telephone service and Oceanic Cable, Inc. provides cable TV to the project area by underground cables. The entire UHM Campus is serviced by these providers.

Impacts – Anticipated electrical peak demand for the new building is 290 Kilo Volt Amperes (KVA). The proposed project will impact the demand for electrical, telephone, and cable services, however, there is adequate capacity to support the project with building service improvements by the UHM IT Facilities and the service providers.

Mitigation – An existing 12.47 Kilovolts (KV) primary electric circuit (MA1/LA1), originating from existing Substations "L" and "M" and running along East-West Road, will be extended from the existing electric manhole V11 located in the parking lot adjacent to the Pope Lab and Biomedical Building, to a University owned pad mounted transformer for the new C-MORE Laboratory Building.

Telephone and telecommunications conduits will be extended to the new C-MORE Building from existing telephone and telecommunications manholes along East-West Road. One 4 inch conduit will be extended from an existing telephone system manhole, and four 4 inch conduits will be extended from an existing telecommunications system manhole. These conduits will be routed through new 3′ by 5′ and 4′ by 6′ handholes respectively to the new building.

Any necessary off-site improvements required to provide the additional services will be the responsibility of HECO, Hawaiian Telcom and Oceanic Cable, Inc. respectively. Required project connections to the services systems will be coordinated with the respective service providers to minimize any potential disruption of service on campus or in adjacent areas to the campus.

3.12 TRAFFIC

A traffic report (October 2007) was prepared by Austin, Tsutsumi & Associates, Inc. for the LRDP Update and is located in *Appendix D*.

Existing Conditions – As a result of being situated at the gateway to the mature residential community of Mānoa, near the H-1 Freeway, and Major Arterials South King Street, Beretania Street, and Wai'alae Avenue, the UHM campus experiences its fair share of traffic (both regional and local in origin).

East-West Road penetrates the Upper Central Campus forming a loop around the Biomedical Science Building. Maile Way is the main access that connects to East-West Road. The intersection of University Avenue and Maile Way operates smoothly at satisfactory conditions (Level of Service (LOS) C) or better during the AM and PM peak hours of traffic for both existing and future conditions. Details pertaining to the roadway system and traffic volumes and conditions in the subject area can be found in the traffic report (*Appendix D).*

Impacts - The C-MORE Building will not impact existing traffic conditions outside of the campus. The project will result in the relocation of existing personnel and students on the Mānoa Campus. No new driveways or parking will be required. During construction, short-term traffic impacts are anticipated that include slight traffic congestions around the parking areas of the building and possible re-routing of traffic on East-West Road and building to provide access for construction equipment.

Future plans of the Upper Central Campus as detailed in the UH LRDP (Plan Book B) include the re-alignment of East-West Road as part of the overall improvements to the circulation and parking of the Upper Central Campus. As the development of the re-alignment progresses, appropriate mitigation measures will be proposed to alleviate traffic impacts in the area.

Mitigation – At this time, no mitigation is proposed as it relates to the C-MORE Building project. However, mitigation of the overall traffic and roadways related to the UHM Campus ~~are required~~ is proposed as detailed in the UH LRDP 2007 Update. Campus wide roadway and traffic improvements are discussed in detail in the UH LRDP 2007 Update. Mitigation measures discussed in the LRDP would require ~~costly~~ modifications to improve congestion along ~~the entire corridor~~ various streets and intersections. However, the implementation of the alternative transportation options, including the County's consideration of a rail transit will ultimately reduce future vehicular traffic demand to the campus.

3.13 PARKING

Existing Conditions- The Parking Study conducted for the 2007 Update to the LRDP (Parking Planners, 2007) determined the effect on physical inventory of parking spaces available for UHM Campus users as 5,940 spaces and or effect or demand of 6,242. In the analysis, it was concluded that the UHM campus has a present-day parking deficit of 1,418 parking spaces. This deficit includes unrestricted 1,240 stalls used by students in the surrounding community. The existing Biomedical Science Building, however, currently has adequate parking to support the facility and surrounding life science buildings.

Impacts – There will be minor impacts to parking during construction, however, appropriate mitigation measures will be carried out to minimize any disruption to existing parking and traffic flow in the area.

The Parking Study determined that the new C-MORE Building will not result in impacts to the overall existing parking needs of the UHM campus. Although the new facility will result in the loss of four to five existing parking spaces, no additional parking spaces are needed. This determination is due to the planned use of the new C-MORE Building which will be to relocate existing personnel on campus.

Mitigation – During construction, the existing access to the Biomedical Science Building will be temporarily relocated at either the west or north courtyard. Parking and pedestrian access will also be relocated accordingly to the west or north side of the building as well. Six stalls will be relocated for handicapped users and a ramp will be constructed to ensure American with Disabilities Act (ADA)-required access for individuals requiring assistance to access the building is met. The ramp will be built to required code for its temporary use.

Fifteen (15) existing parking stalls will be removed; however, nine (9) will be replaced, including two (2) new handicap accessible stalls, resulting in a net loss of six (6) stalls. No mitigation measures are required for the parking related to the C-MORE Building project or the existing Biomedical Science Building where the project will be located once construction of the project is completed.

Mitigation measures for parking conditions on the remainder of the UHM campus will be provided as planned developments detailed in the UH LRDP Update are carried out. Potential parking facility sites have been considered to address the overall parking deficits on the Mānoa Campus and campus design will further encourage the use of public transportation systems such as The Bus and the planned mass transit system.

The issue of parking on the overall campus will be addressed by the construction of the Parking Structure at Kennedy Theatre (480 stalls) and the Parking Structure Phase IIB (900 stalls).

3.14 SOCIO-ECONOMIC CHARACTERISTICS

Existing Conditions – The communities adjoining the UHM Campus beyond its ma uka and 'Ewa borders (Mānoa and Lower Mānoa, respectively) are largely older and stable neighborhoods or large single-family residences. Many of the homes were constructed in the early 1900s and are maintained in good condition. Wa'ahila Ridge, Mānoa Stream, and private and public educational and recreational facilities border the campus on the Koko Head side. The H-1 Freeway and the Mō'ili'ili residential and business communities border the campus on the ma kai side. Mānoa is generally considered a very desirable place to live, and home values are extremely high. Many UHM students, faculty and staff live in the surrounding communities.

Impacts– The further development of the UHM Campus with the C-MORE Building project and other projects identified in the 2007 LRDP update is not expected to adversely impact property values around the campus. As in the past, major developments on campus have had no measurable negative impact on property values.

The project will create short-term benefits as a result of design and construction employment. Upon completion, the proposed improvement will have beneficial long-term social and economic impacts including increased opportunities for the UHM campus through the success of the C-MORE program and its ability to provide world leading research and education.

Mitigation – No specific socio-economic mitigation actions are recommended.

3.15 PUBLIC SERVICES

Existing Conditions – The following describes a variety of public services available on and around the UHM Campus which also includes services to the Biomedical Science Building and the new C-MORE facility. These include Fire Protection, Security, Medical Emergencies, Solid Waste Management and Accessibility for Persons with Disabilities:

- Fire Protection: The Honolulu Fire Department has four stations in the proximity of the campus. First response for medical and fire emergencies at the project site and the surrounding area is provided by the Mānoa Fire Station located on East-West Road. Current University policy calls for access to fire apparatus, water supply and building construction to be in conformance with existing relevant codes and standards.

- Security: All routine patrols and surveillance are provided by the University's Campus Security Office. The Honolulu Police Department is called when situations arise that are beyond the capabilities of Campus Security or when arrests are required.

- Medical Emergencies: Routine and emergency medical services are provided by the University's Student Health Service (USHS). If a situation arises that is beyond USHS's capabilities, the case is referred to the patient's doctor and/ or to local hospitals. Numerous major hospitals and clinics are also in relative proximity to the UHM Campus. Prompt attention is available to patients in medical emergencies. The nearest emergency hospital, Kapiʻolani Medical Center is located approximately 1.6 miles from the project site taking an average response time of 5-7 minutes.

- Solid Waste Management: Refuse is collected and disposed by University personnel at County transfer stations or landfills. Existing solid waste for the Biomedical Science Building is 3 cubic yards or 2,294 liters. Most of the "green waste" from the UHM Campus is composted and is not disposed as refuse. Recycling programs exist on campus and are managed by separate schools and programs.

- Accessibility for Persons with Disabilities: Decades ago, the UHM Campus embarked on a program to remove barriers for persons with disabilities. During this time, the University has removed barriers from many scattered locations throughout the campus based on very specific needs. While measurable progress has been made, the UHM Campus still strives to improve its efforts to become an institution that is more user friendly to persons living with disabilities.

Impacts– The following paragraphs describe how a range of public services will be impacted and, if necessary, mitigated by the proposed C-MORE Building project:

- Fire Protection: Enhanced fire flow and access to many parts of the campus will result from the proposed developments on campus such as the C-MORE Building.

- Security: Proposed improvements, such as the construction of malls, paths and plazas that will accompany building projects like the C-MORE facility, are expected to improve student and staff safety in the evenings. Emergency phones, orientation programs and increased surveillance have been implemented and continue to be improved by the University.

- Medical Emergencies: The proposed project will not impact the handling of medical emergencies on the UHM Campus. The Kapiʻolani Medical Center and the Student Health Center will continue to function in its present locations and will be accessible to the Upper Central Campus area.

- Solid Waste Management: Solid waste is collected in dumpsters that are hauled away by private contractors. C-MORE will generate additional solid waste; however, recycling efforts will be made as programs have been implemented on a building by building basis.

- Accessibility for Persons with Disabilities: Overall, the C-MORE Building project will help create an enhanced network of accessible routes that connect to all parts of the UHM Campus.

  The existing handicap ramp will be removed during construction and existing parking stalls ~~and ramps for~~ handicapped users will be minimally impacted. However, mitigation measures will ensure that impacts are properly handled to meet American with Disabilities Act (ADA).

Mitigation –

- Fire Protection: Current fire protection codes will be met and the University will coordinate with the Fire Department to identify fire escape routes and the location of hydrants and standpipes needed in the area, which will be included as necessary on detailed construction documents. The proposed project will comply with the Uniform Fire Code, Section 902.2.1, requiring a fire apparatus access road.

- Security: The improvements mentioned above will encourage the use of routes that are more heavily traveled, better lit, and more easily patrolled.

- Medical Emergencies: No mitigation is proposed.

- Solid Waste Management: Additional trash bins will be provided for the Biomedical Science Building to accommodate the C-MORE program and other programs and classes. Currently, not all of the classrooms at the Biomedical Science Building is utilized, however, it is anticipated that when the project is completed, the Biomedical Science Building will be at full capacity.

- Accessibility for Persons with Disabilities: Improvements to the existing Biomedical Science Building with the addition of the C-MORE facility will be in conformance with the provisions of the Americans with Disability (ADA) Act, which been incorporated into the City's Building Code.

  During construction, six stalls will be relocated for users with disabilities and a temporary ramp will be constructed to ensure American with Disabilities Act (ADA)-required access for individuals requiring assistance to access the building is met.

3.16 ARCHAEOLOGICAL RESOURCES

Existing Conditions – As the proposed C-MORE Building project is classified as a "state project", it is subject to a historic preservation review process under the auspices of Hawai'i Revised Statutes, §6E-8. Under §6E-8(a), before the University can commence with this project, it needs to afford the State of Hawai'i, Department of Land and Natural Resources, State Historic Preservation Division (SHPD) an opportunity to review the effect of C-MORE project on known or potential historic properties. A request was submitted to SHPD in October 2008 to initiate the historic preservation review process.

Additionally, in May 2008, an *Archaeological Literature Review and Field Inspection Report for the University of Hawai'i at Mānoa Long Range Development Plan Project* was completed by Cultural Surveys Hawai'i (CSH). This study was designed to address archaeological site types and locations and to provide for future recommendations for archaeological work to be completed. The goal was to identify, if possible, a comprehensive report of known cultural resources and historic properties and to provide recommendations for the University as related to the State of Hawai'i's historic review process. The submittal and study are included as *Appendix E* in this EA.

In the May 2008 study, the Area of Potential Effect (APE) consisted of the entire approximately 304-acre campus. The findings of this study identified several past studies that documented historic properties around and within the boundaries of the campus. (*Figure 3-9*) Specific sites which have been previously assessed as eligible for the Hawai'i Register of Historic Places (HRHP) include:

1. The historic core of the campus (State Inventory of Historic Properties [SIHP] No. 50-80-14-1352), consists of Hawai'i Hall, George Hall, Dean Hall, Gartley Hall, Crawford Hall, Varney Circle, Founder's Gate, Andrew's Outdoor Amphitheater, Wist Hall and the Pineapple Research Center. These historic structures were added to the HRHP in 1984.

2. Kānewai Cultural Garden (SIHP No. 50-80-14-4498), consisting of modern surface features (irrigation ditches feeding into taro pond fields) overlying centuries-old deposits consistent with a long history of gardening at this spot along the Mānoa Stream. Subsurface testing (archaeological excavation), radiocarbon dating and pollen analysis by International Archaeological Research Institute, Inc. demonstrate use of the area as a taro lo'i from the middle 1400s, and perhaps earlier. It is also important to state the nearby "Dole Street burials" documented by CSH in 1991 are reburied on the grounds of the Center for Hawaiian Studies.

3. SIHP No. 50-80-14-4191, a traditional-style presumably pre-Contact-era burial discovered during construction activities at Keller Hall (Smith and Kawachi 1991).

FIGURE 3-9 Archaeological Map in Mānoa Ahupua'a

Additionally, the following historic properties located within the boundaries of the UHM campus have not been previously assessed for eligibility for the HRHP:

1. Koana Cave, which has apparently never received a site number designation (see recommendations below), has yielded human skeletal remains (accessioned by the Bishop Museum in the 1960s), and probably contains as yet undiscovered historically-significant cultural materials consistent with habitation and/or gardening, in addition to more human skeletal remains.

2. Hipawai Heiau was designated by McAllister (1933) as "Site 63," that is, SIHP No. 50-80-14-63, but no archaeological observations were made since the site was reported as "torn down" earlier by Thrum. CSH archaeologists may have identified a remnant section of stone wall associated with this heiau, however, as discussed in some detail above, this feature is located just outside the boundaries of the UH property.

In addition to the aforementioned historic properties located on the UHM campus, two areas in the Waʻahila Ridge portion of the campus containing possible rock shelters were identified during the course of the subject field inspection. Additional testing (controlled archaeological excavations) would be needed to more accurately determine whether these possible rock shelters contain any historically-significant cultural materials.

According to native and foreign accounts and records, Mānoa Valley was once traditionally demarcated into two sections, one for the aliʻi and their retainers and one for the makaʻāinana commoners. The aliʻi lived on the high, cooler western slopes; the commoners lived on the warmer eastern slopes and on the valley floor where they tended their irrigated taro fields. Mary Kawena Pukui, noted scholar and historian was quoted as stated the following:

In Mānoa valley a low hill at the head of the valley and Rocky hill above Punahou are said by a kinswoman of mine to have marked the division between the chiefs and the commoners in that valley. The chiefs lived on the west half, the commoners on the east…The imaginary line from Puu-o Mānoa to Ka-pali luahine marks the division of Mānoa; on the left called Mānoa-alii, and on the right, Mānoa-Kanaka.

In review of the 2008 CSH study, Mānoa is watered by five streams in the upper mountain regions that merge into the lower Mānoa stream. Much of the documented history details that due to its vast water supply, Mānoa valley was comprised of a vast agricultural terrace system for the production of kalo and other wetland crops. The proposed C-MORE project area is located in what traditionally was known as Wailele, literally translated to mean spring waters. The general vicinity of the Biomedical Science Building to the present day athletic field of the Mid-Pacific Institute was part of a pūnāwai, or freshwater spring system.

Mānoa was given to the Maui chief Kameʻeiamoku by Kamehameha I after his conquest of Oʻahu. After Kameʻeiamoku's death, the land was inherited by his son Ulumāheihie (or Hoapili), who became the governor of Maui during the reigns of Kamehameha II and Kamehameha III. Liliha, the daughter of Hoapili, ~~inherited~~ was bequeathed these lands by her father in 1811 and brought them with her to her marriage with the high chief Boki, governor of Oʻahu.

Based upon rectification of old maps and modern Geographic Information Systems software, the C-MORE project area is sited along the border line of two pieces of property that were granted to two individuals by Kalaimoku and Boki. (*Figure 3-10*) The project area includes a property that was recorded under Land Commission Award (LCA) 819, which was awarded to George Beckley. In review of genealogical records, the referenced George Beckley is George Charles Beckley (b. 1787, d. 1825). He married Ahia Kalaikumaikiekie, who was the hānai daughter of Ka'ahumanu and the two had seven children. According to accounts, he made numerous voyages between Hawaii, Mexico, and China and is noted to have been a trusted advisor of Kamehameha. Beckley has also been ascribed as designing the first Hawaiian flag.

Supplemental information in other claim awards indicate that the land under LCA 819 was known as Kawailole [sic] and was sold to Beckley by Kalaimoku, who was then Governor of Oahu around 1815. Upon his death, the land was transferred to his heirs until March 1827, when the land was left to Richard Charlton by Boki, who retained these lands for approximately 28 years. The land then returned to Beckley's heirs at the expiration of the Charlton's term. The attached Royal Patent (RP 4546) for the property indicates that the area was surrounded by stone walls, water runs, and kalo patches; indicating that this portion of land was probably still in active agricultural cultivation as late as 1862.

The second parcel which includes the project area was awarded under a Grant (LG) 24 to Theophilus Metcalf. Theophilus Metcalf was a sugar planter and government surveyor who married chiefess Kaili Kapuolono. Their daughter was Emma Metcalf, who married Frederick William Beckley, a descendant of George Beckley, who was chamberlain under King Kalākaua. This grant also validates the information recorded in the adjoining LCA 819/RP 4546 records that this land was surrounded by lo'i kalo, auwai, and stone walls.

Impacts – None of the identified archaeological sites are within or near vicinity to the proposed C-MORE project area. Further, there are no surface archaeological features or sites within the property. However, careful consideration of the known traditional land tenure use patterns within the project area was given to assess the potential sensitivity of unknown subsurface historic properties, including ancestral burials.

The division of Mānoa valley into Mānoa-ali'i and Mānoa-kanaka suggests that the maka'āinana, who once comprised the vast majority of the populace, would have been buried on the Mānoa-kanaka side, the east side of the valley. Prior to the establishment of formal cemeteries, such as O'ahu Cemetery which was founded in 1844, the known burial stewardship practices of maka'āinana indicate that the deceased would have been buried in close proximity to a family house as the ascribed kuleana would be for a designated family member to tend to the physical and spiritual well-being of the burial site. The generally known method of burials practices for areas such as Mānoa would include earth and cave burials.

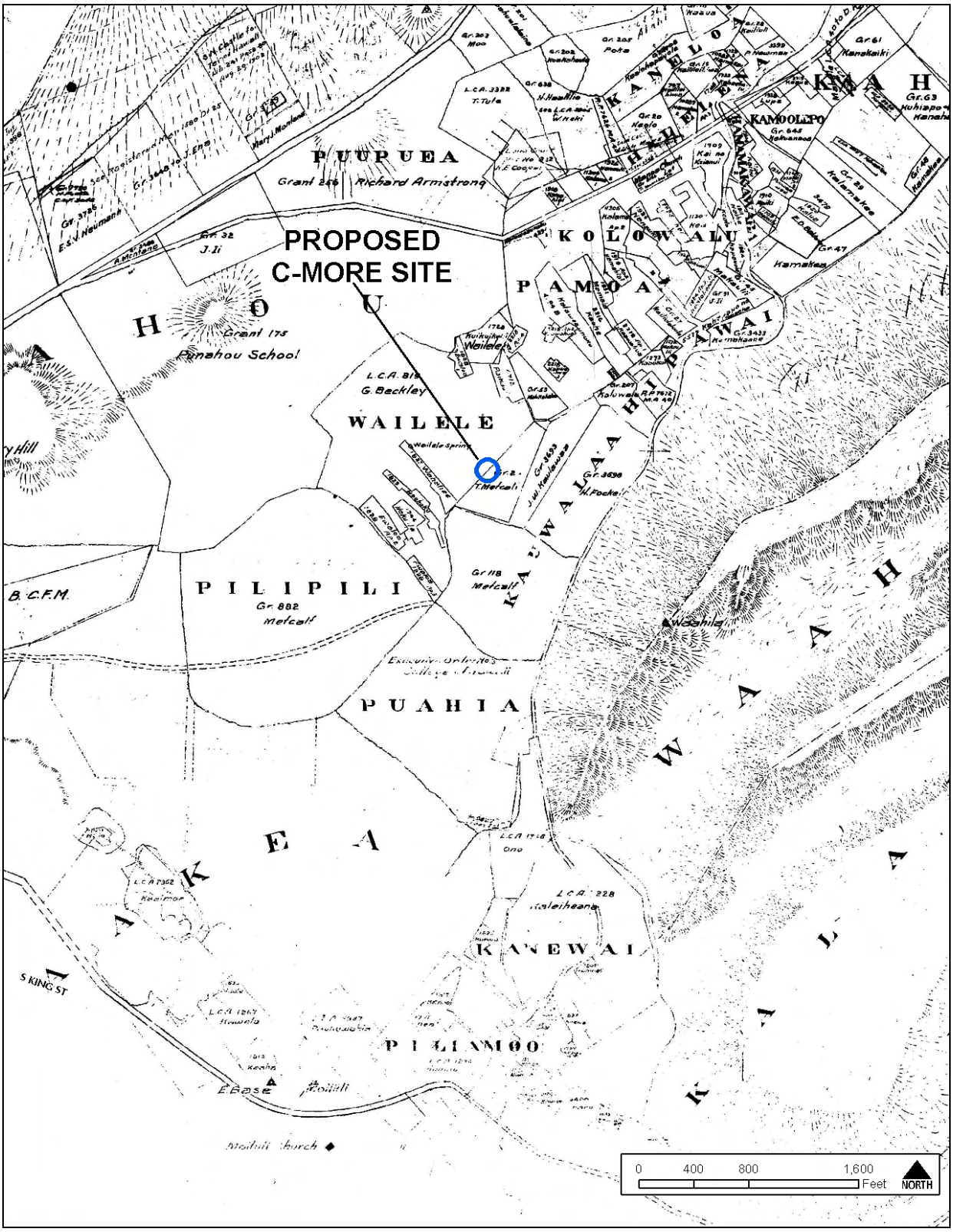


FIGURE 3-10 Project Location Identified on 1882 Alexander Survey Map, Mānoa Valley 1882

Soil conditions sometimes lend to predictability and probability of possible burial encounters. As shown previously in *Figure 3-3*, the project area is comprised of Makiki Stony Clay Loam (MIA), 0 to 3% slopes. This series consists of well-drained soils on alluvial fans and terraces. These soils were formed in alluvium mixed with volcanic ash and cinders. The surface layer is dark-brown clay loam about 20 inches thick. The subsoil, about 10 inches thick, is dark-brown clay that contains cinders and rock fragments. Although not in the immediate vicinity, Hanalei Silty Clay, 0 to 2% slopes, are found immediately west of the project area. The overall soil conditions do provide limited evidence that the project area was once part of vast tributary system being fed by the upper valley, which was utilized for wetland taro cultivation.

Archaeological records indicate that there have been limited past discoveries of human remains within or near vicinity to the overall UHM campus area. The largest discovery of iwi kūpuna was along Dole Street near Kānewai, where 18 kūpuna were discovered during trenching by the Board of Water Supply. However, the most notable find within the same soil context as the project area was the discovery of partial remains of a single kūpuna at Keller Hall (SIHP No. 50-80-14-4191). The only noteworthy piece of information was that "a single water worn stone and a fragment of a cracked rock" were found with the burial but no additional information was provided to indicate if these associated materials were burial markers. It is not clear if this burial was in situ or a secondary context that could have been attributable to original construction activity of Keller Hall or some other near vicinity construction. Review of the complete report for this burial discovery did not indicate any specific information of the burial context that could provide input to the probability of future discoveries on the campus grounds.

Past activities within or near vicinity of the C-MORE project site, including its original construction as well as other facilities, roads, or utility infrastructure; the expansion of Hamilton Library; other building projects in the upper campus did not identify any known burial encounters. Further, given the overall nature and composition of the C-MORE project site, which is well documented as part of a pūnāwai system and the recorded tenure patterns of the immediate area being used in active lo'i cultivation and lack of house lots in the immediate vicinity, preliminary evidence does suggest that this area may not be a high risk area for the future potential of discovering unknown burial encounters.

Mitigation – It is fairly difficult to predict with any specific certainty where burials might occur and it is a fair statement to highlight that there may be a possibility that undiscovered burials may still be present anywhere on the UHM campus. As such, it is suggested that an appropriate mitigative strategy would be to develop an archaeological monitoring plan prior to conducting any construction-related activity, subject to the review and approval of SHPD and consultation with other parties of interest, as appropriate, including but not limited to the Office of Hawaiian Affairs, and the O'ahu Island Burial Council.

3.17 HISTORIC RESOURCES

Existing Conditions - The original Biomedical Sciences Building (BSB) was designed in 1967 and its construction was completed in 1971. Approximately 37 years old, the original Biomedical Science Building is a seven-story tower building centered and surrounded by an exterior façade that creates the illusion of enclosed and fortified structure. Six courtyards were originally created between the outer building perimeter and the inner tower, which allowed for internal circulation

and connection between the two main structures. Four corner courtyards form the interior space of the building. Each cardinal side of the building also has a primary entry leading to its own courtyard. Specific scoring patterns are utilized throughout the design of the concrete walls and walks, emphasizing a sense of linear balance and connectivity between the tower and the courts.

The Biomedical Science Building was designed by world-renown architect Edward Durell Stone in the early 1960's. Some of Stone's most famous and notable buildings include Radio City Music Hall (New York, 1932), the United States Embassy (New Delhi, India, 1958), and the Kennedy Center for the Performing Arts (Washington, D.C., 1971). Born on March 9, 1902 in Fayetteville, Arkansas, Stone is recognized as one of the foremost architects of the mid-twentieth century. Below is a succinct summary of Stone's accomplishments throughout his career

Stone attended the University of Arkansas from 1920 to 1923 before moving to Boston, Massachusetts, where he worked as a draftsman and was mentored under Henry R. Shepley. Stone attended Harvard Architectural School (1925-1926) and then Massachusetts Institute of Technology (1926-1927). Stone then traveled and studied in Europe for two years as part of the Rotch Traveling Scholarship he had received. While in Europe, Stone produced exquisite watercolor drawings in the Beaux-Arts style. Stone returned to the United States in 1929 at the onset of the Great Depression, where he settled in New York City. During this time, Stone was noted to have designed Radio City Music Hall and portions of the Waldorf-Astoria Hotel. In 1936, Stone established his own firm, Edward Durell Stone & Associates, which expanded later to Edward Durell Stone, Inc.; Hicks Drafting Corporation, and Torch Realty.

Influenced by his study of European architecture, Stone became an early advocate of International Style architecture. The style is known to originate in Europe in the 1920s and emerge in the U.S in the 1930s in primarily commercial and institutional buildings. The identifying features of the International Style includes modern structural principles and materials such as concrete, glass, and steel with emphasis on a radical simplification of form with many instances of exposing the structure and frame of construction; rejecting non-essential decoration; and the use of corner windows as a hallmark of the style. Stone helped transform the International Style modernism of the 1950s into the postmodernism of the 1960s and 1970s by substituting formalism for functionalism. Some of his first designs include the Mandel House in Mount Kisco; the Museum of Modern Art in New York City.

During World War II, Stone served as the chief of planning and design in the U.S. Army Air Forces. After the war, he returned to Arkansas to design the Fine Arts Center at UA, the University of Arkansas for Medical Sciences (UAMS) Medical Center in Little Rock (Pulaski County), the Sigma Nu Fraternity house in Fayetteville, and several private residences. After Stone's first marriage ended in divorce, he married again in 1954. During this time, there is a noted change in his architectural style. Austere modernism was replaced by the ornate formality exemplified by his design of the U.S. Embassy in New Delhi, India. For the remainder of his career, it is noted that Stone designed buildings to reflect universal values rather than "transient enthusiasms" of modernism.

In review of various biography sources, the following are noted as Stone's principal works: El Panama Hotel in Panama City, Panama; Stanford University Medical Center in Palo Alto, California; the U.S. Pavilion at the World's Fair in Brussels, Belgium; the Gallery of Modern Art in

New York City; the National Geographic Society headquarters in Washington DC; the State University of New York at Albany, New York; the John F. Kennedy Center for the Performing Arts in Washington DC; the General Motors building in New York City; and the National Assembly and Presidential Palace in Islamabad, Pakistan.

Stone died on August 6, 1978 in New York. It has been noted that Stone's early buildings are important examples of modern architecture, but some critics dismiss his later works. In some of the critique, Stone was quoted as being a "conveyor of banality" who produced "a plague of dreadful buildings." Others though praised him for breaking from the mainstream and seeking to restore a sense of history to architecture.

Impact- No further information other than the copies of the original drawing plans is available to assess Stone's rationale for the Biomedical Science Building's design and intent. In past discussions and processes of UHM's campus plans, including the recent 2007 LRDP update, key buildings of historical significance were identified for eligibility for inclusion on the Registers. Insofar, through all these discussions and reviews by the University Board of Regents and its subcommittees; UHM administration; and UH faculty, including academic experts in architecture and historic preservation, the Biomedical Science Building has not been identified as a key building for consideration as historical significant. For reference, the following buildings and structures on the Mānoa Campus have been listed on the State Historical Register to date:

Hawai'i Hall	Wist Hall	Gartley Hall
Castle Memorial Hall	Crawford Hall	Dean Hall
Andrews Amphitheater	Founders' Gates	
Varney Circle Fountain	George Hall	

Under the US Department of the Interior, National Park Service (NPS) *National Register Bulletin Guidelines for Evaluating and Nominating Properties that Achieved Significance within the Past Fifty Years*, there are specific opportunities and issues to evaluate a property that is less than 50-year old and to consider its inclusion on the National Register of Historic Places. Under the NPS guidelines, the 50-year is an arbitrary span of time, designed as a filter to ensure enough time has passed to evaluate the property in a historic context. Important periods of history that have occurred within the last 50-years do need to be considered in their context of the contribution made of the events or persons historically significant and related to the area in question, which includes a district, site, building, structure, or object. However, it is important to note that under HRS §6E-2, a historic property is defined as "any building, structure, object, district, area, or site, including heiau and underwater site, **which is over fifty years old**." (emphasis added). Accordingly, the Biomedical Science Building fails to meet the basic legal definition of a historic property under State law.

Nonetheless, under the NPS guidelines, a property less than 50 years can be considered as historically significant only if the property is of "exceptional importance," or if it is an integral part to a historic district that is eligible for listing in the National Register. This statement is intended to safeguard against listing properties which are of only a contemporary value and ensures the National Register is one of truly historic places. A case example in Hawai'i would be the State Capitol Building, which is a building less than 50 years old but was added to the National Register

in 1973 and is part of the Hawai'i Capitol Historic District, which includes 20 sites such as 'Iolani Palace, the Territorial Office Building, Honolulu Hale, etc.

The significance criteria do not define what is of "exceptional importance" but by its definition, the term "exceptional" refers to being of rare or superior quality or deviating from the norm. So the simple question to ask is does the Biomedical Science Building, being less than 50 years olds, possess "exceptional importance" to achieve significance under any of the criteria that is used to evaluate historical significance?

Under 36 Code of Federal Regulations 60 (National Register of Historic Places), Section 60.4, the quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in prehistory or history.

The only viable consideration of the Biomedical Science Building as a potential property of historical significance is possibly under criterion (c). However, the point of further discussion is to determine whether the Biomedical Science Building is of "exceptional importance" as a representation of work by Edward Durell Stone. Although Edward Durell Stone is a noted architect, whose works are contributions to the world of design and architecture, the context of the Biomedical Science Building in relation to other comparable works over the span of his career may be subjective but seemingly does not meet the merits to be of "exceptional importance" to Stone's portfolio. In review of Stone's cumulative works during the 1960s and 1970s, some of the notable works of this time include the:

- Museum of Arts and Design (New York, 1965);
- General Motors Building (New York, 1964);
- Kennedy Center for Performing Arts (Washington D.C., 1971);
- Georgetown University Law Center (Washington D.C.; 1971);
- Aon Center (Chicago, 1972).

Further, although the Biomedical Science Building does have a unique character to its design, the building has undergone several alterations and renovations since its original construction. Overall, these projects represent a renovation, alteration or modification of approximately 32,661 sf, or 18% of the original building. The most significant alteration occurred in September 2000 with the opening of a new research facility for the Institute for Biogenesis Research (IBR) within the Biomedical Science Building. This portion of redevelopment of the Biomedical Science Building

created an additional 14,898 sf and modified approximately 8% of the existing building. The inclusion of the Institute for Biogenesis Research resulted with the enclosure and alteration of the east entry to the Biomedical Science Building.

Under §6E-8(a), SHPD must provide a determination of significance with 90 days of a formal request for review. Coordination and consultation is currently ongoing with SHPD in its evaluation. If the building does meet Criterion C or another recommendation is made by SHPD, such as the completion of a HABS (Historic American Building Survey), the project may result in an impact to historic resources.

Mitigation – No mitigation is proposed at this time. However, possible findings by SHPD relating to the Biomedical Science Building as a property of historical significance may result in additional measures for the project, which could include additional documentation and recordation prior to construction. The applicant will continue to work with SHPD, as appropriate, to address their final determination.

3.18 CULTURAL RESOURCES

Existing Conditions – A *Cultural Impact Assessment* was completed by Cultural Surveys Hawai'i, Inc. (CSH) for the UH LRDP and is included as *Appendix F.* For this study, the Area of Potential Effect (APE) consisted of the entire approximately 304-acre campus.

The project requires compliance with the State of Hawai'i environmental review process under Chapter 343, HRS, which requires consideration of a proposed project's effect on traditional cultural practices. Through document research and cultural consultation efforts, the report provided preliminary information that was applicable to the assessment of the C-MORE Building project and its potential impacts to cultural practices.

Hawaiian organizations, agencies and community members were contacted during the original assessment for the UH LRDP Update in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the campus and the vicinity. Organizational members or representatives were consulted and included SHPD, the Office of Hawaiian Affairs (OHA), Hui Mālama I Nā Iwi Kūpuna o Hawai'i Nei, faculty members of the Kamakakūokalani Center for Hawaiian Studies, the Mānoa Heritage Center, the Mānoa Neighborhood Board, Ho'okahe Wai Ho'oulu 'Āina, and Mālama o Mānoa.

As pertinent to the C-MORE project area and it planned programmatic objectives and outreach outcomes, the noteworthy findings and applicable recommendations from this study include the following:

1. Given its abundant natural resources, including streams that feed into the main Mānoa stream and several pūnāwai (fresh-water springs), Mānoa Valley has been an attractive place to settle and garden since periods of early settlement. Lower Mānoa Valley, within which the campus is located, represents the prime wet-taro-growing area and agricultural heartland of the entire valley.

2. Mānoa is exceedingly rich in places names, wahi pana (legendary or storied places) and associated moʻolelo (oral histories), reflecting the valley's elevated cultural and historical significance to Kanaka Maoli. Important moʻolelo focus on Mānoa's many pūnāwai, which are directly associated two primary akua, Kāne and Kanaloa. These springs include Kānewai (location of the current Kānewai Cultural Garden), Hualani, Wailele, the latter of which includes the area of the C-MORE project and the present day athletic field of the Mid-Pacific Institute and associated with Kūkaʻōʻō Heiau, Punahou (a.k.a. Kapunahou), Kaʻaipū, Waʻaloa and Waiakeakua. The valley is also home to many puʻu (hills, mountains), peaks, ridges and caves, all with associated moʻolelo; these include Waʻahila Ridge (which defines the eastern border of the valley) and its numerous peaks. Finally, Mānoa is also associated with a variety of other moʻolelo, including "Pīkoi the Rat Killer," "Maluae and the Underworld," and "The Woman Who Died and Came Back to Life;" as well as famous events and people of the early historic era, including Kamehameha I, Kaʻahumanu and Boki.

3. The archaeology of lower Mānoa is somewhat problematic in that most of the campus was developed before historic preservation awareness and laws were in place; thus many or most surface level sites and features once present in the project area have been destroyed and/or damaged by being covered with sediments and structures. Before these historic impacts, however, the campus undoubtedly contained a patchwork of gardens, including many loʻi (stone terraces) and ʻauwai (irrigation ditches), and house sites, including many small stone enclosures, terraces and platforms. Undoubtedly, there are still subsurface cultural deposits within the campus containing significant historic and cultural resources.

4. Burials have been documented near Keller Hall and along Dole Street, immediately adjacent to the Kānewai Cultural Garden and Kamakūokalani Center for Hawaiian Studies. The latter burials, representing the remains of at least 18 individuals, have been interpreted as a traditional Hawaiian cemetery. It is possible that more burials are located in subsurface deposits within portions of the University campus area.

5. Community consultation conducted for the study yielded the following:

   a. Many participants voiced concern about the possibility of encountering as-yet undiscovered cultural and historic sites, including most importantly, human skeletal remains and burials in subsurface deposits. One participant also pointed out that the burial site preserve near Keller Hall, which used to be marked by a ginger plant, is no longer being maintained.

   b. A few participants stated that existing undeveloped areas, including ridges and valley slopes, should not be developed or impacted in any way, given the already significant loss of such natural portions of the campus and given the importance of retaining a Hawaiian sense of place and landscape integrity. This concern about preserving the last undeveloped portions of the campus extends specifically to the Waʻahila Ridge area.

   c. Many participants voiced concerns about future buildings and projects being more harmoniously designed and integrated into the natural surrounding and themes inherent to the valley. It is important to note that this type of concern is fundamentally a cultural one for Hawaiians, in particular, whose world view and deeper philosophical and spiritual

beliefs are based on key cultural values and concepts such as pono (in this case, "right ways" of doing things) and lōkahi ("harmony"), among other related concepts (e.g., mālama ʻāina, or "taking care of the land").

d. A few participants talked about the importance of understanding and incorporating Hawaiian language words, phrases and concepts that extends beyond the superficial (e.g., naming buildings). expand

e. Many participants talked about the importance of using native plants in future projects.

f. The Waʻahila Ridge area is an important natural and cultural resource, containing trails, native plants and other significant sites and features (e.g., possible rock shelter and overhangs).

g. A few participants provided detailed accounts of well-documented moʻolelo, wahi pana and other cultural sites in Mānoa.

h. Participants questioned the State's record of protecting and preserving important cultural sites in Mānoa, including heiau that have been damaged or compromised by recent construction projects.

i. Dr. McGregor pointed out that there are many significant and commemorative trees on campus that should be systematically catalogued in order to ensure their protection during future development of the campus.

Impacts – *Section 3.16* provides a succinct description of the known traditional land tenure patterns were for the C-MORE project area and addresses the concern of the possibility for encountering unmarked and unknown burials.

The C-MORE building is intended to provide a complementary contrast to the form and design of the existing Biomedical Science Building. The proposed design seeks to create a harmonious balance within the built environment.

There is one identified memorial tree, the Lunalilo Yellow Shower Tree that is currently within the project area, which would need to be relocated as a result of this project.

Mitigation – Early consultation and coordination with SHPD administration and staff is ongoing to ensure that known concerns to potential historic properties are addressed. A pre-consultation meeting was held in October 2008 with SHPD archaeological and architectural staff; project representatives from the University; and project consultants. In addition to the publication of the EA, a separate written request was issued in late October with supporting documentation for SHPD to initiate its review process. Under §6E-8(a), before any agency (UHM) commences any project which may affect a historic property, aviation artifact, or a burial site, the agency (UHM) shall advise and provide SHPD an opportunity to review the effect of the proposed project on historic properties. SHPD is to provide its written concurrence or non-concurrence within 90 days after the filing of a request. Additionally, other parties of interest, including OHA have been and will continue to be consulted for their input on all elements of the proposed project but will seek

specific recommendations related to measures for cultural resources. As appropriate, recommended measures by SHPD will be addressed when its final determination is provided ~~plans are finalized.~~

A key program objective of the Center's mission includes educational outreach. With the building in-place, C-MORE, will be able to expand its current capability to pursue opportunities in furthering its outreach. One possibility of this expansion could include partnerships that result in future programs and initiatives that integrate varying world views and philosophical world views within the explorations of ocean sciences. Key naming elements for the building and its key elements, such as the conference center, could be considered to ~~honorifically~~ honor the traditional and cultural legacy of Wailele. Further opportunities to highlight and showcase the area's rich legacy through interpretative programs and artistic elements will be considered.

Discussions are ongoing with the University's Landscape Architect to ensure the appropriate measures are taken in relocating the Shower Tree. Future landscaping around the new building would include a programmatic element that would utilize native landscaping appropriate for the area.

Finally, as part of this environmental review process, the community is afforded the opportunity to review and comment on the merits of the C-MORE project. Further recommendations and suggestions for input gathered will be considered as plans are finalized.

3.19 VISUAL AESTHETIC RESOURCES

Existing Conditions - The 304 acre UHM campus, strategically located at the mouth of Mānoa Valley, is a significant part of the ahupuaʻa of Mānoa and Waikīkī. Mānoa Stream, which runs along the Diamond Head side of the campus, is the natural feature connecting the ma uka and ma kai portions of the ahupuaʻa and is the source of the waters that feed the ma kai lands with their "Waikīkī" (spouting waters). Waʻahila Ridge, which with Mount Tantalus frames the mouth of the Valley, is the Diamond Head boundary of the campus.

Given its significance within the ahupuaʻa, the campus inherits a major kuleana as a steward of the lands of Waikīkī. This kuleana takes many forms; its most obvious responsibility related to the land is to preserve and enhance the natural systems of the ahupuaʻa to the extent possible. The land has functioned with certain patterns since time immemorial and while these patterns have been modified over time, it can be reasoned that unless these patterns perpetuate the very nature of the land and its ecological values will be lost if proper stewardship practices are not continued.

In the Hawaiian tradition, geographic orientation is often based on being able to see mountains, the sea and prominent land forms. Thus views of the mountains and sea are visual assets of the campus.

Located in the Upper Central Campus, the Biomedical Science Building is nestled next to an open field near the Mid-Pacific Institute Campus. The mountains of Mānoa valley can be seen from the site providing magnificent views and a feeling of tranquility in area. Designed by architect Edward Durell Stone, the building displays unique architectural characteristics and an individualistic style Asian and Western forms in a modern style.

Impacts - With the recent UH LRDP 2007 Update an opportunity exists for the Mānoa Campus to become a more cohesive campus during the planning period. Key sites such as the existing Biomedical Science Building are identified for development during this time. Project design of the C-MORE Building in the Upper Central Campus will contribute towards providing a greater aesthetic and functional wholeness to the campus as outlined in the LRDP.

Mitigation - In exercising its kuleana, responsibility and authority, UHM, through the LRDP, will maintain and enhance the natural patterns of the ahupuaʻa. The campus, even with its extensive development, is envisioned to be an entity that makes positive ecological contributions to its ahupuaʻa and the City of Honolulu. UHM is guided by the LRDP to minimize its negative impact on its neighbors while increasing its accessibility to the larger community. With the objective of sustainability adding to the beauty of the valley with large and small usable, landscaped, open spaces and with environmentally responsible buildings and facilities, the LRDP envisions the campus seamlessly transitioning from the ma uka residential valley into the more urban and commercial districts of Mōʻiliʻili and McCully. Where practicable, views of the mountains and sea will be preserved and others recaptured.

As planned for in the UH LRDP, the addition of the C-MORE Building to the south courtyard of the Biomedical Science Building will compliment and complete the life science buildings in this part of the campus. The facility will enhance the aesthetic beauty of the area while adding a more contemporary appearance. In order to respect the existing building, the project will maintain the two-story height around the base of the building and will not negatively impact existing views.

Other building design features that will enhance the aesthetic resources of the area include a slightly curved glass wall on the south façade of the building to reflect the landscape of the welcoming plaza. An abstracted wave on the glass wall will be an artistic element to reflect the marine- based research inside. The project will incorporate landscaped roofs and photovoltaic panels integrating sustainable design and energy saving techniques. The C-MORE lab will become a model and leader of sustainable practices, having beneficial effects on both the culture and environment of the campus.

3.20 POTENTIAL CUMULATIVE AND SECONDARY IMPACTS

The proposed C-MORE Building is one of the seventeen (17) new buildings and/or building expansion projects included in the UH LRDP 2007 Update for the Mānoa Campus. The LRDP focuses on projects that are on the Capital Improvement Program and/or are anticipated for development within the next 5-10 years.

As the university continues to improve the campus grounds with new buildings and projects detailed in the LRDP, opportunities for enhanced education and campus life experience will be afforded to students, faculty and staff. With a recent increase in academic education and research needs, additional resources on campus will help to grow existing programs such as C-MORE. Improvement of the Mānoa Campus will help to improve the overall image of UH, attracting students from home and abroad. The creation of projects like those listed in the LRDP will bring about new opportunities in education and research and may encourage national and international investments needed to expand existing industries in the state.

Construction activity during the proposed project will generate direct employment as well as indirect and induced employment in construction-related industries. For long-term operations, the new building may require additional employees, including faculty and staff, as well as additional goods and services from related businesses.

4.0 ALTERNATIVES TO THE PROPOSED PROJECT

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This section evaluates alternatives to the proposed project described in *Section 2.0*. The following provides a discussion of the alternatives to the proposed project.

4.1 NO-ACTION ALTERNATIVE

The no-action alternative is the baseline against which all other alternatives are measured. This analysis essentially presents the details of the future site and program conditions that will most likely result should the proposed project not proceed.

The no-action alternative will result in no improvements for this area of the existing Biomedical Science Building on the UHM Campus. While the selection of this alternative would mean that State lands, funds and human resources would not be expended on the project, it would also mean that the numerous, substantial benefits expected to accrue from the project would not be realized since the project would not be implemented.

The no-action alternative also means that necessary improvements to the existing Biomedical Science Building will not be made and UHM would become disadvantaged in the national and global competition with other similar institutions. Needed research and educational facilities to recruit quality faculty and graduate students would not be built and will contribute to the decline in competitiveness.

UHM is one of only 13 institutions to hold the distinction of being a land-, sea-, and space-grant research institution. Classified by the Carnegie Foundation as having "very high research activity," UHM is known for its pioneering research in fields such as oceanography. The Carnegie Foundation for the Advancement of Teaching is an independent policy and research center with a primary mission to do and perform all things necessary to encourage, uphold, and dignify the profession of the teacher and the cause of higher education. The National Science Foundation ranks UHM in the top 30 public universities in federal research funding for engineering and science and 49th overall. The no-action alternative would diminish UHM's capability to continue to thrive as the flagship campus and a Carnegie One ranked University. The potential loss of this status would mean a great loss in research funding for the State of Hawai'i.

4.2 ALTERNATIVE LOCATIONS FOR THE PROPOSED PROJECT

The alternative location option would consider future development plans aside from the Mānoa Campus as the destination for graduate research and education. As a leading research university, the goals of UHM focus on upper-division and graduate programs to attract higher level opportunities in professional development. The great majority of research and graduate students' activities seek a direct relationship to the wide, rich and diverse resources of the whole Mānoa Campus. An alternative location other than the Mānoa Campus for the proposed project would eliminate the ability to easily access these desired resources. The necessary critical mass and synergy needed to attract top level faculty and graduate students would not be available on another campus or location.

Collaborations among disciplines of oceanography, microbiology, ecology and genomics are currently made possible because of their proximity on campus within the area of the life science buildings. One of the main roles and purposes of the Center is to broker partnerships and utilize comprehensive information about microbial life in the sea to address long-term scale ecosystem problems. If an alternative site option other than the Mānoa Campus is chosen for the proposed project, the C-MORE program will have less of an opportunity to work closely with other programs like the School of Ocean and Earth Science and Technology and the Laboratory for Microbial Oceanography who currently conduct the basic research on microbial inhabitants of the sea.

While choosing an alternative location is possible and may be feasible for other programs, this alternative is likely to ultimately result in a loss of program quality, students and staff for UHM. Other campuses in the system do not have the same critical mass of facilities and people necessary to maintain a top university. UHM would probably, slowly lose its flagship quality and result in a decline in quality and reputation needed to compete in the global economy.

4.3 ALTERNATIVE DESIGN THEMES

The Planned Review Use (PRU) process of the City and County of Honolulu serves as a guideline for new facilities on campus. Alternative design themes for the C-MORE Building project have been considered based upon specified guidelines. At the time of the original design phase for the proposed project, plans and policies were based upon a 1994 PRU Update. However, the specified plans and policies related to the 1994 PRU discussed below no longer apply as a new update is currently underway which includes the proposed C-MORE Building project.

Since the C-MORE Building project was not shown on the existing master plan covered under the 1994 PRU, the project would have been required, to complete a Minor Modification to the PRU permit. A Minor Modification would have been required as long as the building addition of the project did not exceed beyond 10% expansion of the existing building footprint. The original design of the C-MORE Building was a three story structure of approximately 24,000 square feet (sf) plus an approximately 5,000 sf mechanical penthouse comprising of a fourth level. The three story height of the building was initially chosen to meet with design criteria standards set in the 2007 UH LRDP Update. The building was designed to step back on the third floor to maintain the two-story datum around the base of building. The roof/penthouse or fourth level was also planned to step back from the third floor roof to further break down and articulate the existing building.

This design theme was not chosen, however, because of a clarification that was made in relation to the 1994 PRU and the existing building footprint. Initial calculations of the existing footprint did not take into account the courtyard areas of the Biomedical Science Building. After including this area into the building footprint, the allowed area of the 10% expansion increased. Therefore, the original design theme was not chosen and the preferred project design was considered.

A new approach was taken to utilize the increased space and the design theme for the C-MORE Building project changed from three-stories to two-stories in height. There were several reasons for the change in height, including the benefits of having a larger floor plate which made the project more functional. Other reasons included a more effective design with the location of the labs directly below the mechanical penthouse and eliminating costs associated with having an additional floor.

Among the alternative designs considered, the existing design described in *Section 2.0* and *3.0* has been determined to be the best use of the available space while also being the most cost-effective. All of the design themes considered for the facility have consisted of research laboratories, offices, classrooms, meeting spaces, laboratory support and building spaces. A welcoming plaza ~~and refurbishment of the existing courtyard~~ has also been included in project designs. The current design proposed in this EA has been determined to be the best fit for the needs of project. The project meets the design criteria set by the 2007 LRDP and desires of the university as it relates to the PRU.

5.0 APPLICABALE LAND USE PLANS AND POLICIES

5.0 APPLICABALE LAND USE PLANS AND POLICIES

An important consideration in evaluating the potential impacts of a proposed action on the environment is how it may conform or conflict with approved or proposed land use plans, policies, and controls for the affected area. The C-MORE project's consistency with applicable land use policies set forth in Hawai'i State Land Use Law, the Hawai'i State Plan, the 2050 Sustainable Plan, the Coastal Zone Management Program, the City and County of Honolulu's General Plan, the Primary Urban Center Development Plan, the applicable provisions of the Land Use Ordinance, Special Management Area and Plan Review Use are discussed. Further, the UH Mānoa Long Range Development Plan (LRDP) will also address the requirements and recommendations of the proposed project.

5.1 HAWAI'I STATE LAND USE DISTRICT BOUNDARIES

Under the Chapter 205, HRS, all lands of the State are to be classified in one of four categories: urban, rural, agricultural, and conservation lands. The State Land Use Commission (LUC), an agency of the State Department of Business, Economic Development, and Tourism (DBEDT) is responsible for the standards and determining the boundaries of each district (Chapter 205-2(a), HRS). The LUC is also responsible to administer all requests for district reclassifications and/or amendments to district boundaries, pursuant to Chapter 205-4, HRS, and the Hawai'i Administrative Rules, Title 15, Chapter 15 as amended.

Discussion
The C-MORE Building property is situated within the State-designated Urban district *(Figure 5-1)*. The proposed uses within the property are consistent with urban design guidelines and permitted activities and require no district reclassification or boundary amendment.

5.2 HAWAI'I STATE PLAN

The Hawai'i State Plan establishes a statewide planning system that provides goals, objectives, and policies which detail property directions and concerns of the State of Hawai'i. Priority guidelines relating to the economy, education and the physical environment will be discussed as they relate to the C-MORE Building project. It is the goal of the State, under the Hawai'i State Planning Act (Chapter 226, HRS), to achieve the following:

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai'i present and future generations.
- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
- Physical, social, and economic well-being, for individuals and families in Hawai'i, that nourishes a sense of community responsibility, of caring, and of participation in community life (Chapter 226-4, HRS).

The objectives and policies of the State Plan that are pertinent to the C-MORE Building project are discussed below.

Figure 5-1 State Land Use Designation Map

Economy: General

The objectives for planning the State's economy include increasing and diversifying employment opportunities to provide a better economic quality of life for Hawai'i's people. It is also the objective of the State to create a diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of industries on the neighbor islands. It is the policy of the State to:

- Promote Hawai'i as an attractive market for environmentally and socially sound investment activities that benefit Hawai'i's people.
- Seek broader outlets for new or expanded Hawai'i business investments.
- Expand existing markets and penetrate new markets for Hawai'i's products and services (HRS, Chapter 226-6).

Discussion

The project will provide an impetus for future economic growth in microbial oceanography education and research. Design plans include the expansion of existing educational and research facilities. The development of this new facility provides a gathering place for scholars, researchers, and others in academia to shareware new ideas and principles as applicable to the world of microbial oceanography research, which may contribute to new market and industry growth and investment opportunities in Hawai'i.

Economy: Potential Growth Activities

It is the objective of the State to increase and diversify Hawai'i's economic base through the development and expansion of potential growth activities. It is the policy of the State to:

- Facilitate investment and employment in economic activities that have the potential for growth such as diversified agriculture, aquaculture, apparel and textile manufacturing, film and television production, and energy and marine-related industries.
- Increase research and the development of ocean-related economic activities such as mining, food production, and scientific research (HRS, Chapter 226-10).

Discussion

The integrated mixed uses of the institute for research, affiliated research, and education will avail new opportunities of economic growth in local research and development, accenting the university's achievements and aspirations in microbial oceanography and marine research. The facility will be designed to host a gamut of educational forums, which will further propel and stimulate national interest and participation in the efforts of the Center.

Socio-Cultural Advancement: Education

It is the objective of the State to adequately provide a variety of education opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations. It is the policy of the State to:

- Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.

- Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.
- Provide appropriate educational opportunities for groups with special needs.
- Provide higher educational opportunities that enable Hawai'i's people to adapt changing employment demands.
- Emphasize quality educational programs in Hawai'i's institutions to promote academic excellence.
- Support research programs and activities that enhance the education programs of the State (HRS, Chapter 226-21).

Discussion

C-MORE's programs provide opportunities to enhance personal development and educational opportunities that give people the tools to adapt to changing employment demands. Educational programs accessible for students who would like to further their education in science and technology, and specifically microbial oceanography.

Through the fortified partnerships with various partner institutions, there is a commitment to the continued development of applied research and subsequent educational programs, services, and curriculum. Education programs will focus on pre-college curriculum enhancements, in service teacher training and formal undergraduate/graduate and post-doctoral programs to prepare the next generation of microbial oceanographers. In addition to these education programs, C-MORE is committed to training the next generation of microbial oceanographers by working with K-12 students and their teachers. Their approach is to work in partnership and leverage resources with existing K-12 programs. C-MORE is particularly focused on increasing diversity by reaching out to underrepresented groups, including ethnic minorities and persons with disabilities.

Collaborative efforts with Hawai'i Education Partners, such as the Waikiki Aquarium, the Hawai'i Institute of Marine Biology and the Pacific Internship Programs for Exploring Science, and other organizations, such as the School of Ocean and Earth Science and Technology, Massachusetts Institute of Technology, Monterey Bay Aquarium Research Institute, University of California at Santa Cruz, Woods Hole Oceanographic Institute, and Oregon State University, will continue to create new linkages and applications, such as the development of creative outreach programs that are derived from the efforts of pure research.

5.3 HAWAI'I STATE FUNCTIONAL PLANS

The State Functional Plans implement the Goals, Objectives, Policies and Priority Guidelines of the Hawai'i State Plan. The Functional Plans provide the connection between State programs and State policy. Twelve functional plans have been adopted by the State Legislature, which includes the areas of Agriculture, Conservation Lands, Education, Energy, Health, Higher Education, Historic Preservation, Housing, Recreation, Tourism, Transportation and Water Resources. The Functional Plans are designed to address issues pertaining to physical resource needs and development. The functions and activities of the C-MORE Building are required to be in conformance with these functional plans. The proposed C-MORE project was not a specific implementing action within the functional plans. However, the spirit and intent of the plans as related to higher education will be respected.

5.4 HAWAI'I COASTAL ZONE MANAGEMENT PROGRAM

The Coastal Management Program (CMP) is a comprehensive state plan that establishes and enforces standards and policies to guide the development of public and private lands within the coastal areas. In the State of Hawaiʻi, the CMP is articulated in the State Coastal Zone Management (CZM) Law (Hawaiʻi Revised Statutes, Chapter 205A). The Hawaiʻi CZM Law charges the counties with designating and administering Special Management Areas (SMA) within the State's coastal areas. Any "development", as defined by the CZM Law, that is located within the SMA requires a SMA Use Permit.

Discussion
The property is situated outside of the SMA *(Figure 1-4)* and as such does not require an additional review under State CZM and County SMA rules.

5.5 2050 SUSTAINABLE PLAN

The Hawaiʻi 2050 Sustainability Plan as a long-term strategy has as its main goals and objectives respect for culture, character, beauty, and history of the state's island communities; balance among economic, community, and environmental priorities; and an effort to meet the needs of the present without compromising the ability of future generations to meet their own needs.

The 2050 Plan delineates five goals toward a sustainable Hawaiʻi accompanied by strategic actions for implementation and indicators to measure success or failure. The goals and strategic actions that are pertinent to the C-MORE Building project are as follows.

Goal One: Living sustainably is part of our daily practice in Hawaiʻi.

Strategic Actions:

- *Develop a sustainability ethic.*
- *Conduct ongoing forums and cross-sector dialogue to promote collaboration and progress on achieving Hawaiʻi's sustainability goals.*
- *Continually monitor trends and conditions in Hawaiʻi's economy, society and natural systems.*

Goal Two: Our Diversified and globally competitive economy enables us to meaningfully live, work, and play in Hawaiʻi.

Strategic Actions:

- *Develop a more diverse and resilient economy.*
- *Increase the competitiveness of Hawaiʻi's workforce.*

Goal Three: Our natural resources are responsibly and respectfully used, replenished, and preserved for future generations.

Strategic Actions:

- *Reduce reliance of fossil (carbon-based) fuels.*
- *Conserve water and ensure adequate water supply.*
- *Increase recycling, reuse and waste reduction strategies.*
- *Provide greater protection for air, and land-, fresh water- and ocean-based habitats.*

- *Research and strengthen management initiatives to respond to rising sea levels, coastal hazards, erosion and other natural hazards.*
- *Develop a comprehensive environmental mapping and measurements system to evaluate the overall health and status of Hawai'i's natural ecosystems.*

Goal Four: Our community is strong, healthy, vibrant and nurturing, providing safety nets for those in need.

Strategic Actions:

- *Strengthen public education.*

Goal Five: Our Kanaka Maoli and island cultures and values are thriving and perpetuated.

Strategic Actions:

- *Honor Kanaka Maoli culture and heritage.*

Discussion

The C-MORE Building Project addresses sustainability through incorporating goals and visions of the university as a leader in environmental sustainability. The C-MORE program is committed to perpetuating Hawai'i's culture while furthering educational and economic development in an environmentally sensitive way. C-MORE partners with a number of educational programs, many of which are Native Hawaiian serving organizations, such as Ka 'Imi 'Ike, Na Pua No'eau and Ka Hana 'Imi Na'auao, to share information and train the next generation of microbial oceanographers. C-MORE will strengthen research and education in microbial oceanography and long-term scale ecosystem problems in Hawai'i and will lend to the future support, economic incentives and opportunities, and continuance of educational outreach programs.

The project design of the C-MORE Building incorporates green building design using water saving features and energy saving features such as photovoltaic panels and a green roof. The project also integrates Hawaiian culture through the use of native plants and landscaping elements that are representative of the natural and cultural landscape. Themes and visions of the LRDP such as a globally connected Hawaiian place of learning, leadership and service are also key components that are integrated in the planning and design of the C-MORE Building.

5.6 CITY AND COUNTY OF HONOLULU GENERAL PLAN

Adopted by resolution in 1977, the General Plan for the City and County of Honolulu sets forth the long-range objectives for the general welfare and prosperity of the people of O'ahu and broad policies to attain those objectives. The General Plan provides objectives and policies intended to guide and coordinate City land use planning and regulation, and budgeting for operations and capital improvements. Provided below are the applicable objectives and policies of the City and County of Honolulu General Plan.

The objectives and policies of the City and County of Honolulu General Plan that are pertinent to the C-MORE Building project are discussed below.

Economic Activity

Objective D: To make full use of the economic resources of the sea.
Policy 2: Encourage the development of aquaculture, open research, and other ocean-related activities.

Discussion
The new C-MORE building allows the Center to provide a major expansion and stimulus in the pure and applied disciplines of microbial oceanography and marine science, thereby affording new economic incentives and opportunities that will contribute in stimulating and stabilizing the local economy.

Natural Environment

Objective A: To protect and preserve the natural environment.
Policy 10: Increase public awareness and appreciation of O'ahu's land, air, and water resources.

Discussion
The new facility will allow C-MORE to continue its commitment and service in the development of programs pertaining to water resources and protection through the continued partnerships with community organizations, private entities, as well as local and federal governmental agencies. These programs include a critical research and educational component that is intended to increase the knowledge, understanding, and appreciation of the general public as to the importance of natural environments and their inherent resources.

Physical Development and Urban Design

Objective E: To create and maintain attractive, meaningful, and stimulating environments throughout O'ahu.
Policy 5: Require new developments in stable, established communities and rural areas to be compatible with the existing communities and areas.

Discussion
The C-MORE Building will be a part of the Biomedical Science Building at UHM. The existing Biomedical Science Building was designed by world-renowned architect Edward Durell Stone in the early 1960's The design of new facility will maintain the character of the existing building and other life science buildings in the area. Design guidelines will strive to seek harmony among elements of the built and natural environments of the Mānoa Campus through design, detail, and selection of color and materials used in creating appropriate balance and scale of the island's facilities.

Health and Education

Objective B: To provide a wide range of educational opportunities for the people of O'ahu.
Policy 1: Support education programs that encourage the development of employable skills

Policy 2: Encourage the provision of informal educational programs for people of all groups.
Policy 5: Facilitate the appropriate location of learning institutions from the preschool through the university levels.

Objective C: To make Honolulu the center of higher education in the Pacific.
Policy 1: Encourage continuing improvement in the quality of higher education in Hawai'i.
Policy 2: Encourage the development of diverse opportunities in higher education.
Policy 3: Encourage research institutions to establish branches on O'ahu.

Discussion
As previously stated, existing and future educational programs will continue to sponsor the prominent commitment of the Center to strive for a refined and distinctive quality standard of academic excellence within the Pacific. Education programs within C-MORE will provide an expanded the knowledge and expert capabilities relative to marine and oceanography resources. Planned programmatic development of outreach and educational programs will enhance the Center's role as a learning institution across the Pacific for students of all age groups.

5.7 CITY AND COUNTY OF HONOLULU PRIMARY URBAN CENTER DEVELOPMENT PLAN

The City and County of Honolulu Primary Urban Center (PUC) includes the communities from Wai'alae-Kahala to Pearl City. It is the most populated part of the State of Hawai'i and is O'ahu's largest employment center. In keeping with the policies of the general plan, the PUC is planned to efficiently accommodate more intensive commercial, governmental, residential and recreational functions in a manner that safeguards and adds to the existing amenities of the city's urban environment.

The Development Plan for the PUC describes the desired urban character and the significant natural, scenic and cultural resources. It includes general guiding principles for the PUC and area specific guiding principles for campuses that detail appropriate land uses. The C-MORE Building project is located in the PUC (*Figure 5-2*). The applicable guiding principles are listed below.

1) Stimulate development of high technology and knowledge-based industries. Take advantage of Honolulu's active urban ambience to attract high-technology businesses. Use State lands in Kakaako for a campus dedicated to biomedical research and other high-technology businesses. Encourage investment in infrastructure in commercial buildings to accommodate and attract high-technology and biotechnology businesses.

2) Provide usable open space. Zoning requirements and bonus provisions for open space associate with larger office buildings should specify design guidelines for usable plazas, parks, and arcades. Key elements of open space are enclosure, shade, seating, and location at street level.

Discussion
C-MORE is designed to facilitate a more comprehensive understanding of microorganisms in the sea. New technology and knowledge-based research such as microbial oceanography attract academic partnerships and high-technology business and development. Leading edge research ventures and technology based businesses typically locate near other office and laboratory facilities. The investment of the new C-MORE Building will accommodate and bring interest from high-technology businesses and related industries.

All campuses located in the PUC, such as UHM, contribute to the urban open space network. Visible landscaped grounds at UHM demonstrate the use of design guidelines that provide key elements of usable open space.

5.8 CITY AND COUNTY OF HONOLULU LAND USE ORDINANCE GUIDELINES

The purpose of the County Land Use Ordinance (LUO) is to regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the O'ahu general plan and development plans. The LUO is intended to provide reasonable development and design standards. These standards are applicable to the location, height, bulk and size of structures, yard areas, off-street parking facilities, and open spaces, and the use of structures and land for agriculture, industry, business, residences or other purposes (Revised Ordinance for the City and County of Honolulu, Chapter 21).

Discussion
The C-MORE Building is located on the UHM Campus. The UHM Campus site is zoned as Residential District (R-5 and R-7.5) (*Figure 1-3*). Pursuant to the City's Land Use Ordinance, the use of these zoning districts for University facilities is permitted provided a Plan Review Use (PRU) has been approved by the City Council.

Pursuant to Land Use Ordinance Section21-2.120-3(b)(2), a new PRU application will be submitted for processing upon completion of conditions of the existing PRU No. 88/PRU-3 (Resolution No. 89-411, CD-2) approved in 1989. The C-MORE project is under the University of Hawai'i at Mānoa Long Range Development Plan 2007 Update which requires a new PRU permit. The project is being reviewed independently of but also in conjunction with the new PRU permit application.

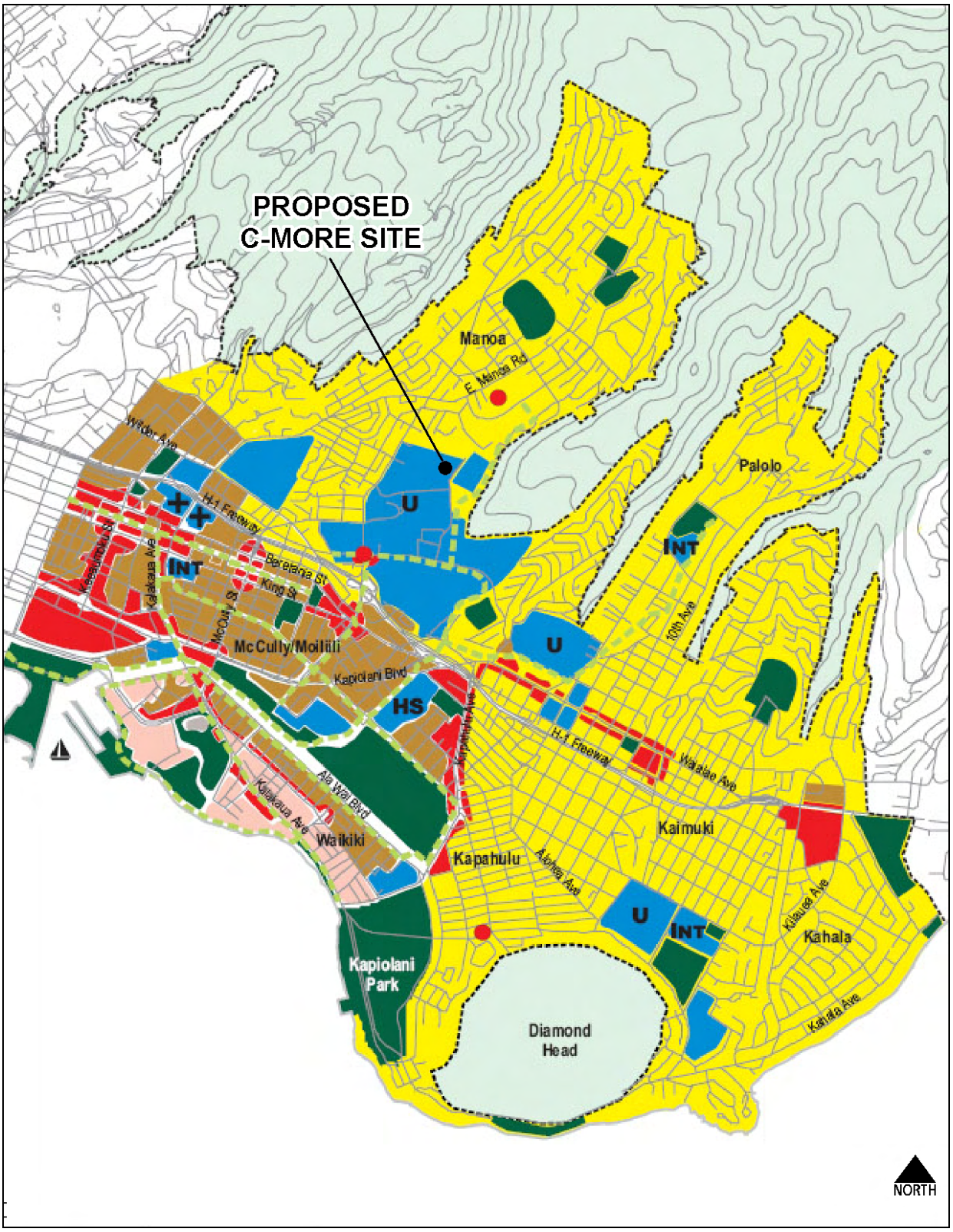

Figure 5-2 Primary Urban Center Development Map, Department of Planning and Permitting City and County of Honolulu, June 2004.

5.9 PLAN REVIEW USE

The purpose of the PRU is to establish a review and approval mechanism for uses of a permanent and institutional nature which, because of characteristics fundamental to the nature of the use, provide essential community services but which could also have a major adverse impact on surrounding land uses.

The intent is that the design and siting of structures and landscaping, screening and buffering for these uses can be master planned so as to minimize any objectionable aspects of the use or the potential incompatibility with other uses permitting the zoning district.

The general provisions for a PRU are that a master plan, spanning at least five years, shall be submitted and shall be reviewed and commented upon by all applicable city, state and federal planning and development agencies. The proposed master plan shall encompass the entirety of all lots for which the PRU is applied. The master plan may consist of both existing and future development; future development in the plan shall indicate general height and bulk concepts, land expansion, landscaping, setbacks and buffering of adjacent parcels.

The master plan shall be approved by City Council Resolution. Only uses and structures in the approved master plan shall be permitted on the subject lots. Density, height and yards shall be determined by taking into consideration the surrounding land use, adopted land use policy and applicable zoning regulations. Parking, loading and sign requirements shall be specified in the approval of the plan.

Subsequent to City Council approval, the Director of the Department of Planning and Permitting shall approve drawings before building permits are issued, in accordance with the approved plan. While the director may approve minor amendments to the plan, other proposed amendments to an approved plan shall require council approval.

Discussion
In 1989, a PRU was approved for the original LRDP for the five-year Master Plan for the expansion of the UHM Campus (City Council Resolution No.89-411, CD-2, as amended). ~~An amendment~~ A major modification to the ~~original PRU~~ Master Plan to increase the seating capacity of the Special Events Arena was ~~as~~ adopted in 1992 (Resolution No. 92-286) to accommodate the development of the Stan Sheriff Center. A major modification to the master plan was also approved for the redevelopment of Frear Residence Hall by Resolution No. 06-255, CD-1. At this time a PRU application is being prepared for the 2007 update to the LRDP.

5.10 THE UNIVERSITY OF HAWAI'I AT MĀNOA STRAGTEGIC PLAN 2002-2010

The University of Hawai'i at Manoa Strategic Plan, 2002-2010 is responsive to focusing on achieving key strategic goals for the University. The C-MORE Building project advocates the following goals and objectives of the University of Hawai'i at Mānoa's Strategic Plan:

Goal 2: A Learning, Research, and Service Network
Objective 1: To excel in basic and applied research for the discovery and dissemination of new knowledge.

Objective 2: To support Hawai'i's economy, workforce development, and improved access and flow of education in Hawai'i from preschool through a lifetime of learning by building partnerships within the University and with other public and private educational, governmental, and business institutions.

Goal 4: Investment in faculty, staff, students, and their environment.
Objective 2: To create positive, healthful, resource efficient, and sustainable physical environments on the campuses of the University that enhance the psychological well-being of the students, employees, and community members.

Discussion
The C-MORE Building project promotes the goals of the University of Hawai'i at Mānoa Strategic Plan by providing resources to carry out its educational programs, research, and training opportunities. The Center will design and conduct research aimed at creating new knowledge using comprehensive information about microbial life in the sea. Partnerships with the program will be used to advance current knowledge and to provide outreach to the public through educational programs. C-MORE is committed to training the next generation of microbial oceanographers by working with K-12 students and their teachers and other private and public organizations.

5.11 LONG RANGE DEVELOPMENT PLAN (LRDP), UNIVERSITY OF HAWAI'I AT MĀNOA 2007 UPDATE

The 2007 Update to the LRDP for the University of Hawai'i at Mānoa is based on planning principles established in the 1987 UHM LRDP. Its purpose is to update the Plan to reflect current and upcoming educational priorities by planning for future buildings and projects in the next 5-10 years. The Update also addresses current space and activity needs on campus while incorporating several new themes and visions developed through collaboration with administration and constituent bodies associated with UHM.

The C-MORE Building project is considered to be one of the capital improvement priorities of the University as it is included in the updated LRDP. This infill project located at the south entrance of the existing Biomedical Science Building maximizes surrounding open space and provides C-MORE students and faculty with improved campus structures for enhanced learning and working environments. The C-MORE Building project advocates the following themes and visions of the UH LRDP:

5.11.1 Major Themes of the LRDP

1. Globally Connected Hawaiian Place of Learning, Leadership and Service
This theme envisions the campus as a physically appropriate Hawaiian place as it functions as a global center of learning, leadership and service.

Discussion
The proposed facility will create a new gateway to the Biomedical Science Building and a

signature identity to the C-MORE program. The new building will be a physically appropriate Hawaiian place as it functions as a global center of learning, leadership, and service to the public. The Hawaiian identity of the campus will be enhanced through selected landscaping elements that promote a cultural and natural landscape while integrating with the surrounding built environment. In addition, the project will serve the traditional Hawaiian concept of mālama 'āina through proper planning techniques such water-saving landscaping practices. Renovation of the existing south courtyard with landscape pavers and new native plantings will create a welcoming and pleasant outdoor experience, making the Life Science Building a people friendly place to work and study.

2. Livable Urban Campus
   This theme envisions a lifestyle for faculty, students, researchers, staff, and visitors which is available in urban communities, which attract young, intellectually, and physically active students and experienced faculty and research members who are seeking a good quality of life.

Discussion
The C-MORE Building will add to the urban campus lifestyle by supporting themes of a live, learn, work, and play environment described in the LRDP. Project design will enhance the existing space by creating and reinforcing synergies between the life science buildings in the area. The C-MORE facility will consist of research laboratories, offices, and classrooms, in addition to pleasant meeting spaces and courtyards with an inviting space for casual dining in a café-like setting for students, faculty and visitors. This type of project design available in an urban community will attract students, faculty, and research members who desire a good quality of life.

3. Outdoor Spaces for Living and Learning
   This theme envisions the spaces between buildings as either "outdoor rooms" functioning in concert with indoor spaces as venues for education, social gathering, recreation, contemplation, unprogrammed uses, or as outdoor corridors.

Discussion
The C-MORE Building will be a functional use of an existing open space adjacent to the Life Science Building. The proposed design elements include a number of spaces for outdoor meetings, study, and gathering. The landscape plaza of the south side entry of the building will be welcoming and inviting having shaded pathways and landscaping complementing the artistic and contemporary elements of the building and surrounding areas.

4. UHM – Leader in Environmental Sustainability
   This theme envisions the campus as a laboratory, model, and institutional leader for sustainable practices.

Discussion
Sustainable design and energy efficiency are incorporated as a supporting theme for the design of the C-MORE facility. The C-MORE Building project is envisioned as a model for laboratory design and for sustainable, energy efficient laboratory facilities. The project is designed with a fully integrated approach as it attempts to meet the Labs 21 guidelines, Leadership in Energy and Environmental Design (LEED) standards, and other aspects of sustainability, lab safety and

flexibility. Energy and water saving features, and perhaps the incorporation of renewable energy technologies are a few aspects of the sustainable design planned for the project. Additionally, green roofs and photovoltaics are proposed for the roof/penthouse of the building. The project is expected to be designed to achieve LEED certification.

5.11.2 LRDP Plan Book B: Upper Center Campus

Plan Book B, Upper Center Campus, is one of the design elements specific to an area of the Mānoa Campus contained in the UH LRDP. The Upper Center Campus site contains the existing Biomedical Science Building where the new C-MORE Building is proposed *(Figure 5-3)*. The C-MORE Building will be an infill project on the south courtyard entrance of the Biomedical Science Building. The UH LRDP's plans for the Upper Campus include the C-MORE Building as an educational priority and future project. Design criteria for the research space are discussed below.

1. The proposed Research Space should be a maximum of three stories in height, with the first two stories related in height to the top of the court buildings of the Biomedical Building.

Discussion
The existing court buildings of the Biomedical Building are two stories in height. The new C-MORE Building will also be two stories in height aligning with the top of the existing court buildings.

2. The architectural character of the Research Space should be compatible with the character of the existing building. This compatibility may, as with the Biogenesis Laboratory, be in contrast. The Research Space should appear to be a sympathetic extension of the existing Biomedical Sciences Building.

Discussion
The architectural character and design of the C-MORE building will be a complimentary contrast with the existing Biomedical Building with key signature elements of the original building's column the use of scoring surfaces interplayed within the new building. Project design will maintain the buildings two-story datum around the base, respecting the existing Biomedical Science Building, and will include the use of complementary building materials such as stone.

3. The design of the Research Space should partially maintain and incorporate the existing courtyard space.

Discussion
The project design will incorporate the existing courtyard space making it an inviting space for casual dining in a café like setting for students, faculty and visitors. Allocation of space for food service operation is expected to be built into the ground floor.

Figure 5-3 UH-Mānoa LRDP, Upper Campus Master Plan

4. The landscape treatment should be simple in design and execution, allowing for minimal maintenance. The new landscaping should be designed to blend with existing landscape.

Discussion

Landscape design will be simple using plants that will blend with the existing landscape. Native plants such as 'ekahakaha and wauke may be used to provide a cultural overlay to the landscape and trees such as Polynesian introduced canopy trees and native loulu palms will be planted to provide shade. Landscape treatment will be simple, requiring minimal maintenance while enhancing the C-MORE Building and surrounding areas.

5. The expansion should maintain the pedestrian entry to the entire complex on the ma kai side.

Discussion

The entry for the new C-MORE Building will maintain the pedestrian entry to the complex.

6.0 FINDINGS SUPPORTING ANTICIPATED DETERMINATION

6.0 FINDINGS SUPPORTING ANTICIPATED DETERMINATION

6.1 ANTICIPATED DETERMINATION

After reviewing the significance criteria outlined in Chapter 343, Hawai'i Revised Statutes (HRS), and Section 11-200-12, State Administrative Rules, Contents of Environmental Assessment, the proposed action has been determined to not result in significant adverse effects on the natural and human environment. A Finding of No Significant Impact (FONSI) is anticipated for this project.

6.2 REASONS SUPPORTING THE ANTICIPATED DETERMINATION

The potential impacts of the planned development of the C-MORE Building project have been fully examined and discussed in this Draft Environmental Assessment. As stated earlier, there are no significant environmental impacts expected to result from the proposed action. This determination is based on the assessments as presented below for criterion (1) to (13).

(1) Involve an irrevocable loss or destruction of any natural or cultural resources.

As detailed in *Section 3.0* of this report, the project does not involve any known permanent loss or destruction of existing natural or cultural resources. Although there is a selection of trees that will need to be removed and relocated from the existing landscaped entry, these species do exist within the project area or elsewhere on campus. Coordination between the University Landscape Architect and the applicant will be ongoing to determine where these trees can be relocated.

There are no known surface historic resources within or near the project area. However, there is one area of concern where measures have been appropriately mitigated to ensure natural and cultural resources are protected. As discussed, the potential for unknown subsurface historic properties, including burials, may be a possibility anywhere within the UH campus area. However, given the known traditional land tenure and use patterns, practices, and conditions of the project area as part of the vast tributary and spring system that supplied freshwater to terraced lo'i, the potential may be less than other high sensitive areas within the campus area, such as Koana Cave, Kānewai, etc.

In general, if any cultural, historic or archaeological resources are encountered during pre-planning and construction related activities, the State Department of Land and Natural Resources (DLNR), Historic Preservation Division (SHPD) and other parties of interest will be notified and the treatment of these resources will be conducted in strict compliance with the applicable historic preservation and burial laws.

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

The C-MORE Building project is part of an overall update and improvement effort within the UHM Campus. The proposed activities will not curtail the range of beneficial uses of the environment. The enhancements to the research and educational experience of the university that is anticipated upon completion of this project will continue to be compatible with the improvements to the surrounding environment and character within the immediate area of the campus and in Mānoa in general. Any use will curtail the range but the C-MORE use is a beneficial use. Also, design changes have optimized the beneficial use of the site.

(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 activities do not 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.

(4) Substantially affects the economic or social welfare of the community or State.

Short-term economic benefits anticipated during construction and landscaping will include direct, indirect, and induced employment opportunities and multiplier effects but not at a level that would generate significant expansion. Long-term economic benefits anticipated during future operations include enabling future growth for the C-MORE program which will help the University bring in external research dollars and global opportunities. Opportunities such as this will help to diversity the existing research industry and employment within Hawai'i. The project will also improve social welfare by providing both a venue and program that creates new knowledge and overall appreciation of our natural resources and expand educational opportunities to a wide range of people from K-12 and beyond.

(5) Substantially affects public health.

The project is not expected to substantially affect public health. However, there will be temporary short-term impacts to air quality emanating from possible dust emissions and temporary degradation to of the acoustic environment in the immediate vicinity resulting from the used construction equipment. Since the project is an infill to the existing courtyard of the Biomedical Science Building, arrangements will be made to minimize effects to on-going classes in the area. Construction related impacts of noise, dust, and emissions will be mitigated by compliance with the State Department of Health's Administrative Rules regulating these activites. The anticipated duration of construction is 15 months.

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

The approval will not have substantial secondary impacts, such as population changes or effects on public facilities. The project will enhance much needed education and research facilities at the UHM Campus to support the existing C-MORE program. Faculty, students and staff will be relocated from the Marine Science Building. Overall impacts to public facilities are minor and insignificant as these activities have occurred on campus for decades and are seen as part of existing conditions and part of the organic evolution of the campus.

(7) Involves a substantial degradation of environmental quality.

The proposed building will not involve a substantial degradation of environmental quality. Improvements to the project area will transform the life science buildings and the Upper Central Campus into a comprehensive and collaborative space for advanced research and education. These improvements would not create impacts to known natural or cultural environmental resources. The improvements will also enhance the live-work-play concept with new amenities beyond the direct research lab facilities.

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

The C-MORE Building project is a small part of the overall improvements adopted in the LRDP for the Mānoa Campus. However, the project is not a precursor for other future actions.

(9) Substantially affects a rare, threatened or endangered species, or its habitat.

The current vacant area on the south courtyard of the existing Biomedical Science Building contains no identified rare, threatened, or endangered species of terrestrial fauna or avifauna.

(10) Detrimentally affects air or water quality or ambient noise levels.

General short-term impacts associated with construction of the facility have been identified in this EA. Mitigation measures which are outlined in the EA will be applied during the on-going construction activity of the C-MORE Building. No detrimental long-term impacts to air, water, or acoustic quality are anticipated with the proposed improvement. The approval will not detrimentally affect air or water quality or ambient noise levels.

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

The C-MORE Building lies within Zone X (500 year flood) and lies outside of the designated tsunami zone. The project will take appropriate measures, such as using floodwalls, to prevent future flooding in the area. Proposed improvements to the existing Biomedical Science Building will comply with necessary design requirements and building codes within the flood district.

(12) Substantially affects scenic vistas and view-planes identified in county or state plans or studies.

The proposed project entails the construction of a two-story structure and is an infill to the south courtyard of the existing Biomedical Science Building. The facility will maintain the two-story height around the base of the building and enhance the Upper Central Campus area. Visual access to the mountains from ma uka roadways or from within the campus will not be impacted by the project.

(13) Require substantial energy consumption.

The additional 28,004 sf building project would increase power consumption needs of the UHM Campus and the Mānoa area. However, energy saving features will be incorporated such as the use of photovoltaic panels on unused roof surfaces, energy efficient lighting, and systems for air-conditioning, and water heating to minimize actual consumption from fossil fuel based sources. The project will use the latest in green building design and is expected to achieve a minimum level of LEED Silver.

6.3 SUMMARY

Based on the above findings, we think the improvements proposed in the C-MORE Building project do not have significant socio-economic or environmental impacts. The Environmental Assessment recommends mitigation measures to alleviate impacts when identified.

The C-MORE Building project is consistent with the Hawai'i State Land Use District Boundaries; the Hawai'i State Plan and Functional Plans; the Hawai'i Coastal Zone Management Plan, the City's General Plan and Development Plan; the City's Zoning Ordinance; the University's Strategic Plan and Long Range Development Plan.

The proposed C-MORE Building project will provide improvements that will have beneficial effects on the UHM Campus and the surrounding neighborhoods. The proposals would improve the quality of building design, create a "sense of place," preserve and enhance the natural and cultural resources, and generally improve the overall student experience.

7.0 LIST OF REFERENCES

7.0 LIST OF REFERENCES

Documents

City and County of Honolulu. *Resolution 89-411, CD-2.*

City and County of Honolulu. *Resolution 92-286.*

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Group 70 International Inc. (2008). *Long Range Development Plan*, University of Hawai'i, Mānoa Campus, Draft Environmental Assessment

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Institutional Research Office, University of Hawai'i. *Enrollment Projections, 2007, University of Hawai'i, Mānoa Campus*

Parking Planners (October 2008). *Parking Supply/Demand Study & Site Alternatives Evaluation*

University of Hawai'i, Mānoa Campus (November 2002), *Defining Our Destiny: Strategic Plan 2002-2010.*

Websites

http://hahana.soest.hawaii.edu/lab/ Accessed on September 12, 2008

http://www.soest.hawaii.edu/cmore/index.htm Accessed on September 9, 2008

http://www.soest.hawaii.edu/soest_web/soest.departments.htm Accessed on September 12, 2008

http://www.uhm.hawaii.edu/about/ Accessed on October 13, 2008

8.0 LIST OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS RECEIVING COPIES OF THE EA

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Respondents and Distribution	Pre-Consultation	Pre-Consultation Comments Received	Received Draft EA	Comments Received	Receiving Final EA/ FONSI
State of Hawai'i Agencies					
Department of Business, Economic Development & Tourism (DBEDT), Office of Planning	X		X		X
DBEDT, Strategic Industries Division	X	X	X	X	X
Department of Land and Natural Resources (DLNR)	X	X	X		X
DLNR, Historic Preservation Division	X	X	X		X
Department of Health	X		X	X	X
University of Hawai'i, Environmental Center			X		X
Office of Environmental Quality Control	X		X		X
Office of Hawaiian Affairs	X	X	X	X	X
City and County of Honolulu					
Board of Water Supply	X	X	X	X	X
Department of Design and Construction	X	X	X	X	X
Department of Planning and Permitting	X		X	X	X
Department of Parks and Recreation			X		X
Department of Environmental Services	X		X		X
Department of Facility Maintenance			X	X	X
Department of Transportation Services			X	X	X
Department of Wastewater Management			X		X
Honolulu Fire Department			X	X	X
Honolulu Police Department			X	X	X
Elected Officials					
State Senator Brian Taniguchi			X		X
State House Representative Kick Caldwell			X		X
Council District Representative Ann Kobayashi			X		X
Libraries					
Mānoa Public Library			X		X

Respondents and Distribution	Pre-Consultation	Pre-Consultation Comments Received	Received Draft EA	Comments Received	Receiving Final EA/ FONSI
Hawai'i State Library					X
UH Hamilton Library			X		X
Citizen Groups, Individuals & Consulted Parties					
Neighborhood Board No. 7, Mānoa	X		X		X
Mālama O Mānoa	X		X		X

APPENDIX A.
COMMENT LETTERS AND RESPONSES

PRE-CONSULTATION SUMMARY

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

September 18, 2008

Subject: Pre-Consultation for Draft Environmental Assessment (EA)
Center for Microbial Oceanography Research and Education (C-MORE)
Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003

Dear Participant:

On behalf of the University of Hawai'i at Mānoa, Facilities Planning and Management Office, Group 70 International, Inc. is currently undertaking the preparation of a Draft EA for the Center for Microbial Oceanography Research and Education (C-MORE) Building. This proposed facility will be used to facilitate a more comprehensive understanding of the diverse assemblages of microorganisms in the sea through designing and conducting novel research, creating partnerships and implementing educational programs. The C-MORE Building is one of the proposed projects included in the 2007 Long Range Development Plan for the University of Hawai'i Mānoa Campus, which reflects the University's educational priorities for the next 5-10 years.

We are beginning with a pre-consultation process to notify and consult with agencies and interested parties to identify any critical issues that should be considered in our environmental review. Enclosed for your review and comment is a project information summary and overview of the proposed action.

Please provide comments regarding the scope of our assessment via telephone, email, fax, or U.S. Mail. We would like to receive these comments no later than Wednesday, October 2, 2008. Comments received subsequent to this deadline will still be considered in participation of the Draft EA. Please forward your comments to:

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813-4307
Attn: George Atta
Tel: (808)-523-5866 Ext. 103
Fax: (808)-523-5874
Email: gatta@group70int.com

Thank you for your time and participation in the pre-consultation phase for this environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

George I. Atta
Principal Planner

Enclosed: Pre-Consultation Summary

PRE-CONSULTATION SUMMARY

This Pre-Consultation Summary has been prepared in accordance with the requirements of Chapter 343, HRS and Hawai'i Administrative Rules, Title 11, Department of Health, which sets forth the requirements for the preparation of environmental assessments.

1.1 PROJECT INFORMATION SUMMARY

Type of Document:	Environmental Assessment (EA)
Applicant:	Facilities Management Office University of Hawai'i at Mānoa 2002 East-West Road Honolulu, HI 96822
Accepting Authority:	Office of Senior Vice President for Administration University of Hawai'i at Mānoa 2444 Dole Street Honolulu, HI 96822
Project Name:	Center for Microbial Oceanography Research and Education (C-MORE) Building
CH. 343, HRS Trigger:	Use of State Land
Project Location:	Mānoa Valley, Honolulu, Island of O'ahu *(Figure 1.1)*
Tax Map Key:	2-8-23:003
Landowner:	State of Hawai'i, University of Hawai'i at Mānoa
Project Area:	24,000 square feet
State Land Use District:	Urban
City& County Zoning:	Residential R-5
City & County Development Plan:	Primary Urban Center, Public Facilities
SMA:	Not in SMA
Flood Zone:	Zone X (500 Year Flood)
Existing Approvals:	Board of Regents Approved University of Hawai'i Long Range Development Plan (LRDP) (2007) City and County of Honolulu Planned Review Use (PRU) Permit (2008)
Anticipated Determination:	Finding of No Significant Impact (FONSI)

1.2 PROJECT SITE

The University of Hawai'i, Mānoa Campus (UHM) occupies some 304 acres on land in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mō'ili'ili and McCully communities. Its principal physical borders are the Mānoa residential community on the ma uka side, the Wa'ahila Ridge on the Kokohead side, the H-1 Freeway on the ma kai side and the lower Mānoa and McCully residential communities on the 'Ewa side (*Figure 1.1*).

The existing Biomedical Science Building (also known as the Life Science Building) at UHM is the location for the proposed Center for Microbial Oceanography Research and Education (C-MORE) Building (*Figure 1.2*). This building is located on the ma uka portion of the Mānoa Campus, adjacent to the Pope Laboratory, Sherman Laboratory, Auxiliary Services, and Agricultural Science Institute. C-MORE will be an addition within the south entrance courtyard of the Biomedical Science Building among the existing life science buildings in this part of campus.

Primary vehicular accesses to the project site are from the H-1 Freeway, University Avenue, Dole Street and Old Wai'alae Road. Public transportation is primarily provided by regular bus services on King Street, University Avenue, Dole Street and Metcalf Street. The bus service includes routes through the campus via East-West Road and Maile Way. The Mānoa Campus is also served by direct express bus service from the outlying communities.

Current enrollment is at UHM is approximately 20,000 students. In addition to student enrollment, faculty and staff number almost 6,000. The daytime population is about 30,000.

1.3 OVERVIEW OF PROPOSED PROJECT

C-MORE is a recently established Science and Technology Center designed to facilitate a more comprehensive understanding of the diverse assemblages of microorganisms in the sea. The range of study includes the genetic basis of marine microbial biogeochemistry including the metabolic regulation and environmental controls of gene expression, to the processes that underpin the fluxes of carbon, related bioelements and energy in the marine environment.

The new C-MORE Building will house the Center's research and educational component and will be part of the exiting Biomedical Science Building. The existing building is currently used for life science studies and supports several faculty, students, and staff.

The new 24,000 square foot C-MORE Building would be a two-story structure and consist of research laboratories, offices, classrooms, meeting spaces, laboratory support and building support spaces. The project may also include refurbishment of the existing courtyard and the inclusion of a new landscape design to promote outdoor meeting and gathering spaces. Planned project design for the C-MORE building will provide a fundamental connection between the surrounding life science buildings and the UHM Campus.

C-MORE will design and conduct novel research, new broker partnerships, increase diversity of human resources, implement education and outreach programs, and utilize comprehensive information about microbial life in the sea. The Center will bring together teams of scientists, educators and community members to communicate, collaborate and design creative solutions to long-term ecosystem problems. The Center's activities will be dispersed among five partner institutions: Massachusetts Institute of Technology, Woods Hole Oceanographic Institute,

Monterey Bay Aquarium Research Institute, University of California at Santa Cruz and Oregon State University.

This new research space is included in the recent 2007 update of the Long Range Development Plan (LRDP) prepared for the University of Hawai'i, Mānoa Campus. The LRDP was updated to reflect current and upcoming educational priorities by planning for future buildings and projects anticipated for development within the next 5-10 years.

1.4 PURPOSE OF ENVIRONMENTAL ASSESSMENT

The Environmental Assessment will be prepared in compliance with Hawaii Revised Statutes, Chapter 343, which requires that any program or project that proposes the use of State or County lands must undergo an environmental review. The C-MORE project proposes to use State land as it is located on the Mānoa Campus of the University of Hawai'i.

1.5 AGENCIES AND PUBLIC CONTACTED IN PRE-CONSULTATION PROCESS

The following agencies and groups having jurisdiction or a potential interest in the on-going development of the Center have been consulted for this pre-consultation period.

State of Hawai'i Agencies
Department of Business, Economic Development & Tourism (DBEDT), Office of Planning
DBEDT, Strategic Industries Division
Department of Health
Department of Land and Natural Resources (DLNR)
DLNR, State Historic Preservation Division
Office of Environmental Quality Control
Office of Hawaiian Affairs

City and County of Honolulu Agencies
Board of Water Supply
Department of Design and Construction
Department of Planning and Permitting
Department of Environmental Services

Community Groups and Associations
Neighborhood Board No. 7, Mānoa
Mālama O Mānoa

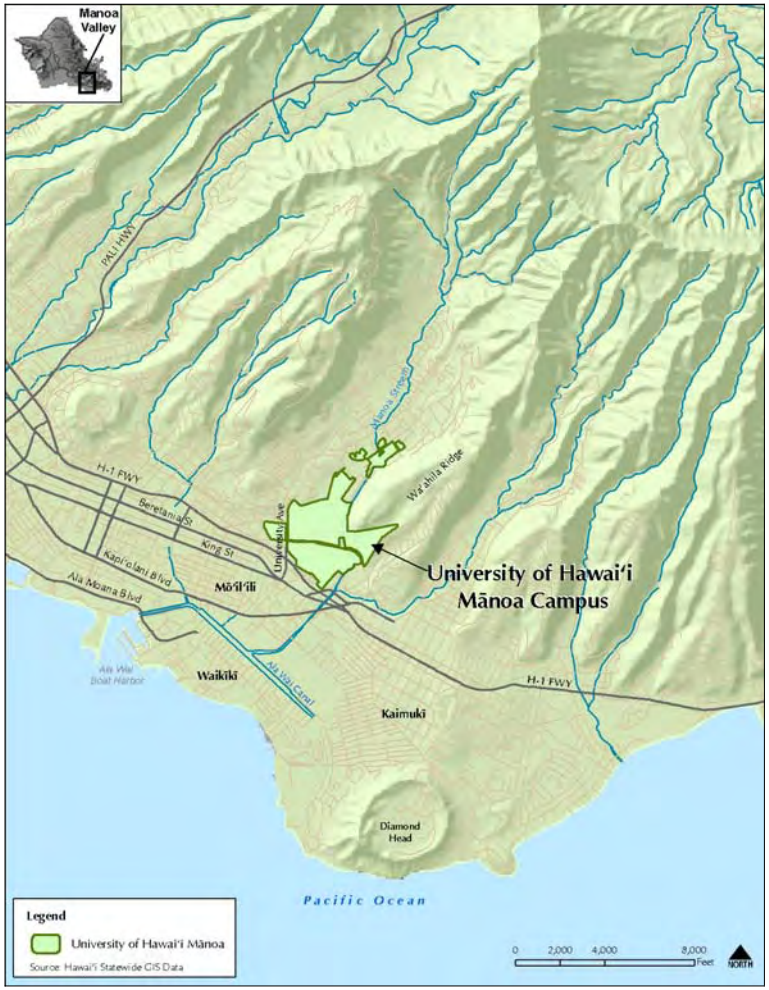

Figure 1.1 Project Location

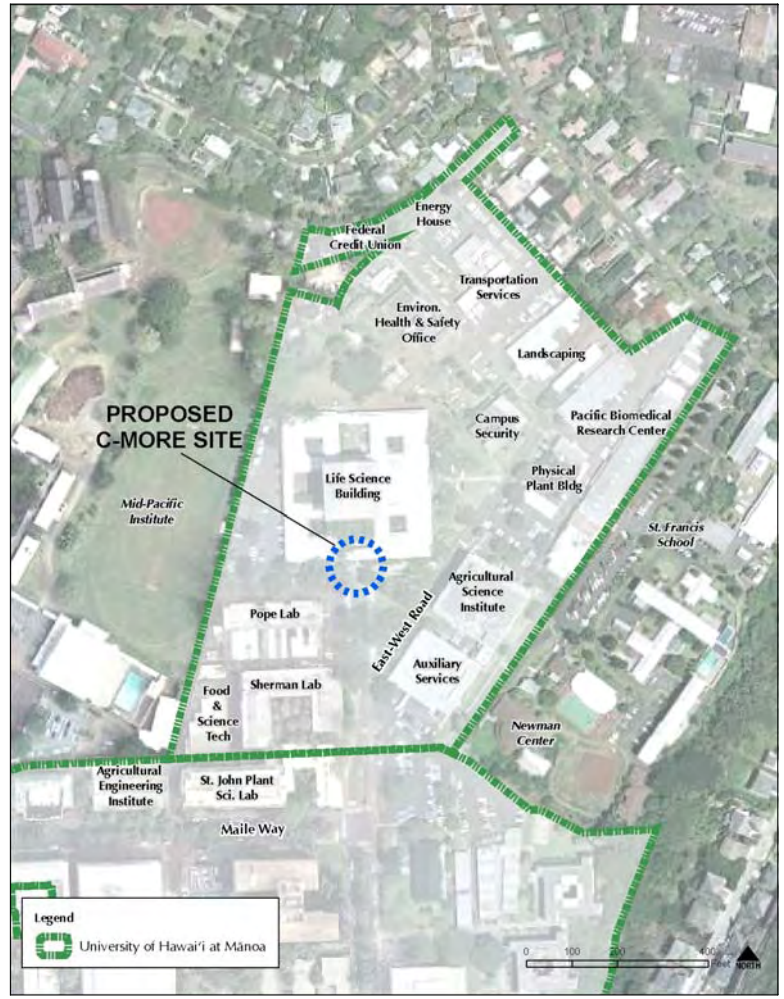

Figure 1.2 Aerial with Project Site Identified

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR

STRATEGIC INDUSTRIES DIVISION
235 South Beretania Street, Leiopapa A Kamehameha Bldg., 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-3807
Fax: (808) 586-2536
Web site: www.hawaii.gov/dbedt

OCT - 9 2008

October 2, 2008

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307
Attn: George Atta

Re: Pre-consultation for the Draft Environmental Assessment (EA) Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawaii Manoa Campus (Manoa Valley, Honolulu, Hawaii) TMK: 2-8-23:003

In response to your pre-consultation notice dated September 18, 2008, thank you for the early opportunity to provide comments on the proposed Center for Microbial Oceanography Research and Education at the University of Hawaii at Manoa.

We would like to call your attention to: (l) State energy conservation goals; and, (2) energy and resource efficiency and renewable energy and resource development.

1. **State energy conservation goals.** Project buildings, activities, and site grounds should be designed and/or retrofitted with energy saving considerations. The mandate for such consideration is found in Chapter 344, HRS ("State Environmental Policy") and Chapter 226 ("Hawaii State Planning Act"). In particular, we would like to call to your attention HRS 226 18(c) (4) which includes a State objective of promoting all cost-effective energy conservation through adoption of energy-efficient practices and technologies. Hawaiian Electric Company, Inc.(HECO) may also have demand-side management programs that offer rebates for installation of energy efficient technologies.

2. **Energy and resource efficiency and renewable energy and resource development.** We recommend that the planning and preliminary design for the project be conducted following sustainable development principles and guidelines. We suggest that the plan look for opportunities for renewable energy such as photovoltaic systems. We also call your attention to the need for actions to enhance the sustainability of the development, including construction activity pollution prevention; green architecture including roof insulation and radiant barriers; and water conservation measures such as using drainage water for irrigation.

Our website (http://www.hawaii.gov/dbedt/info/) provides detailed information on guidelines, directives, and statutes, as well as studies and reports on aspects of energy efficiency and renewable energy. Please also do not hesitate to contact Carilyn Shon, Energy Efficiency Branch Manager, at telephone number (808) 587-3810, for additional information on LEED, energy efficiency, and renewable energy resources.

Sincerely,

Elizabeth Corbin

Elizabeth Corbin
Acting Administrator

c: OEQC

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

November 7, 2008

Ms. Elizabeth Corbin, Acting Administrator
Strategic Industries Division
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, HI 96804

Subject: Pre-Consultation Comments for Draft Environmental Assessment (EA)
Center for Microbial Oceanography Research and Education (C-MORE)
Building, University of Hawai'i Mānoa (UHM) Campus

Dear Ms. Corbin:

Thank you for your Pre-Consultation comment letter dated October 2, 2008 concerning the Draft EA for the C-MORE project.

We are aware of both the state's energy conservation goals and the energy and resource efficiency and renewable energy and resource development policies, that you have mentioned in your letter. UHM supports the state's efforts and has committed to a future of sustainability. UHM is already participating with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System and will continue to do so with the C-MORE Building project. Elements of the project design are intended to meet Laboratories for the 21st Century (Labs 21) guidelines, LEED, and other aspects of lab safety and flexibility.

Proposed design elements of C-MORE Building project includes energy saving features such as access to natural light, high efficiency lighting and solar/occupancy sensors in all offices and labs throughout the building. Additionally, photovoltaic panels and a green roof will be placed on the unused spaces of the roof/penthouse. Recyclable materials will be used during construction to the extent possible and drought tolerant native plant species will also be included into future landscaping plans.

As Hawai'i re-invents its energy portfolio, we do recognize the importance of the state's goals relating to renewable energy resources. The proposed C-MORE Building project will help not only to support those goals but ensure the continued success of the University in its comittment to provide world class research and education.

Upon completion, we will be providing your office with a copy of the Draft EA for your review. We appreciate your input and participation in the pre-consultation process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

RECEIVED
SEP 30 2008

September 22, 2008

Group 70 International, Inc.
925 Bethel Street 5th Floor
Honolulu, Hawaii 96813

Attention: Mr. George Atta

Gentlemen:

Subject: Pre-Consultation for Draft Environmental Assessment for the Center for Microbial Oceanography Research and Education

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Charlene E. Unoki

for Morris M. Atta
Administrator

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

November 7, 2008

Mr. Morris M. Atta, Administrator
Land Division
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Subject: Pre-Consultation Comments for Draft Environmental Assessment (EA)
Center for Microbial Oceanography Research and Education (C-MORE)
Building, University of Hawai'i Mānoa Campus

Dear Mr. Atta:

Thank you for your Pre-Consultation comment letter dated September 22, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Department of Land and Natural Resources, Land Division has no comments on the subject matter at this time.

Upon completion, we will be providing your office with a copy of the Draft EA for your review. We appreciate your input and participation in the pre-consultation process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

October 23, 2008

Mr. George I. Atta, Principal Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813-4307

OCT 29 2008

LOG NO: 2008.4361
DOC NO: 0810ST54
Architecture

Dear Mr. Atta:

SUBJECT: Chapter 6E-8 (HRS) Review, Draft Environmental Assessment, Pre-Consultation – Proposed Addition to the Existing Biomedical Science Building (Life Science Building), Center for Microbial Oceanography Research and Education (C-MORE) University of Hawaii at Manoa, Honolulu, Oahu, Hawaii
TMK: (1) 2-8-023:003

Thank you for the submittal received September 23, 2008 and for the pre-consultation meeting with staff from Group 70 and the University of Hawaii (October 21, 2008) regarding the Draft Environmental Assessment (DEA) for a proposed addition to the existing, Biomedical Science Building (Biomed Building), for the proposed Center for Microbial Oceanography Research and Education (C-MORE) at the University of Hawaii at Manoa (UHM). UHM is listed on the State Register of Historic Places (3/19/1984 and 8/24/1984).

The Biomed Building was built in 1967, less than 50 years ago. However, Edward Durell Stone was its architect who was prolific and nationally noted, therefore possibly qualifying the building's significance under Criteria C of the National Register of Historic Places (that "embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master,..."). In addition under the National Register:

> *Ordinarily...properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties 'shall qualify' if.*(it is)..*g. A property achieving significance within the past 50 years if it is of exceptional importance.*

We look forward to receiving additional documentation from Group 70 in the determination of the Biomed Building's significance.

Thank you for the opportunity to comment. Archaeology concerns will be addressed separately. Should you have any questions regarding architectural concerns, please call Susan Tasaki at (808) 692-8015.

Sincerely,

Astrid M.B. Liverman

Astrid M.B. Liverman, Ph.D.
Architecture Branch Chief

c: Ms. Teresa Davan, SHPD Archaeology Branch, Oahu Island

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

November 7, 2008

Astrid M.B. Liverman, Ph.D.
Architecture Branch Chief
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, HI 96707

Subject: Pre-Consultation Comments for Draft Environmental Assessment (EA)
Center for Microbial Oceanography Research and Education (C-MORE)
Building, University of Hawai'i Mānoa (UHM) Campus

Dear Dr. Liverman:

Thank you for your Pre-Consultation comment letter dated October 23, 2008 concerning the Draft EA for the C-MORE project. Our sincerest appreciation also to Ms. Susan Tasaki and Ms. Teresa Davan, who participated in our meeting.

Please note under the authority promulgated under Hawai'i Revised Statutes, §6E-8, a formal request was submitted to SHPD on November 3, 2008 to initiate the historic preservation review process for this project. Our request included a 76-page compilation of information that hopefully addresses some of the preliminary concerns and issues shared by your staff. Additionally, we offer the following in response to the highlighted concerns in your comment letter.

For clarification, only a selected portion of buildings and structures on the UHM campus form its historic core. These properties are listed under the State Historic Register (Site No. 50-80-14-1352) and consist of Hawai'i Hall, George Hall, Dean Hall, Gartley Hall, Crawford Hall, Varney Circle, Founder's Gate, Andrew's Outdoor Amphitheater, Wist Hall and the Pineapple Research Center. The Biomedical Science Building (BSB) is not part of the listed properties under 50-80-14-1352.

The existing BSB was originally designed in 1967 and its construction was completed in 1971. The building is approximately 37 years old. Under HRS §6E-2, a historic property is defined as "any building, structure, object, district, area, or site, including heiau and underwater site, which is over fifty years old." (emphasis added). Accordingly, the BSB fails to meet the basic legal definition of a historic property under State law.

Under the U.S. Department of the Interior, National Park Service (NPS) National Register Bulletin Guidelines for Evaluating and Nominating Properties that Achieved Significance within the Past Fifty Years, there are specific opportunities and issues to evaluate a property that is less than 50-year old to consider its inclusion on the National Register of Historic Places. Under these guidelines, the 50-year benchmark is an arbitrary span of time, designed as a filter to ensure enough time has passed to evaluate the property in a historic context. Important periods of history that have

occurred within the last 50-years do need to be considered in the context of the contributions made by the events or persons. A property which is less than 50 years old can be considered as historically significant if the property is of "exceptional importance," or if it is an integral part of a historic district that is eligible for listing in the National Register.

As stated in your letter, a viable consideration of the BSB as a potential property of historical significance is possible under criterion (c) of the National Register of Historic Places. However, there is no evidence that the BSB is of "exceptional importance" as a representation of work by Edward Durell Stone. Although Edward Durell Stone is a noted architect that has significantly contributed to the world of design and architecture, the context of the BSB in relation to other comparable works of this period of his career does not serve to meet the clause of "exceptional importance" to his overall portfolio. In review of other buildings that Stone designed during the same era, highlights of his notable work include: the Museum of Arts and Design (New York, 1965); the General Motors Building (New York, 1964); the Kennedy Center for Performing Arts (Washington D.C., 1971); the Georgetown University Law Center (Washington D.C.; 1971); and the Aon Center (Chicago, 1972).

Further, although the BSB does have its own unique design character, it has undergone several changes since its original construction. Extensive interior and exterior renovations have occurred over the years, the most recent activity resulting in the complete enclosure of the east entry and courtyard in support of the Institute for Biogenesis Research program. In reviewing these building improvements, it has been calculated that approximately 18% of the existing building has been altered from its original design and intent. The historical integrity of the building's design, setting, materials, workmanship, feeling, and association has been impacted. The proposed C-MORE building is intended to be a complimentary contrast to the elements of Stone's original design.

We look forward to hearing from the Archeological Branch.

We will be providing your office with a copy of the Draft EA for your review and comment. We appreciate your input and participation thus far in the pre-consultation process and look forward to hearing from you during the public review period.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

PHONE (808) 594-1888

FAX (808) 594-1865

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

OCT - 2 2008

HRD08/3870

September 29, 2008

George Atta
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawai'i 96813-4307

RE: Request for comments on the preparation notice for draft environmental assessment (DEA) for the Center for Microbial Oceanography Research and Education building, Mānoa, O'ahu, TMK: 2-8-23:003.

Aloha e George Atta,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated September 18, 2008. OHA has reviewed the project and offers the following comments.

Naturally OHA is supportive of an education center that proposes to bring together teams of scientists, educators and community members to communicate, collaborate and design creative solutions to long-term ecostystem problems.

In the State of OHA and the Native Hawaiian Community Remarks on Monday, December 17, 2007 made by Trustee Haunani Apoliona she said:

> Our island lifestyle and respect for limited natural resources has been the legacy of our ancestors, generation to generation. We are experts in caring for the environment. Mālama 'āina goes to the core of who we are as a people. Our cultural practices and our values are all about caring for the 'āina, loving our motherland, not just to use, but to conserve and replenish. These traditions and values coincide with the global desire to protect the environment to secure and sustain a certain quality of life for future generations.
>
> Native Hawaiians by virtue of the traditions and values of our ancestors are in a position to demonstrate how caring for the environment is done.

> What we bring from our culture as Native Hawaiians, as native people, is what the world and what this nation sorely need. As Native Hawaiians, we hold this gift. Just by "the nature of who we are," holding close to our cultural values, we can help to make Hawai'i, the nation and the world a better place.

OHA offers not only our support for the goals of this project, but also our council. The stated aim of this proposal parallels our worldview and as such we realize that when we advocate for natural resources we are advocating for cultural resources as well.

OHA would also like to point out that Hawai'i is re-inventing its energy portfolio. As such, the applicant should consider that by 2020, 20% of Hawai'i's electricity is to be from renewable sources.[1] Further, on January 28, 2008, Assistant Secretary of the Department of Energy and Governor Linda Lingle signed a groundbreaking Memorandum of Understanding (MOU) between the state government and the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy. The MOU estimates that Hawai'i can potentially meet between 60 and 70 percent of its future energy needs from clean, renewable energy sources. Additionally, Hawaii Revised Statutes §196-9 *Energy efficiency and environmental standards for state facilities, motor vehicles, and transportation fuel* has specific requirements for state buildings.

OHA is appreciative that UH Mānoa is already participating with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, which is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. Additionally, OHA recommends the use of photovoltaic and small wind harvesting electrical generation for peripheral uses such as parking lot lighting. Solar energy should also be incorporated into the building plans. During construction, OHA urges the use of recyclable materials: steel studs and structural members, and wood products from certified sustainable sources.

OHA would also like to suggest that the project area be landscaped with drought tolerant native or indigenous species that are common to the area. Any invasive species should also be removed. Doing so would not only serve as practical water-saving landscaping practices, but also serve to further the traditional Hawaiian concept of mālama 'āina and create a more Hawaiian sense of place. This would also help to reduce the amount of impervious surfaces in the project area, thereby reducing runoff as well. Tree and landscape planting to shade paved parking areas and provide shade and cooling to building elements and outdoor use areas should also be considered.

---

[1] See Act 95, Session Laws of Hawai'i which, in 2004 set that new original renewable portfolio standard goal.

Thank you for the opportunity to comment. If you have further questions, please contact Grant Arnold by phone at (808) 594-0263 or e-mail him at granta@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Administrator

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

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James I. Nishimoto
AIA

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AIA

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Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

November 7, 2008

Mr. Clyde W. Nāmu'o, Administrator
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813

Subject: Pre-Consultation Comments for Draft Environmental Assessment (EA)
Center for Microbial Oceanography Research and Education (C-MORE)
Building, University of Hawai'i Mānoa Campus

Dear Mr. Nāmu'o:

Thank you for your Pre-Consultation comment letter dated September 29, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge and appreciate the Office of Hawaiian Affair's (OHA) support for the proposed C-MORE Building project. We agree that caring for the land is a necessary core value for our island lifestyle. Through programs such as C-MORE, we can continue to find and utilize creative solutions to long-term scale ecosystem problems and other activities that affect our environment.

As Hawai'i re-invents its energy portfolio, we understand the importance of the state's goals relating to renewable energy resources. Proposed design elements of the C-MORE project includes energy saving features such as access to natural light, high efficiency lighting and solar/occupancy sensors in all offices and labs throughout the building. Additionally, photovoltaic panels and a green roof will be placed on the unused spaces of the roof/penthouse. Recyclable materials will be used during construction to the extent possible and drought tolerant native plant species will also be included into future landscaping plans.

As you have noted in your letter, the University of Hawai'i at Mānoa (UHM) is already participating with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, and will continue to do so with the C-MORE Building as the project is expected to achieve a minimum level of LEED Silver.

Finally, as one of the projects planned for development in the recent update to the UH Mānoa Long Range Development Plan (LRDP), the C-MORE Building will meet the design criteria and advocate the themes set in the LRDP including making the campus a globally connected Hawaiian place of learning, leadership and service.

Upon completion, we will be providing your office with a copy of the Draft EA for your review. We appreciate your input and participation in the pre-consultation process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

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CLIFFORD P. LUM
Manager and Chief Engineer

DEAN A. NAKANO
Deputy Manager and Chief Engineer

October 2, 2008

OCT - 3 2008

Mr. George I. Atta
Principal Planner
Group 70 International, Incorporated
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Atta:

Subject: Your Letter Dated September 23, 2008 on the Draft Environmental Assessment Pre-Consultation for the Proposed C-MORE Building at the University of Hawaii Manoa Campus TMK: 2-8-023:003

Thank you for the opportunity to comment on the proposed Center for Microbial Oceanography Research and Education.

The existing water system is presently adequate to accommodate the proposed development. However, please be advised that this information is based upon current data and, therefore, the Board of Water Supply reserves the right to change any position or information stated herein up until the final approval of your building permit application. The final decision on the availability of water will be confirmed when the building permit application is submitted for approval.

When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

The proposed project is subject to Board of Water Supply cross-connection control and backflow prevention requirements prior to issuance of the Building Permit Application.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

KEITH S. SHIDA
Program Administrator
Customer Care Division

Water for Life . . . Ka Wai Ola

GROUP 70 INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

November 7, 2008

Mr. Keith S. Shida, Program Administrator
Customer Care Division
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96813

Subject: Pre-Consultation Comments for Draft Environmental Assessment (EA) Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus

Dear Mr. Shida:

Thank you for your Pre-Consultation comment letter dated October 2, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge your assessment that the existing water system is adequate to accommodate the proposed development. We further recognize that the Board of Water Supply reserves the right to change its position until the building permit application has been approved.

The University of Hawai'i will pay the necessary fees for water resource development, transmission, and daily storage.

Fire protection requirements will be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department as the project moves forward.

Finally, we are aware that that the project is subject to Board of Water Supply requirements for cross-connection control and backflow prevention prior to the issuance of building permit application.

Upon completion, we will be providing your office with a copy of the Draft EA for your review. We appreciate your input and participation in the pre-consultation process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 523-4567
Web site: www.honolulu.gov

MUFI HANNEMANN
MAYOR

EUGENE C. LEE, P.E.
DIRECTOR

RUSSELL H. TAKARA, P.E.
DEPUTY DIRECTOR

October 16, 2008

OCT 17 2008

Mr. George Atta
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Atta:

Subject: Pre-Consultation for Draft Environmental Assessment
Center for Microbial Oceanography Research and Education
Building, University of Hawaii Manoa Campus
TMK: 2-8-23:003

Thank you for giving us the opportunity to comment on the above Draft Environmental Assessment.

The Department of Design and Construction does not have any comments to offer at this time.

Very truly yours,

Eugene C. Lee, P.E.
Director

ECL:lt (281577)

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

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AIA, CSI

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AICP

James I. Nishimoto
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AICP, LEED AP

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AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

November 7, 2008

Mr. Eugene C. Lee, P.E., Director
Department of Design and Construction
650 South King Street, 11th Floor
Honolulu, HI 96813

Subject: Pre-Consultation Comments for Draft Environmental Assessment (EA)
Center for Microbial Oceanography Research and Education (C-MORE)
Building, University of Hawai'i Mānoa Campus

Dear Mr. Lee:

Thank you for your Pre-Consultation comment letter dated October 16, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Department of Design and Construction has no comments on the subject matter at this time.

Upon completion, we will be providing your office with a copy of the Draft EA for your review. We appreciate your input and participation in the pre-consultation process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta, AICP
Principal Planner

DRAFT ENVIRONMENTAL ASSESSMENT

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR

STRATEGIC INDUSTRIES DIVISION
235 South Beretania Street, Leiopapa A Kamehameha Bldg., 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-3807
Fax: (808) 586-2536
Web site: www.hawaii.gov/dbedt

November 20, 2008

DEC -3 2008

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307
Attn: George Atta AICP

Re: Draft Environmental Assessment (DEA) Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawaii Manoa Campus (Manoa Valley, Honolulu, Hawaii)
TMK: 2-8-23:003 por.

Thank you for your November 20, 2008, letter, and the opportunity to provide comments on the Draft Environmental Assessment (DEA) for the Center for Microbial Oceanography Research and Education at the University of Hawaii at Manoa.

We have no further comments to our pre-consultation letter of October 2, 2008, other than to note the statement in the DEA that the new building is expected to achieve a minimum level of LEED Silver. We would strongly encourage that you investigate the feasibility of photovoltaics for this building.

Please do not hesitate to contact Carilyn Shon, Energy Efficiency Branch Manager, at telephone number (808) 587-3810, for additional information on LEED, energy efficiency, and renewable energy resources.

Sincerely,

Theodore A. Peck
Administrator

c: OEQC
Office of Capital Improvements, University of Hawaii

GROUP 70 INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Theodore A. Peck, Administrator
State of Hawai'i
Department of Business, Economic Development & Tourism
Strategic Industries Division
P.O. Box 2359
Honolulu, HI 96804

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Peck:

Thank you for your comment letter dated November 20, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Department of Business, Economic Development, and Tourism, Strategic Industries Division has no comments on the subject matter at this time. We recognize that comments in your October 2, 2008 letter are still applicable to the proposed project.

The C-MORE building is still expected to achieve a minimum level of LEED Silver. Photovoltaic panels and a green roof will be placed on the unused spaces of the roof/penthouse panels integrating sustainable design and energy saving techniques.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta
Principal Planner

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

DEC 23 2008

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

In reply, please refer to:
EPO-08-174

December 17, 2008

Mr. George Atta
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Atta:

SUBJECT: Draft Environmental Assessment for the University of Hawaii at Manoa Center for Microbial Oceanography Research and Education (C-MORE) Building
Manoa Valley, Oahu, Hawaii
TMK: (1) 2-8-023: 003 (portion)

Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have no comments at this time. We strongly recommend that you review all of the Standard Comments on our website: www.hawaii.gov/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this project should be adhered to.

If there are any questions about these comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

KELVIN H. SUNADA, MANAGER
Environmental Planning Office

c: EPO

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
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James I. Nishimoto
AIA

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AIA

George I. Atta
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AIA, LEED AP

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AICP, LEED AP

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AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Kelvin H. Sunada, Manager
State of Hawai'i
Department of Health
Environmental Planning Office
P.O. Box 3378
Honolulu, HI 96801

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Sunada:

Thank you for your comment letter dated December 17, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Department of Health, Environmental Planning Office has no comments at this time. The proposed project will adhere to all applicable Standard Comments on your website as noted in your letter.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

PHONE (808) 594-1888

FAX (808) 594-1865

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

DEC 10 7

HRD08/3870B

December 4, 2008

Brian Minaai
Office of Capital Improvements
University of Hawai'i System
1960 East West Road, Biomedical Sciences B-102
Honolulu, Hawai'i 96822

RE: Request for comments on the draft environmental assessment (DEA) for the proposed Center for Microbial Oceanography Research and Education building, Mānoa, O'ahu, TMK: 2-8-23:003.

Aloha e Brian Minaai,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated November 20, 2008. OHA has reviewed the project and offers the following comments.

OHA is supportive of this proposal; however, we do have some suggestions to help create an even better project. As we pointed out in our comments for the DEA preparation notice for this same project, the applicant should consider that by 2020, 20% of Hawai'i's electricity is to be from renewable sources.[1] Additionally, Hawaii Revised Statutes §196-9 *Energy efficiency and environmental standards for state facilities, motor vehicles, and transportation fuel* has specific requirements for state buildings.

OHA is appreciative that UH Mānoa is already participating with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System. Additionally, OHA recommends the use of photovoltaic and small wind harvesting electrical generation for peripheral uses such as parking lot lighting. Solar energy should also be incorporated into the building plans. During construction, OHA urges the use of recyclable materials: steel studs and structural members, and wood products from certified sustainable sources.

[1] See Act 95, Session Laws of Hawai'i which, in 2004 set that new original renewable portfolio standard goal.

OHA sees that the DEA proposes a Hawaiian identity for the campus as a Hawaiian place of learning (DEA, page 5-12). We appreciate this concept and urge that landscaping be done only with drought tolerant native or indigenous species that are common to the area. Any invasive species should also be removed. Doing so would not only serve as practical water-saving landscaping practices, but also serve to further the traditional Hawaiian concept of mālama 'āina and create a more Hawaiian sense of place that the applicant strives for. Tree and landscape planting to shade paved parking areas and provide shade and cooling to building elements and outdoor use areas should also be considered. We also ask if the 17 trees selected for removal (DEA, page 3-8) can be replaced or remediated to another area of campus.

Of additional note, we are concerned that the Cultural Impact Assessment (CIA) was completed for the UH Long Range Development Plan, and not specifically for this project. While we understand that the plan seeks to incorporate this and other future proposed project, OHA does not wish for the applicant to interpret their long range plan and associated reviews as a carte blanche for all future proposals. In terms of a CIA, we reviewed the UH Long Range Development Plan and assessed it for its generalized impacts to the area; not for specific projects (such as this one) with particularized facts and circumstances unique to each proposal and location.

OHA realizes that this proposal is to create a new building where one already exists, and so the impacts in this case are expected to be minimal. However, if this project were in an undeveloped or sensitive area, we stress that because we were consulted on the long-range plan, our concerns would not be adequately addressed in such a case by that review alone. OHA states that we are generally satisfied with the Microbial Oceanography Research and Education building CIA; however, we urge caution for future projects in this regard.

Further, we note that on page 1-3 of the DEA it states, "The project *may* also include refurbishment of the existing courtyard and the development of a new landscape design to promote outdoor meeting and gathering places." (Emphasis added) OHA is unable to assess the full impacts of a proposal that is presented conditionally and it usurps the environmental review process itself. This is another reason why we are cautious of the applicant's using their long-range plan consultations for individual projects, which in this case is not fully presented.

Additionally, we ask if the burial site near Keller Hall (DEA, page 3-34) does indeed exist and if so, why it is no longer being maintained.

Thank you for the opportunity to comment. If you have further questions, please contact Grant Arnold by phone at (808) 594-0263 or e-mail him at granta@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Administrator

C: George Atta
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawai'i 96813-4307

Office of Environmental Quality Control
235 South Beretania St., Suite 702
Honolulu, Hawai'i 96813

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

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AICP, LEED AP

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AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Clyde W. Nāmu'o, Administrator
State of Hawai'i
Office of Hawaiian Affairs
711 Kapi'olani Blvd., Suite 500
Honolulu, HI 96813

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Nāmu'o:

Thank you for your comment letter dated December 04, 2008 concerning the Draft EA for the C-MORE project.

We recognize the state's goals relating to renewable energy resources. As you have mentioned in your letter, the University of Hawai'i at Mānoa (UHM) is already participating with Leadership in Energy and Environmental Design (LEED) Green Building Rating System and will continue to do so with the C-MORE Building as the project is expected to achieve a minimum level of LEED Silver. Proposed design elements of the C-MORE project includes energy saving features such as access to natural light, high efficiency lighting and solar/occupancy sensors in all offices and labs throughout the building. Additionally, photovoltaic panels and a green roof will be placed on the unused spaces of the roof/penthouse. Recyclable materials will be used during construction to the extent possible.

We note your concern that the Cultural Impact Assessment was completed for the UH Long Range Development Plan, and not specifically for the C-MORE Building project. While the proposed project is to create a new building where one already exists, we understand your concern that the Office of Hawaiian Affairs' (OHA) review and consultation from the UH-LRDP Update should not be considered carte blanche for all future projects that come online We appreciate the OHA general satisfaction with the project specific evaluation and recognize that caution should be undertaken by the University for future projects in this regard.

Landscaping for the proposed project will be done with drought tolerant native plant species, where possible. Efforts will be made to preserve and protect mature trees in the surrounding area. Where feasible, the 17 trees selected for removal will be relocated on campus. The University's landscape architect has been and will continue to be consulted as the project proceeds.

Regarding the refurbishment of the existing courtyard, this proposed scope of work is no longer being considered a part of the project. All references to the refurbishment of the existing courtyard have been removed in the Final EA. Any future considerations for

refurbishment of the courtyard would be reviewed by the University and other agency interests such as OHA, at a later time.

Finally, to our knowledge, the burial site near Keller Hall does exist, however, we defer to the University of Hawai'i and the State Historic Preservation Division for further information and verification of your inquiry.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

MUFI HANNEMANN, Mayor

RANDALL Y. S. CHUNG, Chairman
SAMUEL T. HATA
ALLY J. PARK
ROBERT K. CUNDIFF
MARC C. TILKER

CRAIG I. NISHIMURA, Ex-Officio
BRENNON T. MORIOKA, Ex-Officio

CLIFFORD P. LUM
Manager and Chief Engineer

DEAN A. NAKANO
Deputy Manager and Chief Engineer

December 1, 2008

Mr. George I. Atta, AICP
Principal Planner
Group 70 International, Incorporated
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Atta:

Subject: Your Letter Dated November 20, 2008 on the Draft Environmental Assessment (DEA) for the Proposed Center for Microbial Oceanography Research and Education (C-MORE) Building in Manoa, TMK 2-8-023:003

Thank you for the opportunity to comment on the proposed project.

The comments in our letter dated October 2, 2008, which is included in the document, are still applicable.

If you have any questions, please contact Robert Chun at 748-5443.

Very truly yours,

K. Shida

KEITH S. SHIDA
Program Administrator
Customer Care Division

cc: Office of Environmental Quality Control
Mr. Brian Minaai, Office of Capital Improvements, University of Hawaii System

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Keith S. Shida, Program Administrator
City and County of Honolulu
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Shida:

Thank you for your comment letter dated December 1, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Board of Water Supply has no comments on the subject matter at this time. We recognize that comments in your October 2, 2008 letter are still applicable to the proposed project.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8480 • Fax: (808) 523-4567
Web site: www.honolulu.gov

MUFI HANNEMANN
MAYOR

EUGENE C. LEE, P.E.
DIRECTOR

RUSSELL H. TAKARA, P.E.
DEPUTY DIRECTOR

RECEIVED
DEC 17 2008

December 16, 2008

Mr. George I. Atta, AICP
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Atta:

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education Building, University of Hawaii Manoa Campus
TMK: 2-8-23:003 por.

Thank you for giving us the opportunity to review the above Draft Environmental Assessment.

The Department of Design and Construction does not have any comments to offer at this time.

Very truly yours,

FOR Eugene C. Lee, P.E.
Director

ECL:lt (288485)

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

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James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

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AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Eugene C. Lee, P.E., Director
City and County of Honolulu
Department of Design and Construction
650 South King Street, 11th Fl.
Honolulu, HI 96813

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Lee:

Thank you for your comment letter dated December 16, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Department of Design and Construction has no comments on the subject matter at this time.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
TELEPHONE: (808) 768-8000 • FAX: (808) 527-6743
INTERNET: www.honolulu.gov • DEPT. WEB SITE: www.honoluludpp.org

MUFI HANNEMANN
MAYOR

HENRY ENG, FAICP
DIRECTOR

DAVID K. TANOUE
DEPUTY DIRECTOR

2008/ELOG-2839(lk)

December 15, 2008

Mr. George I. Atta
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

DEC 16 2008

Dear Mr. Atta:

Subject: Draft Environmental Assessment
University of Hawaii at Manoa
2444 Dole Street – Manoa
Tax Map Key 2-8-23: 3

We have reviewed the Draft Environmental Assessment (DEA) for the proposed Center for Microbial Oceanography Research and Education (C-MORE) building at the University of Hawaii at Manoa (University) and offer the following comments:

1. The project is proposed under the Long Range Development Plan 2007 Update for the University, which will require a new Plan Review Use (PRU) permit. Therefore, the proposed project will be reviewed in conjunction with the new PRU permit application.

2. The University is currently operating under the PRU No. 88/PRU-3 (Resolution No. 89-411,CD-2), approved on December 13, 1989, for the Five-Year Master Plan for the expansion of the University of Hawaii Manoa campus. A major modification to the master plan to increase the seating capacity of the Special Events Arena (now the Stan Sheriff Center) was approved by Resolution No. 92-286,CD-1,FD-1. A major modification to the master plan was also approved for the redevelopment of Frear Residence Hall by Resolution No. 06-255,CD1).

3. The applicant should clarify that, pursuant to Land Use Ordinance Section 21-2.120-3(b)(2), the new PRU application cannot be accepted for processing if, *"[O]ne or more conditions of the existing PRU which are due to be performed (other than conditions of a continuing nature whose performance is current) have not been fully performed."*

If you have any questions, please contact Lynne Kauer of our staff at 768-8016.

Very truly yours,

Henry Eng, FAICP, Director
Department of Planning and Permitting

HE:cs

cc: Office of Environmental Quality Control
UH Manoa, Office of Capital Improvements

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GROUP 70 INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

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Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Henry Eng, FAICP, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawai'i 96813

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Eng:

Thank you for your comment letter dated December 15, 2008 concerning the Draft EA for the C-MORE project.

The following are offered in response to your comments:

1. We recognize that the proposed project is under the University of Hawai'i at Mānoa Long Range Development Plan 2007 Update which requires a new Plan Review Use (PRU) permit. We understand that the C-MORE Building project will be reviewed in conjunction with the new PRU permit application.

2. We acknowledge your comment and are aware that the University is currently operating under the PRU No. 88/PRU-3 (Resolution No. 89-411, CD-2) for the Five-Year Master Plan for the expansion of the University of Hawai'i Mānoa Campus. As part of the 2007 Long Range Development Plan (LRDP) Update a new PRU permit will be submitted for approval to the City and County of Honolulu, Department of Planning and Permitting.

3. It is our understanding that pursuant to Land Use Ordinance Section21-2.120-3(b)(2), a new PRU application will be submitted for processing upon receiving a Finding of No Significant Impact (FONSI) for the UH LRDP Final EA. This Final EA has been submitted to the State Office of Environmental Quality Control for final acceptance and publication. Review of conditions which may be due to be performed is ongoing within the University administration. It is our understanding the University may be coordinating with your department.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

DEPARTMENT OF FACILITY MAINTENANCE

CITY AND COUNTY OF HONOLULU

1000 Uluohia Street, Suite 215, Kapolei, Hawaii 96707
Phone: (808) 768-3343 • Fax: (808) 768 -3381
Website: www.honolulu.gov

MUFI HANNEMANN
MAYOR

CRAIG I. NISHIMURA, P.E.
DIRECTOR AND CHIEF ENGINEER

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

IN REPLY REFER TO:
DRM 08-1145

December 9, 2008

DEC 11 2008

Mr. George I. Atta, AICP
Group 70 International
925 Bethel Street
Honolulu, Hawaii 96813

Dear Mr. Atta:

Subject: Draft Environmental Assessment (DEA)
Center for Microbial Oceanography
Research and Education Building
University of Hawaii at Manoa

Thank you for the opportunity to review and comment on the DEA dated November 2008 for the proposed Center for Microbial Oceanography Research and Education Building.

We have no comments to offer as the proposed building will be within State property and will have negligible impact on our facilities and operations.

Should you have any questions, please call Charles Pignataro of the Division of Road Maintenance, at 768-3697.

Sincerely,

Craig I. Nishimura, P.E.
Director and Chief Engineer

c: Office of Environmental Quality Control
Office of Capitol Improvements
University of Hawaii System (Attention: Brian Minaai)

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
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Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Mr. Craig I. Nishimura, P.E., Director and Chief Engineer
City and County of Honolulu
Department of Facility Maintenance
1000 Uluohia Street, Suite 215
Kapolei, HI 96707

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Nishimura:

Thank you for your comment letter dated December 09, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Department of Facility Maintenance has no comments on the subject matter at this time.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 3RD FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 523-4730 • Internet: www.honolulu.gov

MUFI HANNEMANN
MAYOR

WAYNE Y. YOSHIOKA
DIRECTOR

RICHARD F. TORRES
DEPUTY DIRECTOR

TP11/08-288838R

December 18, 2008

DEC 2 2 2008

Mr. George Atta, AICP
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Atta:

Subject: Center for Microbial Oceanography Research and Education Building
Draft Environment Assessment

This is in response to your letter of November 20, 2008, requesting our review of the Draft Environmental Assessment for the Center for Microbial Oceanography Research and Education Building. We offer the following comments:

1. Prior to submitting any construction documents for approval, the developer should consult with our Public Transit Division (PTD) regarding construction-phase traffic control plans. This will help mitigate any impacts of East-West Road re-routing on TheBus operations.

2. Our PTD also recommends that in addition to the access ramps, paths, and accessible parking stalls described in the DEA, a dedicated drop-off/pick-up area should be included at the building entry for persons with disabilities.

3. Our Traffic Engineering Division notes that the project is subject to any applicable conditions of the Plan Review Use for the update to the UH Manoa Long Range Development Plan.

Should you have any questions on the matter, please contact Mr. Brian Suzuki at 768-8349.

Very truly yours,

WAYNE Y. YOSHIOKA
Director

cc: Office of Capital Improvements,
University of Hawai'i System

Department of Planning and Permitting,
Traffic Review Branch

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

Jeffrey H. Overton
AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Wayne Y. Yoshioka, Director
City and County of Honolulu
Department of Transportation Services
650 South King Street, 3rd Fl.
Honolulu, HI 96813

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Mr. Yoshioka:

Thank you for your comment letter dated December 18, 2008 concerning the Draft EA for the C-MORE project.

The following is offered in response to your comments:
1. Prior to submitting construction documents, we will consult with the Public Transit Division (PTD) regarding construction-phase traffic control plans.

2. We note PTD's recommendation for a dedicated drop-off/pick-up area at the building entry. However, in addition to the access ramps, paths and accessible parking stalls included in the project design, there are parking and access areas around the existing building that are currently utilized and will be maintained. These areas provide adequate space for drop-off/pick-up type areas around the building for persons with disabilities.

3. We acknowledge that the proposed project is subject to applicable conditions of the Plan Review Use for the update to the University of Hawai'i at Mānoa Long Range Development Plan.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

HONOLULU FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

636 South Street
Honolulu, Hawaii 96813-5007
Phone: 808-723-7139 Fax: 808-723-7111 Internet: www.honolulu.gov/hfd

MUFI HANNEMANN
MAYOR

KENNETH G. SILVA
FIRE CHIEF

ALVIN K. TOMITA
DEPUTY FIRE CHIEF

December 9, 2008

DEC 11 2008

Mr. George Atta, AICP
Group 70 International
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

Dear Mr. Atta:

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building,
University of Hawaii Manoa Campus
Tax Map Key: 2-8-023: 003 Portion

In response to your letter dated November 20, 2008, regarding the above-mentioned subject, the Honolulu Fire Department (HFD) reviewed the material provided and has no objections to the proposed project.

Although the proposed project will not adversely impact the services provided by the HFD, the HFD requires that the following be complied with:

1. Provide a fire apparatus access road for every facility, building, or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from fire apparatus access as measured by an approved route around the exterior of the building or facility. (1997 Uniform Fire Code, Section 902.2.1.)

2. Provide a water supply, approved by the county, capable of supplying the required fire flow for fire protection to all premises upon which facilities or buildings, or portions thereof, are hereafter constructed or moved into or within the county.

On-site fire hydrants and mains capable of supplying the required fire flow shall be provided when any portion of the facility or building is in excess of the 150 feet (45 720 mm) from a water supply on a fire apparatus access road, as measured by an approved route around the exterior of the facility or building. (1997 Uniform Fire Code, Section 903.2, as amended.)

3. Submit civil drawings to the HFD for review and approval.

Should you have any questions, please call Battalion Chief Socrates Bratakos of our Fire Prevention Bureau at 723-7151.

Sincerely,

Alvin K. Tomita

ALVIN K. TOMITA
Acting Fire Chief

AKT/KT:bh

cc: Office of Environmental Quality Control
Brian Minaai, Office of Capital Improvements, University of Hawaii

GROUP 70
INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

George I. Atta
AICP

Charles Y. Kaneshiro
AIA, LEED AP

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AICP, LEED AP

Christine Mendes Ruotola
AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Chief Alvin K. Tomita, Acting Fire Chief
City and County of Honolulu
Fire Department
636 South Street
Honolulu, HI 96813

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Chief Tomita:

Thank you for your comment letter dated November 24, 2008 concerning the Draft EA for the C-MORE project.

The following are offered in response to your comments:

1. The proposed project will comply with the Uniform Fire Code, Section 902.2.1, requiring a fire apparatus access road. During the design phase of the project, an acceptable fire apparatus access road will be provided.

2. The project will provide a water supply approved by the county, capable of supplying the required fire flow for fire protection. On-site fire hydrants and mains capable of supplying the required fire flow will also be provided.

3. Civil drawings will be submitted to the HFD for review and approval.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

Group 70 International • 925 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET · HONOLULU, HAWAII 96813
TELEPHONE: (808) 529-3111 · INTERNET: www.honolulupd.org

MUFI HANNEMANN
MAYOR

BOISSE P. CORREA
CHIEF

PAUL D. PUTZULU
KARL A. GODSEY
DEPUTY CHIEFS

OUR REFERENCE BS-DK

November 24, 2008

Mr. George I. Atta, AICP
Principal Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Atta:

This is in response to your letter of November 20, 2008, requesting comments on the Draft Environmental Assessment for the Center for Microbial Oceanography Research and Education Building project at the University of Hawaii at Manoa.

This project should have no significant impact on the facilities or operations of the Honolulu Police Department.

If there are any questions, please call Major Robert Green of District 7 at 529-3362 or Mr. Brandon Stone of the Executive Bureau at 529-3644.

Sincerely,

BOISSE P. CORREA
Chief of Police

By
DEBORA A. TANDAL
Assistant Chief of Police
Support Services Bureau

cc: OEQC
Mr. Brian Minaai, UH System

Serving and Protecting With Aloha

GROUP 70 INTERNATIONAL

PRINCIPALS

Francis S. Oda
Arch.D., FAIA, AICP

Norman G.Y. Hong
AIA

Sheryl B. Seaman
AIA, ASID

Hitoshi Hida
AIA

Roy H. Nihei
AIA, CSI

Ralph E. Portmore
AICP

James I. Nishimoto
AIA

Stephen Yuen
AIA

Linda C. Miki
AIA

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AICP

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AIA, LEED AP

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AICP, LEED AP

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AICP

James L. Stone
AIA, LEED AP

Paul Bierman-Lytle
M. Arch., AIA, LEED AP

Katherine M. MacNeil
AIA, LEED AP

Tom Young
AIA

January 12, 2009

Chief Boisse P. Correa
City and County of Honolulu
Police Department
801 South Beretania Street
Honolulu, HI 96813

Subject: Draft Environmental Assessment
Center for Microbial Oceanography Research and Education (C-MORE) Building, University of Hawai'i Mānoa Campus
(Mānoa Valley, Honolulu, Hawai'i)
TMK: 2-8-23:003 por.

Dear Chief Correa:

Thank you for your comment letter dated November 24, 2008 concerning the Draft EA for the C-MORE project.

We acknowledge that the Police Department has no comments on the subject matter at this time since the project will have no significant impact on existing facilities or operations.

Upon completion, we will be providing your office with a copy of the Final EA for your review. We appreciate your input and participation in the environmental process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

George I. Atta

George I. Atta, AICP
Principal Planner

APPENDIX B.
UTILITY SYSTEMS REPORT
UNIVERSITY OF HAWAIʻI AT MĀNOA
LONG RANGE DEVELOPMENT PLAN 2007 UPDATE
(CATEGORY I)

UTILITY SYSTEMS REPORT
UNIVERSITY OF HAWAII AT MANOA
LONG RANGE DEVELOPMENT PLAN
2007 UPDATE (CATEGORY I),
Manoa, Honolulu, Hawaii

October 24, 2007

Prepared for:

Group 70 international

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817-5031
Telephone: (808) 533-3646
Facsimile: (808) 526-1267
E-mail: atahnl@atahawaii.com
Honolulu • Wailuku, Hawaii

UTILITY SYSTEMS REPORT

University of Hawaii at Manoa Long Range Development Plan 2007 Update (Category I)

Manoa, Honolulu, Hawaii

Prepared for

Group 70 International

Prepared by

Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors

Honolulu • Wailuku, Hawaii

October 24, 2007

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1-2
	A. Location	1
	B. Project Description	1
II.	DRAINAGE SYSTEM	2-7
	A. Existing Conditions	2
	B. Current Improvements (prior to this LRDP)	4
	C. Proposed Improvements for the LRDP	6
	D. Stormwater Quality	7
	E. Future Drainage Master Plan	7
III.	WASTEWATER DISPOSAL SYSTEM	7-8
	A. Existing Conditions	7
	B. Proposed Conditions	8
IV.	POTABLE WATER SYSTEM	8-11
	A. Existing Conditions	8
	B. Proposed Conditions	9
	C. Water Consumption/Conservation	9
V.	CONCLUSION	11
VI.	REFERENCES	12

TABLE OF CONTENTS
Cont'd

FIGURES

1. DRAINAGE EXHIBIT
2. WASTEWATER EXHIBIT
3. POTABLE WATER EXHIBIT

UTILITY SYSTEMS REPORT

University of Hawaii at Manoa

Long Range Development Plan 2007 Update (Category I)

Manoa, Honolulu, Hawaii

I. INTRODUCTION

The University of Hawaii at Manoa (UHM) is the main campus in Hawaii's state-wide higher education system. The campus is encompassed by 304 acres and serves approximately 20,000 students and 6,000 faculty and staff members.

A. Location

UHM is situated at the entrance to Manoa Valley, and is bordered by the communities of Saint Louis Heights, Moiliili and Manoa. Generally, the land is sloped from the mauka side of the campus towards Manoa Stream and the makai campus.

B. Project Description

The purpose of this report is to assess the impacts of the LRDP's short term development (5 to 10 years) on the University of Hawaii at Manoa (UHM) utility systems. The current plan includes numerous building and parking improvements, including:

- Law School Expansion
- Campus Center Expansion to the Northeast
- Instruction Building at Henke Hall Site
- Kennedy Theatre Expansion
- Parking Structure at Kennedy Theatre (480 parking Stalls)
- Parking Structure IIB/Bookstore (900 Parking Stalls)
- Research Buildings – North and East of Biomedical Building
- Research Buildings – Mauka Campus
- Instruction Building – College of Education
- I.T.S. – Bilger Hall Addition, Phase II
- Media Facilities at KHET Site
- Johnson Hall – Replacement Dormitory
- Hale Noelani – Replacement Dormitory
- Faculty Housing – Waahila Ridge or Mauka Campus
- Klum Gym Replacement
- School of Hawaiian Knowledge

II. DRAINAGE SYSTEM

A. Existing Conditions

1. Existing Drainage System

The Manoa Campus is part of the Manoa Watershed. A large amount of off-site drainage from portions of Manoa and Mid-Pacific Institute is conveyed through the City and County's drainage system on UHM's campus. As shown in Figure 1, UHM's storm drain system connects to the City's drainage system on University Avenue and Dole Street. The Makai Campus has several existing outlets to Manoa Stream as well as a storm drain system that is connected to the City's drainage system on Varsity Place.

2. Flood Zone

According to FEMA's Flood Insurance Rate Map (FIRM) dated September 30, 2004, the entire UHM Campus, other than the banks along Manoa Stream and two (2) adjacent areas to the stream are located in Zone X (500 year flood). The two (2) areas adjacent to the stream are at the Mauka Campus where Woodlawn Drive crosses Manoa Stream and at the Makai Campus below Dole Street where Manoa Stream passes the Taro Patch area adjacent to the Center for Hawaiian Studies. These two (2) areas are in Zone AE (100 year flood) and their

Base Flood Elevations are specified on the FIRM. No developments in the Zone AE areas are planned for this LRDP.

In October 2004, there was a 25-year storm event that flooded parts of Manoa, including a portion of the University of Hawaii Manoa Campus. According to the U.S. Army Corps of Engineers "Hydrology and Hydraulics Study, Flood of October 30, 2004, Manoa Stream" dated November 15, 2006, the flooding was caused by blockages in Manoa Stream and an inadequate channel capacity between Kahaloa Drive and Woodlawn Drive. The main buildings affected by the storm were Hamilton Library and the Biomedical Science Building.

3. Manoa Watershed Project

The flooding of Manoa Stream in October 2004 was caused by poor maintenance and inadequate capacities upstream of the Manoa Campus. The U.S. Department of Agriculture Natural Resources Conservation Services is currently investigating the flood mitigation and restoration of Manoa Stream in the Manoa Watershed Project. The project is a partnership between city, state and federal agencies as well as a consultant team led by Oceanit, Inc. They expect to have a final Environmental Impact Statement and implementation plan by the end of 2008 with design and implementation to follow thereafter. Through this project, the flood mitigation measures such as the measures suggested in the U.S. Army Corps' report (e.g., adding a flood wall or levee at the Woodlawn Drive Bridge) will be implemented. It is recommended that the University be represented at the Manoa Watershed Project meetings to review their recommendations and monitor the Project's implementation of the recommendations in order to coordinate improvements affecting the University's property.

4. Mid-Pacific Institute

a. Existing Concrete Ditches

There are two (2) concrete interceptor ditches outside of and along The University's common boundary with Mid-Pacific Institute that converge just above the Agricultural Engineering

Building. One of the ditches runs along the property line just mauka of Maile Way. The other ditch runs along the property line beginning near the Biomedical Science Building and ending near the Agricultural Engineering Building. A portion of UHM's drainage system ties into the concrete ditch near the Biomedical Science Building. Any connections to the ditch will need to be coordinated with Mid-Pacific Institute. The capacity of this ditch is also questionable as it was overwhelmed in the October 2004 flood. It is recommended that the ditch be evaluated in the Drainage Master Plan in concurrence with the recommendations from the Manoa Watershed Project.

b. Future Improvements

The City and County of Honolulu is planning drainage improvements on and near Mid Pacific Institute. These drainage improvements could increase the amount of storm water going through the University. According to the City and County of Honolulu, the types of drainage improvements are not known at this time. It is recommended that UHM planners periodically check on the status of the City and County's projects.

B. Current Improvements (Prior to this LRDP)

There are two major drainage improvements in the Central Campus that will be constructed in the near future. These improvements are being made to help protect UHM from future flood damage as sustained in the October 2004 storm event.

1. Hamilton Library Ground Floor Renovation - According to a memorandum dated November 1, 2006 from Chris Ball of Mitsunaga & Associates, "drainage options were examined to protect Hamilton Library from a flood of approximately 2,000 cfs." According to the U.S. Army Corps' report, the storm event was equivalent to approximately a 25 year storm. Three alternatives were suggested to protect Hamilton Library from future flooding in a similar event to the October 2004 storm.

a. Option 1 - Install a new box drain approximately 10' x 8' with a new inlet structure by the Agricultural Engineering Building and a new outlet at Manoa Stream. This drain would accommodate approximately 2,000 cfs, which is similar to the storm event that flooded the library in October 2004. The cost was approximated to be $8.7 million.

b. Option 2 - Install a 60 inch culvert from the library to Manoa Stream and a 2-foot high wall around the front and side of the library building and repair the existing improvements upstream at the entrance to the box drain, and lower a portion of the driveway at the ewa end of the library. This option would mitigate about 1,000 cfs, thus allowing approximately 1,000 cfs to pass through the McCarthy Mall and downstream areas.

c. Option 3 - Install a smaller drainage system and a 2.5 foot high wall around the front and side of the library, repair the existing improvements upstream at the entrance to the box drain and lower a portion of the driveway at the ewa end of the library. This option would mitigate about 500 cfs, therefore allowing approximately 1,500 cfs to pass through the McCarthy Mall and downstream areas.

For the short term, the University decided to do a variation of Option 3. This includes all of the items listed in option 3 above, plus covering the existing "moat" at the north, east and west sides of Hamilton Library with a concrete roof to prevent flood water from filling up the moat and entering the ground floor. The construction plans for this project is currently being finalized.

During the upcoming LRDP, UHM should evaluate the feasibility of building a large box culvert as described in Option 1.

2. Biomedical Science Building - To prevent future flooding of the building, several walls on the northern and eastern sides of the Biomedical Science Building are being designed. A concrete channel will also be installed adjacent to the northern wall to direct the flow to the existing ditch on the Mid-Pacific Institute/University of Hawaii property line.

Construction of these improvements is expected to begin in the near future. In addition to the floodwalls, the existing drainline will be extended in this LRDP as discussed in Section II.C.

C. Proposed Improvements for the LRDP

The improvements proposed in the LRDP will not have significant long-term impacts on campus drainage. The majority of the new buildings and parking structures will be in areas that are already paved; therefore the increase in impervious area should be minimal. In addition, the building slabs and paved areas will be set close to existing grades to minimize excavation and embankment, thus retaining the existing drainage pattern on campus.

There are three (3) drainlines which need to be designed and constructed as part of the LRDP building and roadway improvements to improve the overall drainage on campus. These include the following:

1. Parking Structure Phase IIB – Extend drain lines on the makai side of the parking structure to connect to existing drainage system. This drain line is referred to as "Project B" on Figure 1 and the 1990 Drainage Master Plan.

2. Proposed Road "A" – Extend Drain "C" to St. Francis School to convey the storm water through an underground drainage system. This drain line is referred to as "Project E" on Figure 1 and the 1990 Drainage Master Plan.

3. Research Buildings North and East of Biomedical Science Building – There is an existing 54" pipe that currently outlets at an energy dissipater into a small swale on the north side of the Biomedical Science Building. The swale runs to an existing 18" pipe that outlets to the concrete ditch on Mid-Pacific Institute's property. The existing pipe and swale will need to be re-routed around the new research building. The existing 54" pipe should be extended to the existing concrete ditch to improve the conveyance of storm water in that area. This design will need to be coordinated with Mid-Pacific Institute since they own the ditch. As discussed in Section II.A.iv.1, the capacity of the ditch needs to be studied.

In addition to these improvements, the installation of the large box drain (option 1 in Section II.B.i) should be studied to help alleviate the amount of surface drainage coming through the Manoa Campus. The alignment of this box drain will be challenging because of the existing infrastructure and new underground electrical lines being constructed on Maile Way and East West Road. This box culvert will also be conveying stormwater from Mid-Pacific Institute and other parts of Manoa besides UHM. The study of this area needs to be coordinated with the Manoa Watershed Project.

D. Stormwater Quality

Site erosion control measures and Best Management Practices will be utilized to reduce pollution from construction activities prior to entering the City and County's drainage system. Other permanent mitigation measures such as vegetated roofs, porous paving and stormwater separators with media filters may be used to reduce the amount of runoff and improve stormwater quality, as discussed in the LRDP's Sustainability Guidelines.

E. Future Drainage Master Plan

A new Drainage Master Plan should be completed in conjunction with the Manoa Watershed Project and City and County's future drainage improvements. The off-site improvements from these projects can greatly affect UHM's existing infrastructure.

III. Wastewater Disposal System

A. Existing Conditions

The UHM Campus wastewater is disposed through the City System which runs through the campus (see Figure 2). Through discussions with the City and County of Honolulu Department of Environmental Services Wastewater Management Branch, there are three areas with potential capacity problems on the UHM Campus:

- Dual sewer lines mauka of Agricultural Engineering Building
- Metcalf Street
- University Avenue near King Street

According to UHM Facilities Management, the existing sewer lines owned and maintained by UHM have no known problems at this time.

B. Proposed Conditions

Only one of the areas that the City and County is concerned about is affected by this LRDP. That area is the dual sewer lines mauka of the Agricultural Engineering Building. According to City and County Wastewater Management Division, the dual 24" sewer lines may be near capacity. These sewer lines are owned by the City and County and serve the Manoa Valley and UHM Campus. At this time, the Wastewater Management Division is not able to determine specific restrictions until they can assess the future flows from UH and upstream users. In order to inquire about specific future building connections to this line, such as the Research Building north of Biomedical Sciences Building, a formal request to the Wastewater Management Division would need to be initiated by UH. The Research Building north of Biomedical Sciences Building is also located in the vicinity of this line and UHM will need to work with the City and County to either relocate or avoid the existing dual 24" sewer lines in that location. As an alternative, the Sewer Master Plan should evaluate whether this building along with future buildings in the area can be connected to the existing sewer line on East West Road or any other location to provide relief for the City and County's dual sewer lines.

At the time of development, the City and County Wastewater Management should be contacted to ensure that the sewer system has the available capacity to handle any of the planned campus improvements.

IV. POTABLE WATER SYSTEM

A. Existing Conditions

The existing Manoa Campus is served by the City's Board of Water Supply system. There are several water meters on campus that connect to the BWS system. The two main meters on the central campus are located near Burns Hall on Dole Street and just north of Kennedy Theatre on East West Road.

Since the last LRDP, some of the water lines that were inadequate for fire flow have been improved. These areas include the Teachers College/Lab

School and Hemenway Hall. In addition, there were a few fire hydrants added to the Central Campus. A significant amount of water lines were installed in the Makai Campus to provide adequate fire flow and water service to the area.

B. Proposed Conditions

Although the additional buildings in this LRDP will be increasing the water demand for UHM, the water conservation efforts as discussed in Section C below should actually decrease the total water demand for UHM. With this in mind, the main focus of this LRDP should be to improve fire flow and provide redundancy for the existing water system. Improvements to be constructed in the next 5 to 10 years are as follows:

- Parking Structure Phase IIB/Bookstore – construct 12" water line to complete the loop on Makai Campus;
- Research Buildings North and East of Biomedical Building – construct 8" water line with fire hydrants to provide adequate fire protection;
- Upper Central Campus Roadway – construct 8" water line and connect to the existing "high service" BWS Main on Pamoa Road. This would provide fire protection for St. Francis Convent
- Consider making a new connection to the existing 20" transmission main near the Student Services Center and loop the system back to the existing 8" water line near Sakamaki Hall. This will improve water pressure and provide redundancy for the water system.

There was a significant amount of changes to the water system since its last Master Plan in 1990. An updated Water Master Plan should be completed to reevaluate the existing water system.

C. Water Consumption/Conservation

1. Background

Since 2002, the guiding principle of the University of Hawaii is sustainability – living in ways that meet our present needs without limiting the potential of future generations to meet their needs. As part of this philosophy, the University of Hawaii and the Honolulu Board of Water Supply signed a memorandum of understanding in 2003 to establish a program for reducing water and wastewater use at the Manoa Campus.

The goal of the program is to reduce water consumption by 10 percent annually.

2. Water Management Plan

A Water Management Plan (WMP) should be developed during this LRDP and incorporated by the Facilities Planning and Management Office (FPMO) to help incorporate and evaluate UHM's water conservation efforts. The WMP will consist of the following:

a. Analyze the existing water system on campus

- o Sub-meters - There are a minimal number of water meters on the Manoa Campus. According to FPMO, the master water meter near East West Road serves over half of the campus. This makes it difficult to determine the optimal locations for improvements since there is no way of determining individual water uses. Sub-meters throughout campus could be installed to better monitor the water usage on campus.
- o Determine the amount of fixture units and the daily demands for each building.
- o Run a hydraulic model of the water system to check for adequate water supply and pressures.

b. Mitigation Measures

- o Quarry Water Source – The "Makai Campus/Quarry Water Source Feasibility Study" prepared by Fukunaga and Associates was completed in March 1982. It determined that the quarry spring water in the Makai Campus is viable for either potable or non-potable water use. Currently, the water source has not been developed. This is a valuable resource to the Manoa Campus and the University should develop the water source for non-potable water use in the next 5-10 years if feasible. A pumping system, distribution system and possibly a storage system will need to be constructed in order to use the water for irrigation. Using the non-potable water for irrigation will help reduce the burden on BWS' water supply,

even with the additional buildings being constructed during this time period.

- Landscape and Irrigation – The water from the Quarry as discussed above could provide a large part of the irrigation water for the Manoa Campus. In addition to using this resource, the landscaping on campus should use native or adapted plants to reduce or eliminate irrigation requirements. The irrigation controllers should also be high-efficiency equipment and/or climate-based controllers as discussed in the Sustainability Guidelines.
- Low-flow plumbing fixtures – The Manoa Campus is currently renovating their campus buildings to use low-flow fixtures. This should continue through the 5-10 year period, if not already completed. In addition, all new buildings should be constructed with low-flow fixtures.
- Education – Research, curriculum and community service projects for water conservation are currently taking place at the University and should continue through this LRDP.

c. Monitoring

- The water usage should be monitored on a regular basis to determine if the mitigation measures are working. This can also help determine trouble spots in the buildings or water system.

V. CONCLUSION

The additional buildings in this LRDP do not have a significant impact on the City and County of Honolulu's infrastructure. Most of the recommendations in this report are to improve existing utility systems within the UHM Campus or improvements required for an increased amount of off-site drainage from the Manoa Watershed. It is important to note that this is not a comprehensive Utility Master Plan and many of the recommendations throughout this report were based on the 1990 Utility Master Plan and project information provided by FPMO and the City and County of Honolulu. It is UHM's intent to start a total Campus Master Planning effort in the Spring of 2008.

VI. REFERENCES

Information for the existing utility system and future utility improvements were compiled from the following references:

- University of Hawaii – Manoa Campus Utilities Master Plan, by Fukunaga and Associates, Inc., dated March 1982.
- University of Hawaii – Manoa Campus Utilities Master Plan – VI Makai Campus/Quarry Water Source Feasibility Study, by Fukunaga and Associates, Inc., dated March 1982.
- 1990 Utilities Master Plan Update, University of Hawaii – Manoa Campus, by Fukunaga and Associates, Inc., dated August 1991.
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- Memorandum from Chris Ball of Mitsunaga & Associates, Inc. to Dennis Kimura of Kimura Ybl Inc., dated November 1, 2006 regarding the Hamilton Library Ground Floor Renovation, University of Hawaii at Manoa.

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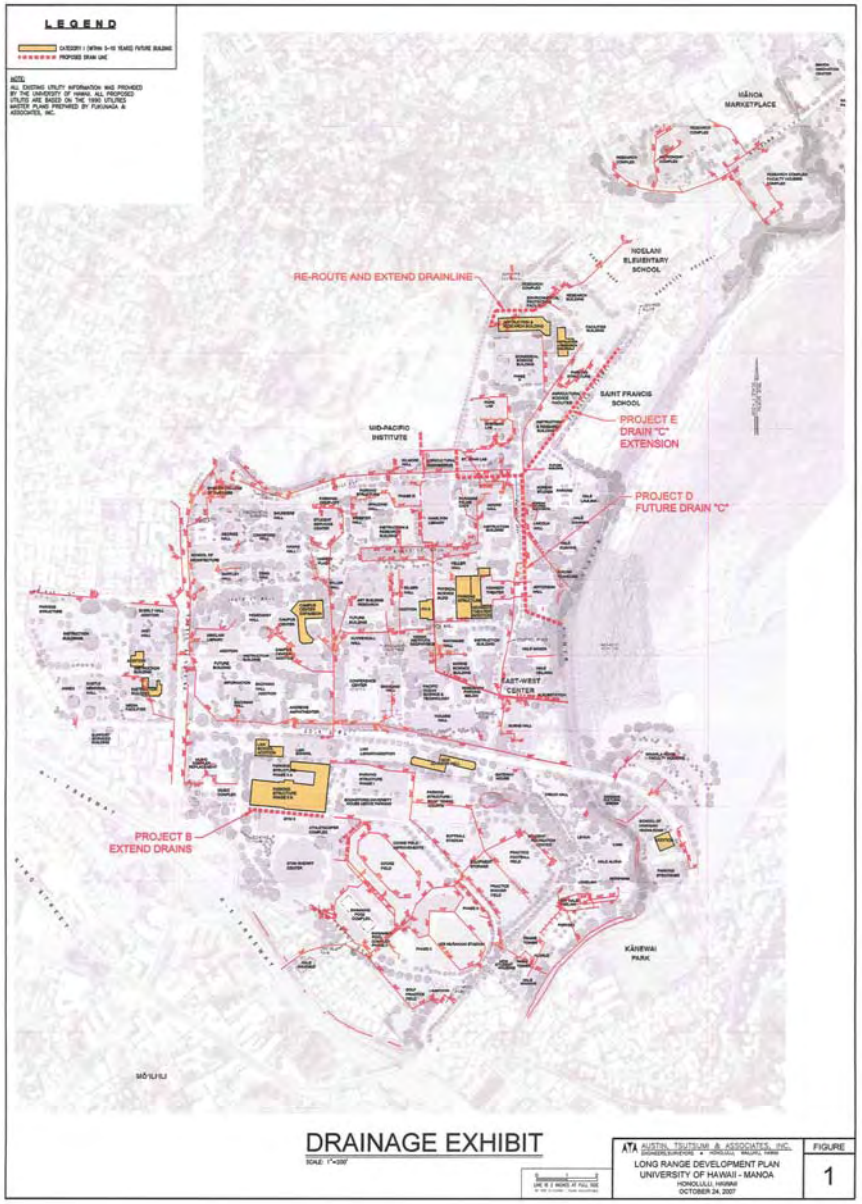
FIGURES



DRAINAGE EXHIBIT

SCALE: 1"=200'

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LONG RANGE DEVELOPMENT PLAN
UNIVERSITY OF HAWAII - MANOA
HONOLULU, HAWAII
OCTOBER 24, 2007

FIGURE 1

WASTEWATER EXHIBIT

SCALE: 1"=200'

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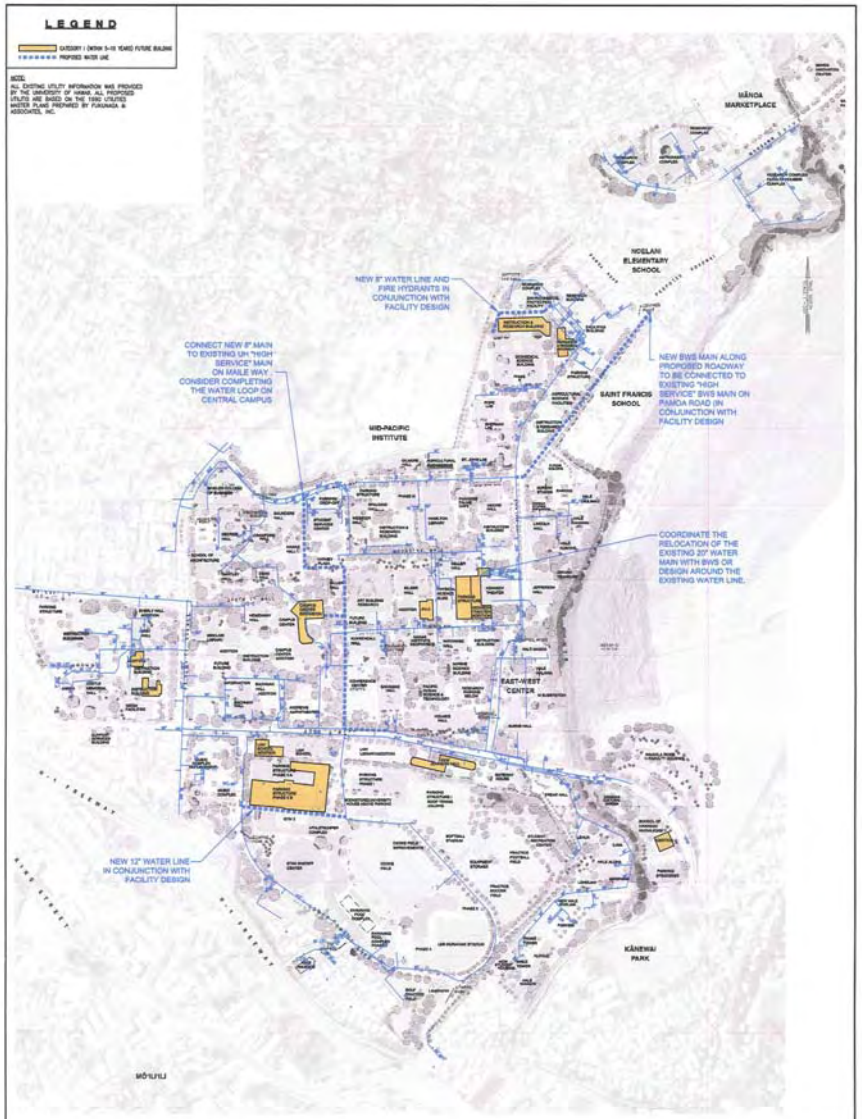
HONOLULU, HAWAII
OCTOBER 24, 2007

FIGURE 2



POTABLE WATER EXHIBIT

SCALE: 1"=200'

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HONOLULU, HAWAII
OCTOBER 24, 2007

FIGURE 3

APPENDIX C.
CHEMICAL INVENTORY: EXISTING C-MORE LABORATORIES AT THE UNIVERSITY OF HAWAIʻI MĀNOA CAMPUS

Chemical Inventory: Existing C-MORE Laboratories
(University of Hawai'i Mānoa Campus)

Chemical Name	Quantity	Liquid/Solid	Building
acetanilide	100 g	solid	MSB
acetic acid, glacial	500 mL	liquid	Steward
acetone	22 L	liquid	Biomed
acetone	20 L	liquid	MSB
acridine orange	1 g	solid	MSB
acrylamide	5 mL	liquid	Steward
agarose	35 g	solid	MSB
agarose	500 g	solid	Steward
alcohol, reagent grade	4 L	liquid	Biomed
alcohol, denatured	250 mL	liquid	Biomed
alginic acid	100 g	solid	MSB
aluminum chloride	5 g	solid	Steward
L-α-aminoadipic acid	100 mg	solid	MSB
L-α-amino-n-butyric acid	1 g	solid	MSB
5-amino-2,3-dihydro-1,4-phthalazinedione	10 g	solid	MSB
1-aminoethylphosphonic acid	100 g	solid	MSB
7-amino-4-methylcoumarin	1 g	solid	Steward
ammonium chloride	100 mg	solid	MSB
ammonium chloride	5 kg	solid	Biomed
ammonium chloride	500 g	solid	Steward
ammonium ferric citrate	500 g	solid	Steward
ammonium formate	500 g	solid	MSB
ammonium iron (III) citrate	1.5 kg	solid	MSB
ammonium molybdate	3 kg	solid	Biomed
ammonium phosphate, monobasic	1 lb	solid	Steward
ammonium sulfate	500 g	solid	Biomed
ammonium sulfate	100 g	solid	Steward
ampicillin sodium salt	5 g	solid	Steward
anidrone	100 g	solid	MSB
antipyrine	100 g	solid	MSB
arsenic acid	25 g	solid	MSB
ascarite	200 g	solid	MSB
ascarite	600 g	solid	Biomed
L-ascorbic acid	1.5 kg	solid	Biomed
L-ascorbic acid	800 g	solid	MSB
ascorbic acid	100 g	solid	Steward
D,L-aspartic acid	1.6 kg	solid	MSB
L-aspartic acid	100 g	solid	MSB
bacto tryptic soy bath	500 g	solid	MSB
bacto-agar	1 kg	solid	MSB
bacto-peptone	1 kg	solid	MSB
barium chloride	500 g	solid	MSB

Chemical Name	Quantity	Liquid/Solid	Building
barium hydroxide	100 g	solid	MSB
benzoic acid	750 g	solid	MSB
betaine, anhydrous	60 g	solid	MSB
betaine hydrochloride	100 g	solid	Biomed
blue dextran	50 mg	solid	Steward
boric acid	200 g	solid	MSB
boric acid	500 g	solid	Biomed
boric acid	1 kg	solid	Steward
anti-bromodeoxyuridine	100 ug	solid	Steward
2-bromoethane sulfonic acid	250 g	solid	MSB
bromophenol blue	1.5 kg	solid	Biomed
Buffer pH 4	500 mL	liquid	Biomed
Buffer pH 7	500 mL	liquid	Biomed
Buffer pH 9	500 mL	liquid	Biomed
2,3-butanedione monoxime	25 g	solid	MSB
n-butyl methacrylate	250 g	solid	MSB
cacodylic acid	5 g	solid	MSB
cadmium	5500 g	solid	MSB
cadmium chloride hemi(pentahydrate)	500 g	solid	Biomed
calcium carbide	500 g	solid	MSB
calcium carbonate	100 g	solid	MSB
calcium carbonate, chips	1.5 kg	solid	MSB
calcium chloride	3 kg	solid	MSB
calcium chloride dihydrate	500 g	solid	Biomed
calcium chloride dihydrate	500 g	solid	Steward
calcium pantothenate	5 g	solid	Steward
calcium phosphate	1 kg	solid	MSB
carbon anode solution	32 oz	liquid	Biomed
carbon cathode solution	3.75 gal	liquid	Biomed
Celite 545 diatomaceous earth	50 g	solid	MSB
cesium chloride	500 g	solid	Steward
charcoal, activated	500 g	solid	MSB
charcoal, activated	1 lb	solid	Biomed
Chelating Resin (iminodiacetic acid)	500 g	solid	Biomed
Chelex 100 resin	100 g	solid	Steward
chloramine-T	250 g	solid	Biomed
chlorine tablets	200 g	solid	MSB
chloroform, anhydrous	4 L	liquid	MSB
chloroform, anhydrous	500 mL	liquid	Steward
choline chloride	75 g	solid	MSB
chondroitin sulfate A	100 g	solid	MSB
chromium potassium sulfate dodecahydrate	10 g	solid	MSB
cicloesanone-2-4-dinitrofenil-idrazone	100 g	solid	MSB
citric acid monohydrate	1 g	solid	MSB
cobalt (II) nitrate hexahydrate	500 g	solid	MSB

Chemical Name	Quantity	Liquid/Solid	Building
cobalt (II) nitrate hexahydrate	100 g	solid	Steward
congo red	5 g	solid	MSB
copper (II) sulfate pentahydrate	5 g	solid	Steward
cresol red	5 g	solid	MSB
m-cresol purple	5 g	solid	Biomed
crystal violet	10 g	solid	Biomed
CTAB cetyltrimethyl ammonium bromide	25 g	solid	MSB
cupric chloride	25 g	solid	MSB
cupric sulfate	100 g	solid	MSB
cupric sulfate	1 kg	solid	Biomed
(+)-cyclohexamide	500 g	solid	MSB
DAPI	1 mL	liquid	Steward
2'-deoxyadenosine	10 g	solid	MSB
deoxycholic acid	25 g	solid	MSB
dextran sulfate, 50% solution	100 mL	liquid	Steward
dextrose	25 g	solid	MSB
3,5-diaminobenzoic acid	1.2 kg	solid	MSB
1,12-diaminododecane	10 g	solid	MSB
1,7-diaminoheptane	10 g	solid	MSB
1,8-diaminooctane	2 g	solid	MSB
dichloroisocyanuric acid	25 g	solid	MSB
3-(3,4-dichlorophyenyl)-1,1-dimethylurea	1 g	solid	MSB
diisopropylamine	75 g	solid	MSB
dimethyl formamide	100 mL	liquid	MSB
dimethyl formamide	100 mL	liquid	Steward
diphenyl carbazone	100 mL	liquid	MSB
diphenylamine	20 g	solid	MSB
disodium ethylenediamine tetraacetate	75 g	solid	MSB
2,4-dinitrophenol	200 g	solid	MSB
dodecyl sodium sulfate	100 g	solid	MSB
Drierite	50 g	solid	MSB
Drierite	15 lbs	solid	Biomed
epichlorohydrin	100 g	solid	Steward
ethanol	4 L	liquid	Steward
ethanol, denatured	6 L	liquid	Steward
ethyl acetate	1 L	liquid	MSB
ethylenediamine tetraacetate	500 g	solid	MSB
ethylenediamine tetraacetate	500 g	solid	Steward
Esculin (6,7-dihydrocoumarin-6-glucoside)	500 g	solid	MSB
ethanolamine-2-aminoethanol	5 g	solid	MSB
ehidium bromide	100 mL	liquid	MSB
ferric ammonium citrate	2 g	solid	MSB
ferric chloride, anhydrous	500 g	solid	MSB
ferric nitrate	500 g	solid	MSB
ferric phosphate solution	500 g	solid	Steward

Chemical Name	Quantity	Liquid/Solid	Building
ferrous ammonium sulfate	1.5 kg	solid	Biomed
ferrous sulfate heptahydrate	600 g	solid	MSB
flourescamine	1.25 kg	solid	MSB
fluorescein sodium	5 mg	solid	Biomed
formaldehyde	2 L	liquid	Biomed
formaldehyde	2 L	liquid	Steward
formamide	1 L	liquid	MSB
formamide	500 mL	liquid	Steward
formic acide	100 g	solid	MSB
Gelatin	500 g	solid	MSB
D(+)-galactose, anhydrous	4 g	solid	MSB
α-D-(+)-glucose	1 kg	solid	MSB
D(+)-glucose	100 g	solid	MSB
D-glucuronic acid	1.5 kg	solid	MSB
D-glucuronic acid lactone	10 g	solid	MSB
L-(+)-glutamic acid	300 g	solid	MSB
glycerol	16 L	liquid	Biomed
glycerin	500 mL	liquid	Steward
β-glycerophosphate	100 g	solid	MSB
glycine	500 g	solid	MSB
cly-cly-glycine	100 g	solid	MSB
glycolic acid	200 g	solid	MSB
Gly-Gly	25 g	solid	MSB
glyphosate	10 g	solid	MSB
guanidine thiocyanate	500 g	solid	Steward
hexadecyltrimethylammonium bromide	1 g	solid	MSB
L-histidine	25 g	solid	MSB
hydrazine	2.5 kg	solid	MSB
hydrazine sulfate	100 g	solid	MSB
hydrochloric acid, ACS grade	17.5 L	liquid	Biomed
hydrochloric acid, ACS grade	12 L	liquid	MSB
hydrochloric acid, trace metal grade	10 L	liquid	Biomed
hydrochloric acid, 0.1 M	10 L	liquid	Biomed
hydrochloric acid	2 L	liquid	Steward
hydroxylamine	100 g	solid	MSB
7-hydroxy-4-methylcoumarin	1 g	solid	MSB
2,2-bis-(hydroxymethyl)-2,2',2"-notrilotriethanol	300 g	solid	MSB
p-hydroxyphenylacetic acid	100 g	solid	MSB
Ilford Rapid Fixer	3 L	liquid	MSB
imidazole	1 kg	solid	MSB
inositol	100 g	solid	Steward
iron, reduced	500 g	solid	MSB
iron (III) chloride	500 g	solid	Steward
isobutanol	1 L	liquid	Steward
isopropanol	1 L	liquid	Steward

Chemical Name	Quantity	Liquid/Solid	Building
kanamycin sulfate	5 g	solid	Steward
D,L-lactic acid	25 g	solid	MSB
lauryl sulfate	100 g	solid	MSB
lead acetate	750 g	solid	MSB
L-leucine	25 g	solid	MSB
lithium chloride	200 g	solid	MSB
lithium sulfate monohydrate	500 g	solid	MSB
L-malic acid	5 g	solid	MSB
D-mannitol	5 g	solid	MSB
D,L-methionine	10 g	solid	MSB
Lauria-Bertani Agar	500 g	solid	MSB
lithium acetate dihydrate	250 g	solid	Steward
magnesium acetate	1 kg	solid	MSB
magnesium chloride	500 g	solid	Biomed
magnesium hydroxide	250 g	solid	MSB
magnesium perchlorate	500 g	solid	MSB
magnesium perchlorate	500 g	solid	Biomed
magnesium sulfate	1 kg	solid	MSB
magnesium sulfate	1 kg	solid	MSB
Malachite Green	75 g	solid	Biomed
Maltose, hydrate	100 g	solid	MSB
manganous chloride tetrahydrate	2 kg	solid	MSB
manganese (II) chloride tetrahydrate	500 g	solid	Steward
manganous sulfate	4 kg	solid	MSB
magnesium sulfate heptahydrate	500 g	solid	Steward
magnesium sulfate, anhydrous	500 g	solid	Steward
D(+)-mannose	1 kg	solid	MSB
2-mercaptoethanol	25 mL	liquid	MSB
2-mercaptoethanol	25 mL	liquid	Steward
mercuric chloride	250 g	solid	Biomed
mercuric chloride	150 g	solid	MSB
mercuric sulfate	100 g	solid	MSB
methanol	4 L	liquid	MSB
methanol	1 L	liquid	Steward
2-methoxyethanol	1 L	liquid	MSB
2-methoxyethanol	500 mL	liquid	Steward
methyl orange	25 g	solid	MSB
methylamine	100 g	solid	MSB
3-methyl-2-benzothiazolinone hydrazone	50 g	solid	MSB
methylphosphonic acid	25 g	solid	MSB
4-methylumbelliferone	10 g	solid	MSB
4-methylumbeliferone sodium salt	300 g	solid	MSB
4-methylumbelliferone sodium salt	25 g	solid	Steward
mitomycin C	4 mg	solid	Steward
Molecular Sieve, 5A	500 g	solid	Biomed

Chemical Name	Quantity	Liquid/Solid	Building
molybdic acid sodium salt	100 g	solid	MSB
MOPS	1 kg	solid	MSB
myo-inositol	50 g	solid	MSB
n-(1-naphthyl)ethylenediaminedichloride	25 g	solid	Biomed
nalidixic acid	6 g	solid	MSB
naphthalene	250 g	solid	MSB
nickel nitrate	500 g	solid	MSB
Nile Blue Chloride	10 g	solid	MSB
Nitrification Inhibitor, Formula 2533	35 g	solid	MSB
nitromethane	500 mL	liquid	MSB
L-norleucine	100 mg	solid	MSB
Orange G	25 g	solid	MSB
orcinol monohydrate	40 g	solid	MSB
ouabain octahydrate	250 mg	solid	MSB
oxalic acid	500 g	solid	MSB
RNA	25 g	solid	Steward
rubidium chloride	10 g	solid	Steward
paraformaldehyde	1 kg	solid	MSB
pentachlorophenol	100 g	solid	MSB
pentachlorophenol sodium salt hydrate	1 kg	solid	MSB
pH electrode storage solution	40 mL	liquid	Biomed
pH probe storage solution	1 L	liquid	Biomed
phenol:chloroform:isoamyl alcohol	500 mL	solid	Steward
phenolphthalein	100 g	solid	MSB
phenolphthalein, 1% solution	500 mL	liquid	MSB
L-phenylalanine	10 g	solid	MSB
β-phenylethylamine hydrochloride	10 g	solid	Biomed
phenylmethyl sulfonyl fluoride	5 g	solid	Biomed
phosphoric acid, 8.5%	500 mL	liquid	Biomed
phosphoric acid, 85%	1.5 L	liquid	Biomed
phosphoric acid, 85%	500 mL	liquid	MSB
phosphorous pentoxide	500 g	solid	MSB
o-phospho-L-serine	1 g	solid	MSB
o-phthaldialdehyde	6 g	solid	MSB
poly-D-lysine	5 mg	solid	Steward
poly(allylamine hydrochloride)	5 g	solid	Steward
polyethylene glycol	250 g	solid	Steward
Polyseed Capsules	50 capsules	solid	MSB
polyvinyl-pyrrolidone	100 g	solid	MSB
potassium antimony tartrate	1 kg	solid	Biomed
potassium borohydride	25 g	solid	MSB
potassium bromide	250 g	solid	MSB
potassium carbonate	1.5 kg	solid	MSB
potassium chloride	3 kg	solid	MSB
potassium chloride	500 g	solid	Steward

Chemical Name	Quantity	Liquid/Solid	Building
potassium chloride, solution	500 mL	liquid	MSB
potassium chloride solution	500 mL	liquid	Biomed
potassium dichromate	500 g	solid	MSB
potassium ethyl xanthogenate	100 g	solid	Steward
potassium fluoride	25 g	solid	Steward
potassium hydrogen phthalate	100 g	solid	Biomed
potassium hydroxide	2.25 kg	solid	MSB
potassium iodate	10 g	solid	Biomed
potassium iodate	100 g	solid	MSB
potassium iodide	50 g	solid	Biomed
potassium iodide	8 kg	solid	MSB
potassium nitrate	200 g	solid	Biomed
potassium persulfate	1.1 kg	solid	Biomed
potassium persulfate	1 kg	solid	MSB
potassium phosphate	600 g	solid	Biomed
potassium phosphate	500 g	solid	MSB
potassium phosphate dibasic, trihydrate	500 g	solid	Steward
potassium phosphate monobasic	500 g	solid	Biomed
potassium phosphate monobasic	500 g	solid	MSB
potassium phosphate monobasic	500 g	solid	Steward
potassium sodium tartrate tetrahydrate	250 g	solid	MSB
primulin	25 g	solid	MSB
procaine	50 g	solid	MSB
proflavine	25 g	solid	MSB
D,L-proline	100 g	solid	MSB
L-proline	25 g	solid	MSB
2-propanol	1 L	liquid	MSB
2-propanol	1 L	liquid	Steward
propionic acid	100 g	solid	MSB
protease inhibitor cocktail	25 mL	liquid	Steward
putrescine	5 g	solid	MSB
3-(2-pyridyl)-5,6-bis(4-phenylsulfonic acid)-1,2,4-triazine	500 mg	solid	MSB
pyridoxine	5 g	solid	MSB
pyridoxine hydrochloride	5 g	solid	Steward
pyruvic acid	25 g	solid	MSB
oxalic acid	3.5 kg	solid	Biomed
Reference Electrode Solution	90 mL	liquid	Biomed
resazurin	1 g	solid	MSB
α-L-rhamnose	10 g	solid	MSB
Rifamycin SV	250 mg	solid	MSB
Ruthenium Red	1 g	solid	MSB
Sselenious acid	10 g	solid	MSB
selenium dioxide	10 g	solid	MSB
silica, fumed	100 g	solid	MSB
silver nitrate	25 g	solid	MSB

Chemical Name	Quantity	Liquid/Solid	Building
silver sulfate	25 g	solid	MSB
Soda Lime	2.5 kg	solid	Biomed
tetrasodium ehtylenediamine tetraacetate	500 g	solid	Biomed
sodium acetate	1 kg	solid	MSB
sodium acetate	500 g	solid	Steward
sodium azide	50 g	solid	MSB
sodium azide	50 g	solid	Steward
sodium bicarbonate	500 g	solid	Biomed
sodium bicarbonate	1 kg	solid	Steward
sodium bisulfate	500 g	solid	MSB
sodium borate	500 g	solid	Biomed
sodium borate	1 kg	solid	MSB
sodium carbonate	1 kg	solid	Biomed
sodium carbonate	20 g	solid	MSB
sodium carbonate, anhydrous	1.5 kg	solid	MSB
sodium carbonate anhydrous	500 g	solid	Steward
sodium carbonate, volumetric standard	1 L	liquid	MSB
sodium chloride	11.6 kg	solid	Biomed
sodium chloride	3.5 kg	solid	MSB
sodium chloride	1 kg	solid	Steward
sodium citrate	500 g	solid	Biomed
sodium citrate	3 kg	solid	MSB
sodium citrate	1 kg	solid	Steward
sodium cyanide	100 g	solid	MSB
sodium deuteroxide	50 g	solid	MSB
sodium dodecyl sulfate	1 kg	solid	Biomed
sodium dodecyl sulfate	1 kg	solid	Steward
sodium flouride	100 g	solid	MSB
sodium formate	500 g	solid	MSB
sodium hexafluorosilicate	1 kg	solid	Biomed
sodium hydrogencarbonate	100 g	solid	Biomed
sodium hydrosulfite	500 g	solid	MSB
sodium hydroxide	2.5 kg	solid	Biomed
sodium hydroxide	4 kg	solid	MSB
sodium hydroxide	1 kg	solid	Steward
sodium hydroxide, 0.1 M	30 mL	liquid	Biomed
sodium hydroxide, 5 N	1 L	liquid	MSB
sodium hypochlorite	16 L	liquid	MSB
sodium iodate	3.1 kg	solid	MSB
sodium iodide	500 g	solid	Biomed
sodium lauryl sulfate	500 g	solid	MSB
sodium m-arsenite	100 g	solid	MSB
sodium meta-bisulfite	500 g	solid	Biomed
sodium metabisulfite	500 g	solid	MSB
sodium metaphosphate	500 g	solid	MSB

Chemical Name	Quantity	Liquid/Solid	Building
sodium metasilicate	250 g	solid	Biomed
sodium metavanadate	5 g	solid	Steward
sodium molybdate	100 g	solid	MSB
sodium molybdate (IV) dihydrate	5 g	solid	Steward
sodium nitrate	1.25 kg	solid	MSB
sodium nitrate	250 g	solid	Steward
sodium nitrite	500 g	solid	MSB
sodium nitroprusside	450 g	solid	MSB
sodium nitroprusside dihydrate	50 g	solid	MSB
sodium periodate	100 g	solid	MSB
sodium persulfate	500 g	solid	Biomed
sodium persulfate	500 g	solid	MSB
sodium phosphate	500 g	solid	MSB
sodium phosphate dibasic, anhydrous	500 g	solid	MSB
sodium phosphate dibasic heptahydrate	1 kg	solid	MSB
sodium phosphate dibasic heptahydrate	500 g	solid	Steward
sodium phosphate monobasic	1.5 kg	solid	MSB
sodium phosphate monobasic monohydrate	500 g	solid	Steward
sodium potassium tartrate	1 kg	solid	MSB
sodium pyrophosphate	500 g	solid	MSB
sodium pyrophosphate	500 g	solid	Steward
sodium pyrosulfite	1 kg	solid	MSB
sodium salicylate	500 g	solid	MSB
sodium selenite	25 g	solid	Steward
sodium sulfate anhydrous	2.5 kg	solid	MSB
sodium sulfate anhydrous	500 g	solid	Steward
sodium sulfite	1.5 kg	solid	MSB
sodium tetraborate decahydrate	500 g	solid	MSB
sodium tetraborate decahydrate	25 g	solid	Steward
sodium thiosulfate	500 g	solid	Biomed
sodium thiosulfate	500 g	solid	MSB
sodium thiosulfate solution (1N)	1 L	liquid	MSB
sodium tungstate dihydrate	100 g	solid	Biomed
stannous chloride	100 g	solid	MSB
Starch	600 g	solid	MSB
strontium chloride hexahydrate	100 g	solid	Steward
succinic acid	100 g	solid	MSB
sucrose	500 g	solid	MSB
sucrose	1 kg	solid	Steward
sulfanilamide	400 g	solid	Biomed
sulfanilamide	200 g	solid	MSB
sulfathiazole	100 g	solid	MSB
sulfuric acid	25 L	liquid	Biomed
sulfuric acid	10 L	liquid	MSB
sulfuric acid, 10N solution	9 L	liquid	MSB

Chemical Name	Quantity	Liquid/Solid	Building
SYBR Gold	1 mL	liquid	Steward
SYBR Green I	1 mL	liquid	Steward
SYBR Green II	1 mL	liquid	Steward
SYTO 60	1 mL	liquid	Steward
TAE, 25x powder	500 g	solid	Steward
tartaric acid	500 g	solid	MSB
D-tartaric acid	5 lbs	solid	MSB
D,L-tartaric acid	1 g	solid	MSB
tetramethylammonium chloride	500 mL	liquid	Steward
tetrasodium pyrophosphate	100 g	solid	MSB
thiamine hydrochloride	100 g	solid	MSB
tin, metal	500 g	solid	MSB
tin (II) chloride dihydrate	5 g	solid	Steward
titanous chloride solution (20%)	500 mL	liquid	MSB
Toluidine Blue O	5 g	solid	MSB
trichloroacetic acid	500 mL	liquid	Steward
trichloroacetic acid	500 mL	liquid	MSB
trimethylamine	100 g	solid	MSB
triphenyltetrazolium chloride, 1% solution	30 mL	liquid	Steward
tripolyphosphate	500 g	solid	Biomed
Tris base	1 kg	solid	Steward
Tris-EDTA buffer, 100x concentrate	100 mL	liquid	Steward
tris-(hydroxymethyl)-aminomethane	3.1 kg	solid	MSB
tris-(hydroxymethyl)-aminomethane hydrochloride	1.1 kg	solid	MSB
trisodium trimetaphosphate	500 g	solid	MSB
Triton X-100	500 mL	liquid	MSB
Trizma Base	700 g	solid	MSB
Trizma Base	500 g	solid	Steward
Trizma hydrochloride	100 g	solid	MSB
Trizma pH 7.0	225 g	solid	MSB
Trizma pH 7.4	100 g	solid	Biomed
Trizma pH 7.4	250 g	solid	Steward
Trizma pH 7.7	250 g	solid	MSB
Trizma pH 7.8	100 g	solid	MSB
Trizma pH 8.0	50 g	solid	MSB
Trizma pH 8.0	250 g	solid	Steward
Trizma pH 8.4	50 g	solid	MSB
Trizma pH 8.8	1 kg	solid	MSB
Trizma Pre-set Crystals	100 g	solid	Biomed
L-tryptophane	5 g	solid	MSB
tungstic acid	100 g	solid	MSB
tungstic anhydride	25 g	solid	Biomed
L-tyrosine	25 g	solid	MSB
Ultrawet 60L solution (25%)	120 mL	liquid	MSB
urea	500 g	solid	Biomed

Chemical Name	Quantity	Liquid/Solid	Building
vanadyl sulfate	600 g	solid	MSB
vanadyl sulfate hydrate	50 g	solid	MSB
vinyl cyclohexene dioxide	250 g	liquid	MSB
D,L-xylose	25 g	solid	MSB
zinc chloride	5 g	solid	Steward
zinc metal	1 kg	solid	MSB
zinc sulfate heptahydrate	125 g	solid	MSB
zinc sulfate heptahydrate	500 g	solid	Steward

APPENDIX D.
TRAFFIC IMPACT ANALYSIS REPORT
UNIVERSITY OF HAWAIʻI AT MĀNOA
LONG RANGE DEVELOPMENT PLAN 2007 UPDATE
(CATEGORY I)

TRAFFIC IMPACT ANALYSIS REPORT
UNIVERSITY OF HAWAII AT MANOA
LONG RANGE DEVELOPMENT PLAN
2007 UPDATE (CATEGORY I)

Manoa, Honolulu, Hawaii

October 26, 2007

Prepared for:

Group 70 international

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817-5031
Telephone: (808) 533-3646
Facsimile: (808) 526-1267
E-mail: atahnl@atahawaii.com
Honolulu • Wailuku, Hawaii

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TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1-6
A.	Background	1
B.	Location	1
C.	Project Description	3
D.	Study Methodology	4
E.	Definitions	4
II.	EXISTING CONDITIONS	6-21
A.	General	6
B.	Roadway System	6
C.	Existing Traffic Volumes	8
D.	Existing Traffic Conditions Analysis and Observations	11
III.	BASE YEAR 2017 SCENARIO	22-35
A.	Defacto Growth Rate	22
B.	Base Year 2017 Traffic and Analysis	22
C.	Base Year 2017 Mitigative Measures	25
IV.	YEAR 2017 WITH PROJECT SCENARIO	36-46
A.	Discussion	36
B.	Trip Generation	37
C.	Trip Distribution/Assignment	37
D.	Year 2017 with Project Analysis	37
E.	Year 2017 with Project Recommended Improvements	44
V.	CONCLUSIONS AND RECOMMENDATIONS	47-56
VI.	REFERENCES	57

TABLE OF CONTENTS
Cont'd

		Page
TABLES		
1.	EXISTING LEVEL OF SERVICE SUMMARY	19
2.	BASE YEAR 2017 LEVEL OF SERVICE SUMMARY	33
3.	YEAR 2017 WITH LRDP UPDATE (CATEGORY 1 5-10 YEARS...	41
FIGURES		
1.	LOCATION MAP	2
2.	SITE PLAN	5
3.	EXISTING LANE CONFIGURATION	10
4.	EXISTING TRAFFIC VOLUMES AND LEVEL OF SERVICE	18
5.	BASE YEAR 2017 TRAFFIC VOLUMES AND LEVEL OF SERVICE	24
6.	EXISTING LANE CONFIGURATION AT UNIVERSITY AVENUE INTERSECTIONS WITH DOLE STREET AND LOWER CAMPUS ROAD	27
7.	PHASE I MODIFICATIONS	28
8.	PHASES I AND II MODIFICATIONS	28
9.	BASE YEAR 2017 WITH MITIGATION TRAFFIC VOLUMES AND LEVEL OF SERVICE	32
10.	UH LRDP UPDATE TRAFFIC VOLUMES AND LEVEL OF SERVICE	39
11.	YEAR 2017 WITH UH LRDP UPDATE TRAFFIC VOLUMES AND LEVEL OF SERVICE	40
12.	OLD WAIALAE ROAD	45
13.	VARSITY AREA	46

TABLE OF CONTENTS
Cont'd

		Page
14.	EXISTING LAND CONFIGURATION AT UNIVERSITY AVENUE AND INTERSECTIONS WITH DOLE STREET AND LOWER CAMPUS ROAD	52
15.	PHASES I AND II MODIFICATIONS	53

TABLE OF CONTENTS
Cont'd

APPENDICES

A. TRAFFIC COUNT DATA (TO BE SUBMITTED WITH FINAL)

B. LEVEL OF SERVICE CRITERIA (TO BE SUBMITTED WITH FINAL)

C. LEVEL OF SERVICE CALCULATIONS (TO BE SUBMITTED WITH FINAL)

TRAFFIC IMPACT ASSESSMENT REPORT

University of Hawaii at Manoa

Long Range Development Plan 2007 Update (Category I)

Manoa, Honolulu, Hawaii

I. INTRODUCTION

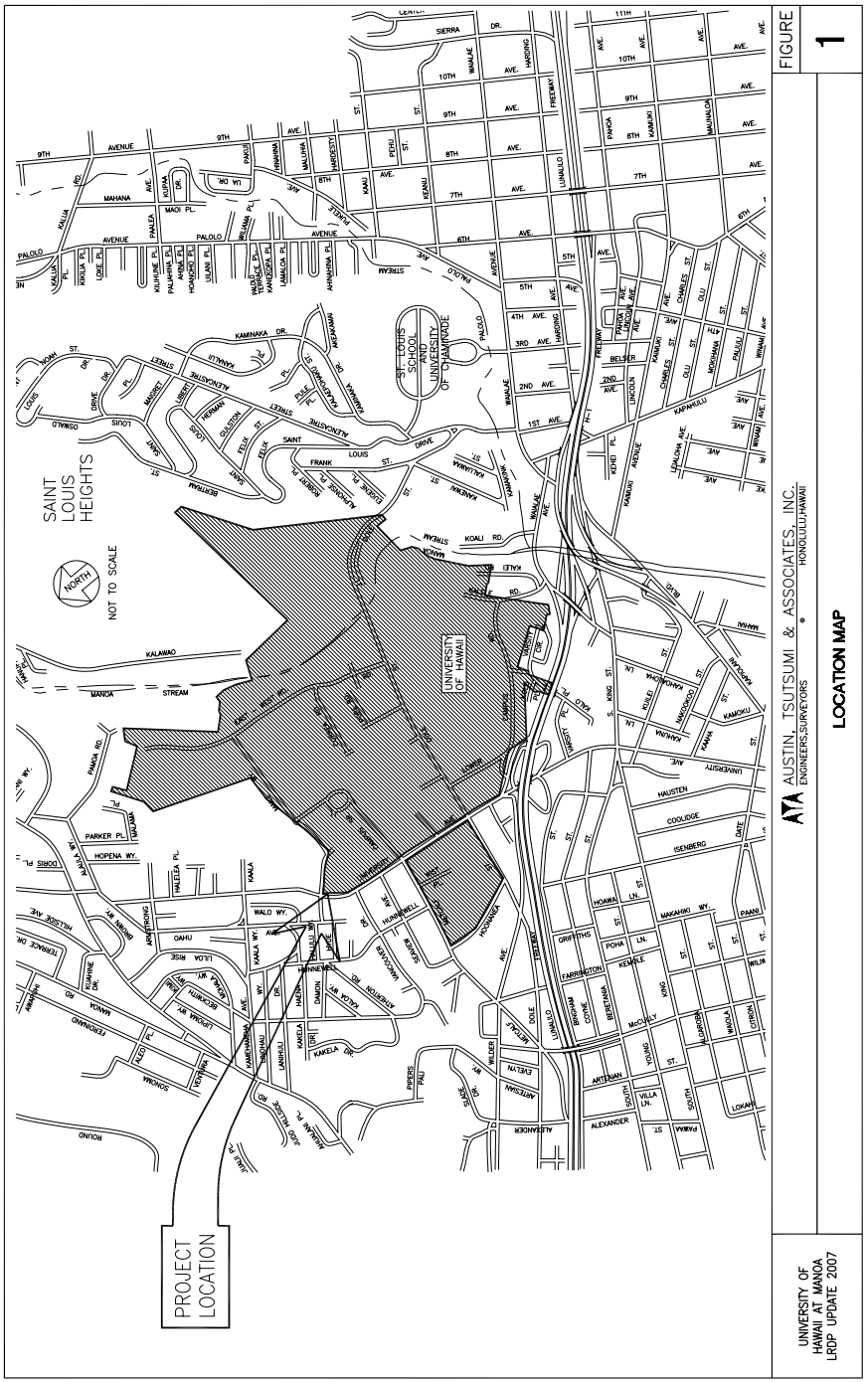
This report documents the findings of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts resulting from the University of Hawaii Long Range Development Plan 2007 Update – Category I, which shall be referred to hereinafter as "LRDP".

A. Background

As stated in the LRDP, throughout its early years, the University of Hawaii at Manoa (UHM) was developed without the benefit of a formalized development plan. In 1987, the first LRDP was completed and adopted, with the goal of coordinating growth and removing vehicular traffic from the center of its campus. The LRDP was subsequently updated in 1994, and is in the process of being updated for a second time.

B. Location

The University of Hawaii, Manoa Campus (UHM) is situated at the entrance to Manoa Valley, and is bordered by the communities of Saint Louis Heights, Moiliili, and Manoa. The H-1 Freeway lies just south of UHM. Figure 1 shows the project location.



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C. Project Description

The intent of this report is to assess the potential traffic impacts arising from the LRDP. The current plan includes numerous building and parking improvements, including:

- Law School Expansion
- Campus Center Expansion to the Northeast
- Instruction Building and Henke Hall Site
- Kennedy Theatre Expansion
- **Parking Structure at Kennedy Theatre (480 parking Stalls)**
- **Parking Structure IIB/Bookstore (900 Parking Stalls)**
- Research Buildings – North and East of Biomedical Building
- Research Space – Infill of South Courtyard of Biomedical Building
- Research Buildings – Mauka Campus
- Instruction Building – College of Education
- I.T.S. – Bilger Hall Addition, Phase II
- Media Facilities at KHET Site
- Johnson Hall – Replacement Dormitory
- Hale Noelani – Replacement Dormitory
- Faculty Housing – Waahila Ridge or Mauka Campus
- Klum Gym Replacement
- School of Hawaiian Knowledge

Relative to traffic analysis, the additional parking structures will be the only part of the LRDP that will significantly affect traffic operations along the roadways within the area. This is due to the fact that traffic projections for

Universities are generally based upon student enrollment, which is not projected to increase (see Section IV). See Figure 2 for Site Plan.

D. Study Methodology

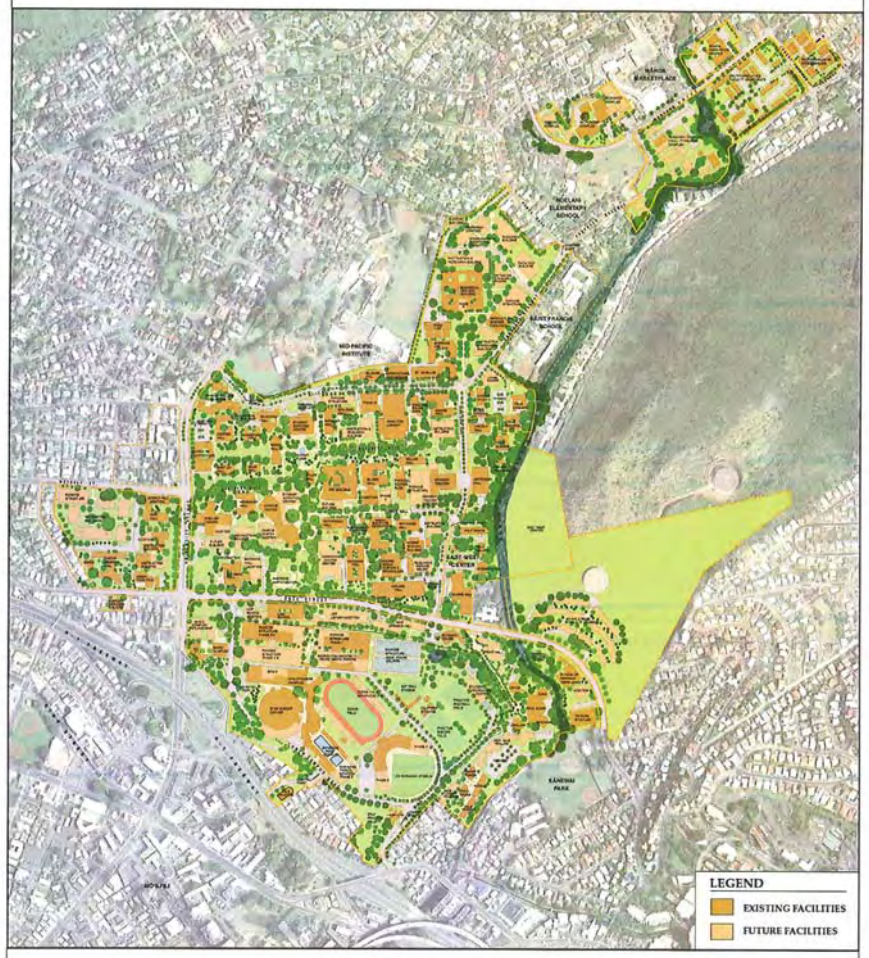
This study will address the following:

1. Existing traffic operating conditions at key locations within the study area.
2. Base Year 2017 (buildout year for LRDP) traffic projections (without LRDP) including traffic generated by a defacto growth rate. Note: LRDP Category I includes improvements for a timeframe of 5-10 years.
3. Identify potential traffic mitigation measures for the Base Year 2017 Traffic.
4. Trip generation and traffic assignment characteristics.
5. Determination of the impact of Project-generated traffic.

Recommendations for roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by the LRDP.

E. Definitions

- **Base Year 2017** – describes scenario where vehicular traffic volumes for the year 2017 are projected <u>without</u> the traffic generated by the LRDP. In simple terms, this is the “no-build” or “do-nothing” alternative.
- **High, or Heavy Turning Movement Volume –** a subjective term that for this report; shall be used to describe conditions where the turning movement volume forms a significant component of the traffic processed through the intersection, and noticeably reduces capacity along the main arterial. This term can apply to a single heavy turning movement, or the collective effect of all turning movements.
- **Mitigation** – applies to recommendations aimed at improving unsatisfactory traffic conditions (i.e. LOS = F, volume/capacity ratio>1) experienced as a result of Base Year 2017 conditions.
- **Year 2017 with Project** – describes estimated vehicular traffic volumes for the year 2017 with the traffic generated by the LRDP.



UNIVERSITY OF HAWAII AT MANOA LRDP UPDATE 2007

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
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SITE PLAN

FIGURE 2

- **Level-of-Service (LOS)** – as based on The Highway Capacity Manual – Special Report 209 (HCM), dated 2000, LOS is a qualitative measure used to describe the conditions of traffic flow at intersections. Values range from LOS A (minimal delay) to LOS F (congested).
- **Trips** – for the purposes of this report, vehicular trips traversing the roadway network. Note that this term can also signify other modes of transportation, however vehicular trips will be the only trips considered in this report.
- For a complete glossary of terms, refer to Appendix E.

II. EXISTING CONDITIONS

A. General

UHM has been divided into three (3) distinct areas throughout the LRDP as follows:

The Central Campus is bounded by University Avenue, Dole Street, East-West Road, Maile Way, and extends mauka to Pamoa Road, between Mid-Pacific Institute and Saint Francis School. The other part of the Central Campus is the College of Education, which is bounded by University Avenue, Metcalf Street, Hoonanea Street, and Dole Street. Vehicular access to the Central Campus is provided via the Dole Street/East-West Road and University Avenue/Maile Way intersections.

The Upper Campus is bounded by Maile Way, Mid-Pacific Institute, Pamoa Road residences, and Saint Francis School.

The Makai Campus, also called the "Quarry" or "Lower Campus" is bounded by Dole Street, University Avenue, the H-1 Freeway, and Manoa Stream. Access to the Makai Campus is provided via Lower Campus Road at Dole Street, Old Waialae Road at Kalei Road, Varsity Place in Varsity Circle, and a direct off-ramp connection from the westbound H-1 Freeway.

B. Roadway System

The following are brief descriptions of the existing roadway network in the vicinity of UHM:

University Avenue is a six-lane, north-south major collector roadway in the vicinity of UHM. North of Maile Way, the roadway narrows to two (2) lanes. South of The H-1 Freeway, the roadway narrows to four (4) lanes with channelization.

In addition to UHM, this roadway serves as one (1) of two (2) primary access roads into Manoa Valley, which is comprised primarily of residential land uses. South of UHM, on-ramps and off-ramps to the Eastbound/Westbound H-1 Freeway are provided.

University Avenue ultimately terminates at Ala Wai School.

H-1 Freeway is a six-lane divided freeway in the vicinity of UHM. On-ramps and Off-ramps to University Avenue and Old Waialae Road are provided in the vicinity of UHM.

South King Street is a five-lane, one-way eastbound major arterial west of University Avenue. East of University Avenue, the road combines with its westbound couplet Beretania Street and continues as a six-lane, two-way Major Arterial, eventually terminating at its intersection with Kapahulu Avenue.

Beretania Street is a three-lane, one-way westbound arterial west of University Avenue. Beretania Street begins at University Avenue when it recombines with South King Street.

Waialae Avenue is a six-lane, two-way east-west arterial roadway in the vicinity of UH Manoa. Contra-flow operation occurs during PM peak hour of traffic.

East-West Road is a two-lane UHM campus road that provides access from Dole Street onto the heart of UHM's campus.

Dole Street is a four-lane, two-way east-west collector road between University Avenue and East-West road, where it is otherwise a two-lane collector road.

Saint Louis Drive is generally a two-lane, two-way north-south collector road. South of its intersection with Dole Street, this road provides one lane in the northbound direction, and three lanes in the southbound direction.

Metcalf Street is a two-lane, two-way east-west collector road that begins at its intersection with Alexander Street (near H-1 Freeway Westbound On-Ramp) to the west and terminates at University Avenue, where it continues eastward as Campus Road, which is incidentally inaccessible to vehicles from University Avenue.

Maile Way is a two-lane, two-way east-west minor collector raod that begins at its intersection with Oahu Street and terminates within the University Campus at its intersection with East-West Road.

Varsity Place is a two-lane, two-way, east-west county road that begins at its intersection with University Avenue and terminates at its intersection with Varsity Circle.

Old Waialae Road is a three-lane, one-way westbound arterial road, which begins at Waialae Avenue to the East and ends at near the.Humane Society.

Figure 3 shows the existing lane configuration at the study intersections.

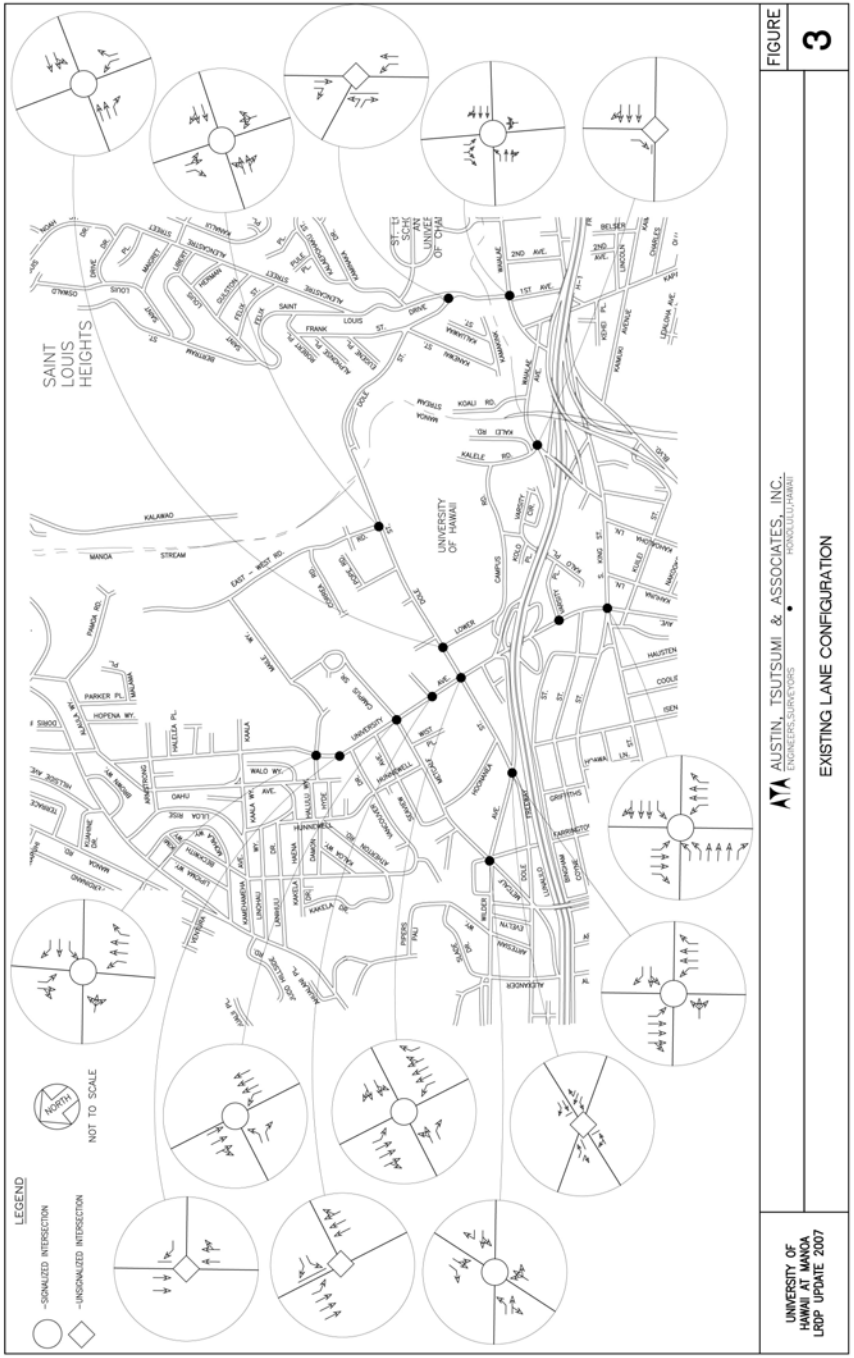
C. Existing Traffic Volumes

The hourly turning movement data utilized in this report was collected by ATA between Tuesday, April 20 and Thursday, April 22, 2004. Traffic Counts were redone at the University Avenue/Dole Street intersection on September 13, 2007. The counts showed a slight decrease in volume during the PM peak hour of traffic, and a negligible increase during the AM peak hour of traffic.

Due to proximity to UHM, the following intersections were studied:

- King Street/Beretania Street/Waialae Avenue/University Avenue (signalized)
- University Avenue/Dole Street (signalized)
- University Avenue/Sinclair Parking Lot (signalized)
- University Avenue/Metcalf Street (signalized)
- University Avenue/School of Architecture entrance/exit (unsignalized)
- University Avenue/Maile Way (signalized)

- Wilder Street/Dole Street (unsignalized)
- Wilder Street/Metcalf Street (signalized)
- Dole Street/Lower Campus Road (signalized)
- Dole Street/East-West Road (signalized)
- Dole Street/Saint Louis Heights Drive (unsignalized)
- Waialae Avenue/Saint Louis Heights Drive (signalized)
- University Avenue/Varsity Place (signalized)



Based on traffic count data, the peak hours of traffic were determined to be from 6:45 AM to 7:45 AM and 4:30 PM to 5:30 PM on weekdays. The traffic count data is provided in Appendix A. See Figure 3 for existing lane configurations.

D. Existing Traffic Conditions Analysis and Observations

Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual – Special Report 209 (HCM), dated 2000, methods for calculating volume to capacity ratios, delays and corresponding Levels of Service were utilized in this study. LOS definitions for signalized intersections are provided in Appendix B.

The Manual on Uniform Traffic Control Devices, 2003 edition (MUTCD) recommends that successive intersections along a major arterial and within proximity of less than a half of a mile of each have their timing optimized and coordinated in order to facilitate optimal vehicular flow along the arterial. Currently, most of the signalized intersections along the following arterials meet this criterion:

- South King Street,
- Beretania Street,
- University Avenue (only between Varsity Place and King Street)

The University Avenue/Dole Street and Dole Street/Lower Campus Road intersections are not currently coordinated. Coordination is accomplished by ensuring that each intersection within the coordinated region is bound by the same cycle length (or multiples thereof), and that the through traffic on the major arterial in the peak direction is allowed to flow at carefully planned offsets (see Appendix E for definition) through consecutive intersections. This reduces the "stop and go" effect that drivers experience on uncoordinated systems, where red lights sometimes appear at each successive intersection, thus increasing motorist frustration and delay.

As a consequence of coordination and fixed-cycle lengths in general, vehicles traversing the minor approaches and those making the left-turn movement off of the main road often must wait at the intersection, despite the absence of vehicles traversing the main road.

Methodology

Analysis for the study intersections was performed using Synchro, which is able to prepare reports based on the methodologies prescribed by the HCM. These reports contain control delay results, as based on intersection lane geometry, signal timing (including coordination and actuated minimums and maximums), and hourly traffic volume. Based on the vehicular delay at the intersection, a LOS is assigned (see Appendix B) as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.

Regional Analysis

UHM lies at the base of Manoa, which is a primarily residential town, to which access provided solely through University Avenue and Punahou Street. Relative to vehicular travel to and from the campus, much of the regional traffic arrives via the H-1 Freeway, King Street, Beretania Street, or Waialae Avenue. During the AM and PM peak hours of traffic, regional congestion occurs along all of these major roads, which is consistent with conditions throughout much of the urbanized areas of Oahu.

Results of Intersection Analysis

The analysis and observations described below are based on prevailing conditions during the time at which the data was collected in 2004, and reassessed in 2007, with little noticeable change. Hereinafter, observations that are expressed as ongoing and current shall represent the conditions that prevailed at the times during which field observations were taken in 2004 and 2007.

South King Street/Beretania Street/University Avenue

In addition to the Manoa and UHM traffic, this intersection experiences a heavy regional component along South King Street and Beretania Street during the peak hours of traffic. During the PM peak hour of traffic, queues in the eastbound direction along King Street at times extend beyond Star Market (approximately 1,000 feet) in all lanes.

Although other potential bottlenecks exist downstream along South King Street, one hindrance to vehicular flow in the eastbound direction near this intersection is the permitting of left-turns into driveways despite the absence of channelized left-turn lanes. This occurs between University Avenue and the Humane Society. This decreases the effective capacity of South King Street, as left-turning vehicles wait for openings in opposing traffic, which are few and far between.

Westbound traffic along South King Street and Beretania Street in this area is generally constrained due to the prevailing regional congestion caused by commuters during the afternoon peak hour of traffic. Successive downstream bottlenecks occur at McCully Street, Punahou Street, Piikoi Street, and Ward Avenue. Traffic generally queues back to the humane society.

As a result of this prevailing congestion, northbound and southbound traffic along University Avenue are also affected, wherein southbound traffic often must wait for two (2) or more traffic signal cycles before passing through the intersection.

University Avenue/Dole Street

Due to the fact that this intersection serves as a junction point between Manoa Residents, students accessing the Quarry Parking Lot and Central Campus, Moiliili residences, and the H-1 Freeway, congestion occurs here.

One problem observed during the AM peak hour of traffic is that vehicles traveling in the northbound direction queue back beyond the H-1 Freeway off-ramps (approximately 1000 feet) due to:

- Prohibition of right-turn-on-red in the northbound direction, although an extraordinarily high number of right-turns occur (648) during the AM peak hour of traffic;
- Weaving pattern – vehicles exiting the H-1 Freeway off-ramps in the northbound direction along University Avenue do not always make the right-turn. In fact, their destinations may include Saint Francis School, the Mid Pacific Institution, the University Lab School, Manoa, UHM's Maile Way Gate, Moiliili, and U-turns towards the south. As these vehicles exit, they attempt to move towards the center and left lanes while the prevailing queue hinders this movement. Furthermore, especially during the AM peak hour of traffic, after exiting the H-1 Freeway eastbound and westbound Off-Ramps, vehicles immediately move towards the left lane in order to make u-turns;
- Current information indicates that the University Avenue/Dole Street and the Dole Street/Lower Campus Road intersections are not coordinated. This could be a contributing factor to problems at these intersections.

The result of this is a vehicular queue that causes queues to extend through the H-1 Freeway off-ramps and onto the Freeway.

During the PM peak hour, congestion in the westbound direction queues back beyond the Dole Street/Lower Campus Road intersection and near the Law School Library. This often reduces the ability of vehicles to make the northbound left-turn out of Lower Campus Road onto Dole Street.

University Avenue/Sinclair Parking Lot

This intersection serves the Sinclair Library and Bachman Hall Parking Lots and the Bus Turnaround. The entering/exiting volume is relatively low. However, it has been observed that the busses have difficulty making westbound left-turn onto University Avenue.

University Avenue/Metcalf Street

Vehicles generally flow smoothly through this intersection.

University Avenue/School of Architecture Entrance/Exit

Vehicles generally flow smoothly through this intersection, which operates as right-in/right-out.

University Avenue/Maile Way

Although analysis indicates that this intersection operates at LOS B during the AM and PM peak hours of traffic, vehicular flow in the northbound is often impeded by:

- Narrowing of University Avenue to two (2) lanes immediately north of the University Avenue/Maile Way intersection,
- Occasional School Bus Stoppages (near the Mid-Pacific Institute) during the AM peak hour of traffic, and
- Operations at signalized intersection of University Avenue and Kaala Street, which incidentally provides access to the Mid-Pacific Institute. No chanellized lanes are currently provided at this intersection.

Wilder Avenue/Dole Street

While the high-volume H-1 Freeway off-ramp movements experience relatively unimpeded flow, through and left-turning traffic along Dole Street experience LOS F. Furthermore, downstream congestion occurs along Wilder Avenue during the PM peak hour of traffic.

Wilder Avenue/Metcalf Street

According to HCM analysis, this intersection operates at LOS E or better on all approaches during the AM and PM peak hour of traffic. However, downstream congestion does occur along Wilder Avenue in the westbound direction during the PM peak hour of traffic and in the eastbound direction during the AM peak hour of traffic.

Dole Street/Lower Campus Road

This intersection serves as the highest volume access road into the Makai Campus. Currently, 3,509 parking stalls exist within the Makai Campus. These stalls, in combination with drop-off/pick-up turn-around's at the Music Building

and Law School Parking Lot, contribute to the high turning movement volume into and out of this intersection.

During the AM peak hour of traffic, 490 vehicles make the eastbound right-turn into Lower Campus Road. Some of the congestion along University Avenue can be attributed to this.

During the PM peak hour of traffic, approximately 271 vehicles make the northbound left-turn out of Lower Campus Road and westbound onto Dole Street, whereupon they immediately meet the westbound queue generated by the University Avenue/Dole Street intersection.

Dole Street/East-West Road

This intersection operates relatively smoothly during both the AM and PM peak hours of traffic.

Dole Street/Saint Louis Heights Drive

Although traffic making the southeastbound left-turn experience LOS F during the PM peak hour of Traffic, the volume for this movement is low. Furthermore, traffic was observed to operate relatively smoothly at this intersection, with no significant queues occurring during the AM and PM peak hours of traffic.

Waialae Avenue/Saint Louis Heights Drive

During the AM peak hour of traffic, congestion was observed to occur in the westbound direction, where queues were observed to extend as far as 10th Avenue during the AM peak hour of traffic, primarily in the right and center lanes.

During the PM peak hour of traffic, similar congestion occurs in the westbound direction along Waialae Avenue. Although there is a brief reprieve west of Saint Louis Drive, congested conditions resume along Old Waialae Road, the H-1 Freeway and King Street further westward.

University Avenue/Varsity Place

Traffic at this intersection is affected by downstream conditions at the South King Street/Beretania Street/University Avenue intersection. Westbound queues sometimes extend as far back as Varsity Circle. To exacerbate matters, the left-turn movements into driveways and side streets are allowed in the

northbound and southbound direction immediately south of this intersection along University Avenue. Due to the absence of left-turn lanes along University Avenue, the capacity of this roadway segment is decreased significantly, primarily during the PM peak hour of Traffic.

Figure 4 shows the existing traffic volumes and overall LOS for the study intersections. See Table 1 for LOS for at individual turning movements.

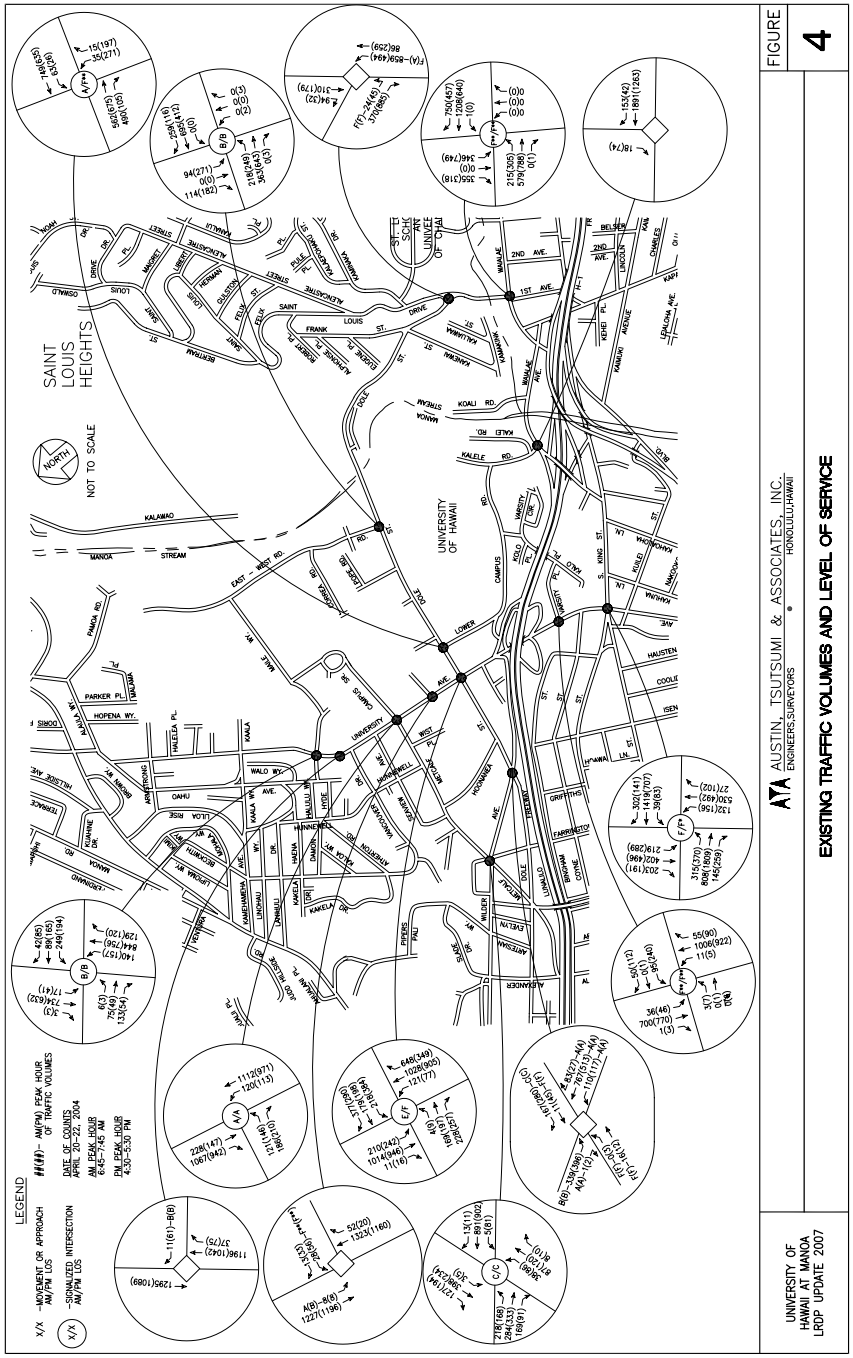


TABLE 1
Existing Level of Service Summary

Intersection	Existing AM LOS	Existing PM LOS
South King Street/Beretania Street/University Avenue		
EB LT	F	E
EB TH	C	D
EB RT	B	C
WB LT	F	F
WB TH/RT	**F***	D
NB LT	F	**F***
NB TH	F	F
NB RT	D	D
SB LT	**F***	**F***
SB TH	D	D
SB RT	D	D
OVERALL	*F*	***F****
University Avenue/Varsity Place		
EB LT/TH/RT	C	C
WB LT/TH	D	D
WB RT	C	C
NB LT	A	A
NB TH	A	A
NB RT	A	B
SB LT	A	A
SB TH	A	A
OVERALL	*F***	*F***
University Avenue/Dole Street		
EB LT/TH	D	E
EB RT	D	D
WB LT/TH/RT	E	F
NB LT	E	E
NB TH/RT	**F***	**F***
NB RT	B	B
SB LT	E	E
SB TH/RT	D	D
OVERALL	*E*	*F*
University Avenue/Sinclair Parking Lot		
WB LT	F**	F**
SB LT	B	A

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

TABLE 1
Existing Level of Service Summary

Intersection	Existing AM LOS	Existing PM LOS
University Avenue/Metcalf Street		
EB LT	C	B
EB RT	C	B
NB LT	A	B
NB TH	A	A
SB TH/RT	A	A
OVERALL	*A*	*A*
University Avenue/School of Architecture		
WB RT	B	B
University Avenue/Maile Way		
SEB LT/TH/RT	C	B
NWB LT	E	C
NWB TH	C	B
NWB RT	B	B
NEB LT	C	B
NEB TH	A	A
NEB RT	A	A
SWB LT	A	A
SWB TH/RT	B	A
OVERALL	*B*	*B*
Dole Street/Wilder Street		
EB LT/TH	F	F
WB TH	F	F
WB RT	C	C
NB LT/TH	A	A
SB LT	B	B
Wilder Street/Metcalf Street		
EB LT/TH/RT	C	E
WB TH/LT	D	C
WB RT	B	B
SEB LT	B	B
SEB TH/RT	B	A
NWB LT/TH/RT	C	C
OVERALL	*C*	*C*
Dole Street/Lower Campus Road		
EB TH	A	A
EB RT	A	A
WB LT/TH	A	A
NB LT	C	F**
NB RT	C	B
OVERALL	*A*	*F***

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

TABLE 1
Existing Level of Service Summary

Intersection	Existing AM LOS	Existing PM LOS
Dole Street/East-West Road		
EB LT/TH	B	A
WB TH/RT	B	C
NB LT/TH/RT	A	B
SB LT/TH	C	B
SB RT	C	B
OVERALL	*B*	*B*
Dole Street/Saint Louis Heights Drive		
NB LT	F	A
SEB LT	F	F
Waialae/Saint Louis Heights Drive		
EB LT	D	**F***
EB TH	A	A
WB TH/RT	**F***	D
SB LT	B	C
SB TH	B	C
SB RT	B	B
OVERALL	*E*	*C*

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

III. BASE YEAR 2017 SCENARIO *(see section I.D. for definition)*

*Base Year 2017 = (Existing Traffic * Growth Factor)*
Where Growth Factor = (1 + defacto growth rate) ^ 10

The Year 2017 was selected as the Base Year to reflect the time table for Category 1 of the LRDP (5-10 Years). Base Year 2017 projections were formulated by applying a defacto growth rate, described in the following section, to existing hourly vehicular traffic volumes.

A. Defacto Growth Rate

The State Department of Transportation (SDOT) performs 24-hour traffic counts annually at various locations on Oahu. Based on this data, it was possible to estimate the prevailing regional growth along King Street and Waialae Avenue, which is predicted to be approximately 1 percent, annually. By the year 2017, this equates to a 10.5 percent increase over existing conditions. No growth was projected near the University, since the LRDP projects that UHM's student enrollment will remain stable, and that not much more residential or commercial development will occur within the area.

B. Base Year 2017 Traffic and Analysis

Based on the defacto growth rate, regional traffic will increase along King Street, Waialae Avenue, and Beretania Street. However, most of the study intersections will experience a relatively stable demand, due to the fact that development and student base within the area is projected to remain constant for all intents and purposes.

LOS F conditions will continue to occur at the following intersections:

- South King Street/Beretania Street/University Avenue*
- University Avenue/Varsity Place*
- University Avenue/Dole Street*
- University Avenue/Sinclair Parking Lot*
- Dole Street/Wilder Avenue
- Dole Street/Lower Campus Road*
- Dole Street/Saint Louis Heights Drive

- Waialae Avenue/Saint Louis Heights Drive

* Indicates that Mitigation is proposed in Section III C.

While mitigation is proposed to address the intersections with asterisks after them, the remaining intersections will be discussed below.

Dole Street/Wilder Avenue

The northbound approach to this intersection is a busy freeway off-ramp, whose vehicular flow should not be impeded to accommodate minor street traffic. Wilder Avenue, in general, is congested downstream in the westbound direction during the AM and PM peak hours of traffic due heavy school traffic caused by Punahou and Maryknoll schools. Therefore, no mitigation is recommended for this intersection.

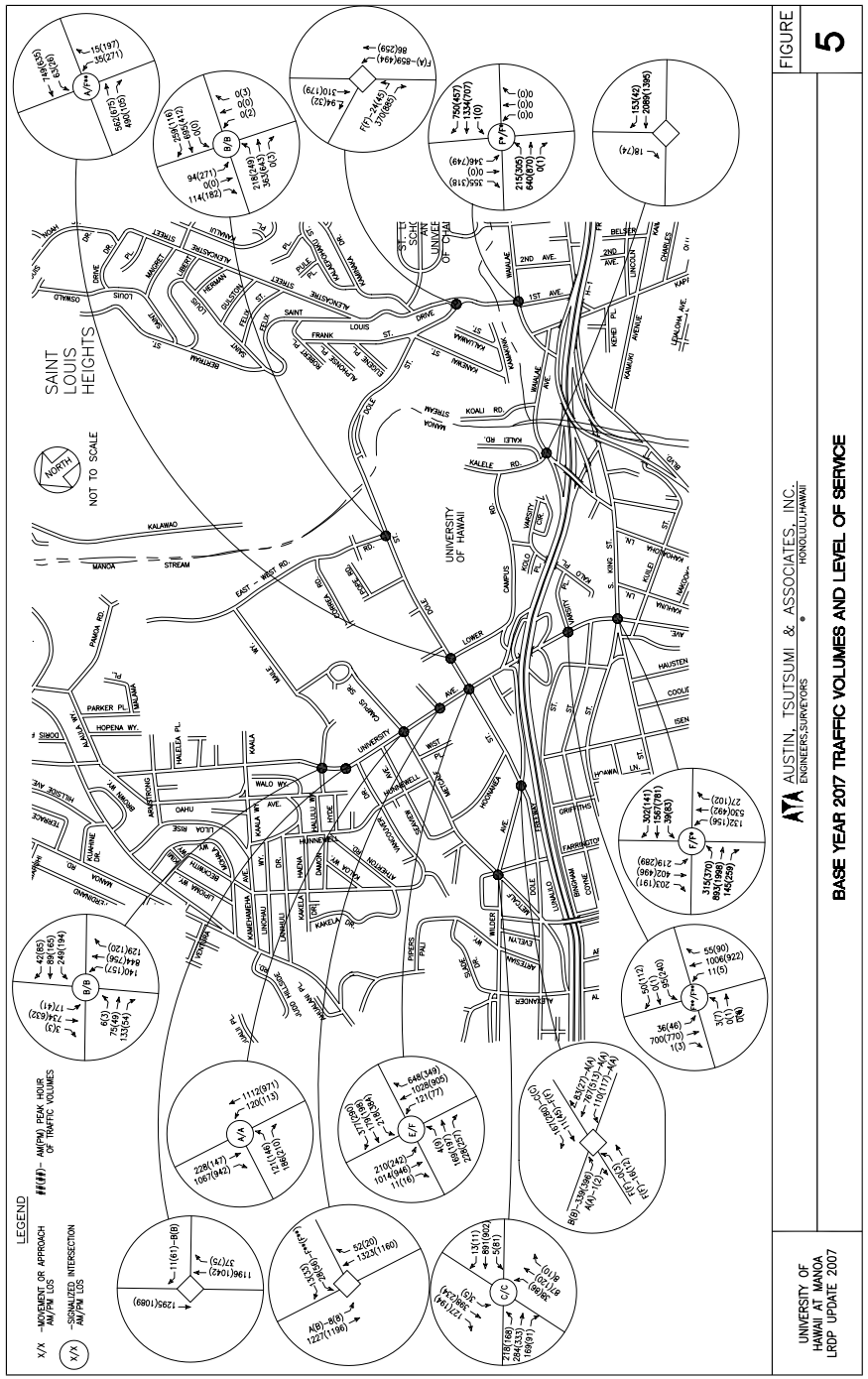
Dole Street/Saint Louis Heights Drive

While turning movement analysis indicates that the eastbound left-turn movement at this intersection will continue to operate at LOS F during the PM peak hour of traffic, this intersection was not observed to be problematic during the AM or PM peak hours of traffic. Furthermore, with only 25(45) vehicles making this turn during the AM(PM) peak hours of traffic, a traffic signal will not be warranted. No mitigation is recommended for this intersection.

Waialae Avenue/Saint Louis Heights Drive

This intersection currently operates at an observed LOS F during the AM and PM peak hours of traffic. However, due to limited right-of-way, no geometric improvements can be made at this intersection.

See Figure 5 for Base Year 2017 traffic volumes and Overall LOS.



C. Base Year 2017 Mitigative Measures

The Base Year 2017 mitigative measures are designed to improve conditions at intersections that are projected to operate unsatisfactorily during Base Year 2017, regardless of whether or not the LRDP is implemented.

University Avenue/Dole Street and Dole Street/Lower Campus Road Intersections

Mitigation is recommended to improve operating efficiency of this intersection. As discussed earlier, during the AM peak hour of traffic, there is a lack of capacity in both the northbound and westbound directions that generates vehicular queues that extend onto the H-1 Freeway's Westbound and Eastbound off-ramps at times, ultimately causing a safety hazard along the H-1 Freeway, as fast-moving vehicles encounter vehicles in queue. The improvements recommended below seek to reduce this congestion.

Intersection analysis indicates that that traffic in the northbound direction is and will continue to operate beyond its capacity. This problem can be addressed by the following modifications:

Phase I

Reconfigure the westbound approach to the University Avenue/Dole Street intersection to incorporate an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane, with storage extending approximately 100 feet east of the University Avenue/Lower Campus Road intersection. This mitigative measure could potentially necessitate the relocation of the historic Gateway structures located along University Avenue.

The effect of Phase I would be to eliminate over-capacity conditions. However, the southbound left-turn movement would still expericnce LOS F during the PM peak hour of traffic.

See Figure 6 for existing lane configuration, and Figure 7 for Phase I modifications.

Phase II

Reconfigure the northbound approach to the University Avenue/Dole Street intersection to incorporate three (3) exclusive through lanes and two exclusive right-turn lanes, the rightmost of which would directly connect with the H-1 Freeway Westbound Off-Ramp. In conjunction with this, modify the Dole Street/Lower Campus Road intersection to incorporate one (1) Eastbound through lane, an eastbound shared through/right-turn lane, and an exclusive right-turn lane. Note that these modifications could potentially necessitate the relocation of the existing monkeypod trees along University Avenue, and reduce the available parking within the Music Building Complex.

Phase II, when implemented without Phase I, would produce a similar result as phase I, in that over-capacity conditions would be eliminated, and that the southbound left-turn movement would continue to experience LOS F, while the eastbound and westbound approaches would experience LOS E during the PM peak hour of traffic.

Phase I & II

HCM analysis indicates that the effect of implementing phases I and II in combination would improve the overall delay of the intersection from 73.1 (56.6) seconds during the AM (PM) peak hours of traffic to 38.8 (39.9) seconds, with all movements at the intersection operating at LOS E or better during both periods. It should be noted that at the Dole Street/Lower Campus Road intersection, the lane modification will reduce the number of lanes that drivers need to cross to enter the Lower Campus Road, thereby reducing capacity reductions caused by weaving movements.

It is recommended that Phases I and II be implemented as a mitigative measure, while recognizing that the intent of this geometric augmentation would be to improve conditions for vehicles traveling northbound along University Avenue. Although vehicular flow will also improve in the westbound direction during the PM peak hour of traffic,

such benefits would generally be realized locally, given that existing bottlenecks occur downstream at the following locations:

- University Avenue/H-1 Freeway Eastbound On-ramp
- University Avenue/H-1 Freeway Westbound On-ramp
- South King Street/Beretania Street/University Avenue
- Dole Street/Wilder Street
- University Avenue, south of Maile Way

Mitigation of these problems would require costly modifications, including improving congestion along the entire corridor. The H-1 Freeway, Beretania Street, and South King Street would all have to be widened to accomplish this. However, the implementation of the Rapid Transit System will ultimately reduce future vehicular traffic demand.

See Figure 8 for an illustration of Phases I and II.

Figure 6: Existing Lane Configuration at University Avenue Intersections with Dole Street and Lower Campus Road

Figure 7: Phase I Modifications

Figure 8: Phases I and II Modifications

Turning Movement Restriction

During field observations, it was noted that along South King Street, east of University Avenue, and University Avenue in the Varsity Area, vehicular flow was hampered by the allowing of left-turns into driveways and small side streets.

Varsity Area

Vehicles turning left from the southbound direction cause other vehicles to switch lanes to maneuver around them. Due to the lack of an acceptable gap in northbound traffic, these vehicles often cause those behind them to arrive at the South King Street/Beretania Street/University Avenue intersection after the signal indication has turned red. The resulting flow interruptions have implications along University Avenue in this area, due to the fact that the current cycle length at that intersection is 170 seconds. Effectively, all of the vehicles impacted by this problem will be delayed by a additional two minutes, fifty seconds as the traffic signal cycles through all of its phases again. Operations at the University Avenue/Varsity Place intersection are also affected by this problem.

Similarly, in the northbound direction left-turns impede the flow of the approximately 1000 vehicles (for both AM and PM peak hours of traffic) traveling in the northbound direction, sometimes reducing the upstream capacity of the South King Street/Beretania Street/University Avenue intersection.

South King Street – East of University Avenue

South King Street, east of University Avenue has become a bottleneck for eastbound traffic during the PM peak hour of traffic. It has been observed that vehicles traveling eastbound along South King Street are affected by vehicles making left-turns into driveways, and at the signalized intersection near the Seven Eleven/Aloha Gas station.

Based on the conditions described above, it is recommended that a dialogue be initiated between community members and the City to assess the potential for left-turn prohibitions during the PM peak hour of traffic for:

- Northbound and southbound University Avenue traffic, south of Varsity Place, and north of King Street
- Eastbound South King Street traffic, East of University Avenue and west of the Humane Society.

It is recognized that the merit of this mitigative measure will have to be balanced with the needs of the local community and businesses.

It should be noted that should these prohibitions be implemented, they would not eliminate LOS F at the South King Street/Beretania Street/University Avenue intersection. However, they would improve the efficiency of the intersection and the capacity of University Avenue and South King Street in the area.

University Avenue/Sinclair Library Driveway

While this intersection experiences a relatively low turning movement volume and operates at LOS B, the bus traffic that passes through the turnaround often have difficulty making the westbound left-turn out of the driveway. Therefore, it is recommended that a traffic signal be installed to facilitate this movement. In conjunction with this, it is recommended that the bus stop located along University Avenue, just north of Dole Street be relocated to the existing bus turnaround at this intersection.

University Avenue/Maile Way

Although HCM analysis indicates that this intersection operates at LOS C(B) during the AM (PM) peak hours of traffic, existing operations have been observed to be worse, especially during the AM peak hour of traffic, where vehicles destined towards the Mid Pacific Institute and Saint Francis cause the downstream intersection (Kaala Street) to be overburdened. Currently, this intersection only provides a single lane at each approach, with no channelization (turning lanes). It is therefore recommended that a dialogue be initiated between community members and the City to assess the feasibility for widening the segment of University Avenue between Kaala Street and Maile Way to incorporate a second northbound lane. This lane would terminate at Kaala Street as an exclusive right-turn lane.

Figure 9 shows the traffic volumes and overall LOS. Table 2 compares the individual turning movement LOS for Base Year 2017 with/without mitigation with existing conditions.

<u>Traffic Signal Coordination along University Avenue and Dole Street/Lower Campus Road</u>

All of the signalized intersections along University Avenue between Dole Street and Maile Way, and the Dole Street/Lower Campus Road intersection are within approximately 1000 feet or less of each other. Therefore, in order to facilitate flow between these intersections, it is recommended that the following intersections be coordinated:

- University Avenue/Maile Way
- University Avenue/Metcalf Street
- University Avenue/Sinclair Library Parking Lot (New Signal)
- University Avenue/Dole Street
- Dole Street/Lower Campus Road

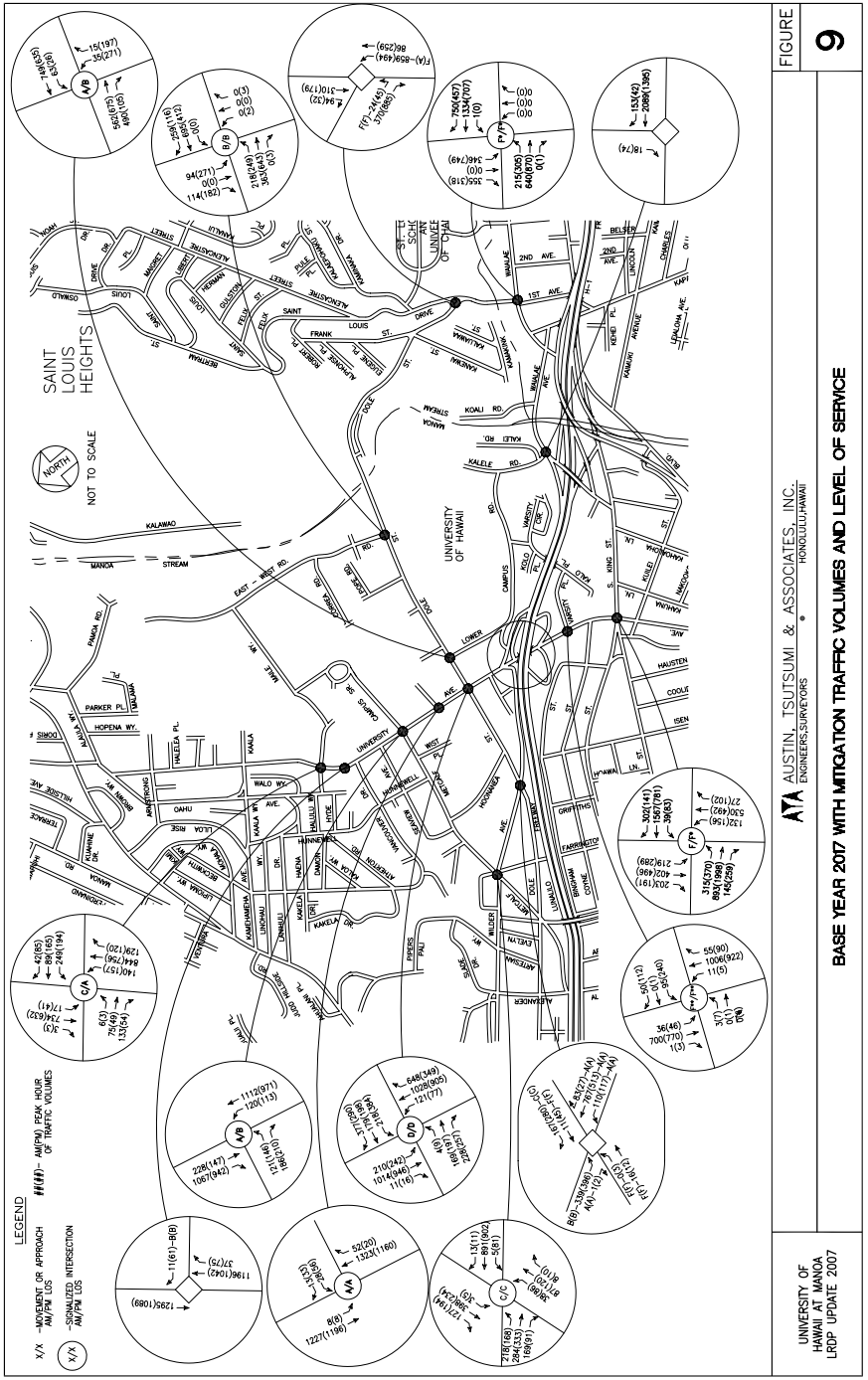


TABLE 2
Base Year 2017 Level of Service Summary

Intersection	Existing AM LOS	Existing PM LOS	Base 2017 (Timings Optimized) AM LOS	Base 2017 (Timings Optimized) PM LOS	Base 2017 with Mitigation AM LOS	Base 2017 with Mitigation PM LOS
South King Street/Beretania Street/University Avenue						
EB LT	F	E	F*	E		
EB TH	C	D	C	F*		
EB RT	B	C	B	C		
WB LT	F	F	F	F*		
WB TH/RT	F*	D	F	E		
NB LT	F	F*	F*	F*		
NB TH	F	F	F*	E		
NB RT	D	D	D	D		
SB LT	F*	F*	F*	F*		
SB TH	D	D	D	D		
SB RT	D	D	D	D		
OVERALL	*F*	*F**	*F**	*F**		
University Avenue/Varsity Place						
EB LT/TH/RT	C	C	C	C		
WB LT/TH	D	D	D	D		
WB RT	C	C	C	C		
NB LT	A	A	A	A		
NB TH	A	A	A	B		
NB RT	A	B	A	C		
SB LT	A	A	A	A		
SB TH	A	A	A	A		
OVERALL	*F***	*F***	*F***	*F***		
University Avenue/Dole Street						
EB LT/TH	D	E	E	E	E	E
EB RT	D	D	D	D	D	D
WB LT					D	D
WB LT/TH/RT	E	F	E	E		
WB LT/ TH					D	D
WB RT					D	B
NB LT	E	E	E	E	E	E
NB TH					D	D
NB TH/RT	F*	F*	F*	F*		
NB RT	B	B	B	B	B	B
SB LT	E	E	E	E	E	E
SB TH/RT	D	D	D	D	C	C
OVERALL	*E*	*F*	*E*	*E*	*D*	*D*
University Avenue/Sinclair Parking Lot						
WB LT	F**	F**	F**	F**	E	E
WB RT					E	E
NB TH/RT					A	A
SB LT	B	A	B	A	A	A
SB TH					A	A
OVERALL					A	A

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

TABLE 2
Base Year 2017 Level of Service Summary

Intersection	Existing AM LOS	Existing PM LOS	Base 2017 (Timings Optimized) AM LOS	Base 2017 (Timings Optimized) PM LOS	Base 2017 with Mitigation AM LOS	Base 2017 with Mitigation PM LOS
University Avenue/Metcalf Street						
EB LT	C	B	C	B	E	E
EB RT	C	B	C	B	E	A
NB LT	A	B	A	B	B	A
NB TH	A	A	A	A	A	A
SB TH/RT	A	A	A	A	A	A
OVERALL	*A*	*A*	*A*	*A*	*A*	*B*
University Avenue/School of Architecture						
WB RT	B	B	B	B	B	B
University Avenue/Maile Way						
SEB LT/TH/RT	C	B	C	B	D	B
NWB LT	E	C	E	C	F	D
NWB TH	C	B	C	B	C	C
NWB RT	B	B	B	B	C	B
NEB LT	C	B	C	B	C	B
NEB TH	A	A	A	A	A	A
NEB RT	A	A	A	A	A	A
SWB LT	A	A	A	A	B	A
SWB TH/RT	B	A	B	A	C	B
OVERALL	*B*	*B*	*C*	*B*	*C*	*B*
Dole Street/Wilder Street						
EB LT/TH	F	F	F	F		
WB TH	F	F	F	F		
WB RT	C	C	C	C		
NB LT/TH	A	A	A	A		
SB LT	B	B	B	B		
Wilder Street/Metcalf Street						
EB LT/TH/RT	C	E	C	E		
WB TH/LT	D	C	D	D		
WB RT	B	B	B	B		
SEB LT	B	B	B	B		
SEB TH/RT	B	A	B	A		
NWB LT/TH/RT	C	C	C	C		
OVERALL	*C*	*C*	*C*	*C*		
Dole Street/Lower Campus Road						
EB TH	A	A	A	A	A	A
EB RT	A	A	A	B	A	A
WB LT/TH	A	A	A	A	A	A
NB LT	C	F**	C	F**	E	E
NB RT	C	B	C	D	E	D
OVERALL	*A*	*F**	*A*	*F**	*A*	*B*

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

TABLE 2
Base Year 2017 Level of Service Summary

Intersection	Existing AM LOS	Existing PM LOS	Base 2017 (Timings Optimized) AM LOS	Base 2017 (Timings Optimized) PM LOS	Base 2017 with Mitigation AM LOS	Base 2017 with Mitigation PM LOS
Dole Street/East-West Road						
EB LT/TH	B	A	A	A		
WB TH/RT	B	C	B	C		
NB LT/TH/RT	A	B	A	B		
SB LT/TH	C	B	C	D		
SB RT	C	B	D	B		
OVERALL	*B*	*B*	*B*	*B*		
Dole Street/Saint Louis Heights Drive						
NB LT	F	A	C	A		
SEB LT	F	F	F	F		
Waialae/Saint Louis Heights Drive						
EB LT	D	F*	D	D		
EB TH	A	A	A	B		
WB TH/RT	F*	D	F*	D		
SB LT	B	C	B	D		
SB TH	B	C	B	D		
SB RT	B	B	B	C		
OVERALL	*E*	*C*	*f***	*f***		

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

IV. YEAR 2017 WITH PROJECT SCENARIO *(see section I.D. for definition)*

Year 2017 with Project = Base Year 2017 + LRDP Traffic

A. Discussion

While the LRDP includes new buildings and parking structures, during its 5-10 year horizon, number of students is not projected to increase as a result of these additions. Generally for traffic studies, vehicular trips are generated using empirical correlations between known independent variables that are based upon data compiled by the Institute of Transportation Engineers (ITE). The compiled data is reduced into average trip rates or formulae. In the case of Universities, the only studied independent variable is the number of students.

However, despite the construction of an additional 1200 parking stalls as a result of the LRDP, the student population is not projected to increase. Logically, the potential users of the additional parking will be drawn from the pool of existing campus commuters that are either currently unable or unwilling to utilize campus parking. This report assumed that the additional vehicles that will park on campus will relocate from existing off-campus parking.

Effectively, while within the segment of University Avenue between Dole Street and Maile Way, and the segment of Dole Street between Lower Campus Road and East-West Road may see an increased amount of traffic as a result of this redistribution, areas exogenous to these segments will likely notice a reduction. Such areas are identified in the Parking Study, and include:

- Manoa,
- Saint Louis Heights,
- Dole Street (Near Cultural Center), and
- Residential area west of Varsity

While the potential for trip reduction in these areas may occur, it would be overly presumptive to make assumptions to this point, especially since the future is unknown in regard to the possibility of permit parking for residents. Therefore, this report will conservatively assume that any areas outside of the aforementioned segments of University Avenue and Dole Street will experience no change as a result of the additional parking.

B. Trip Generation

Although standard methods for trip generation are not applicable in this case, the Lower Campus, with relatively few entrances and exits, offers a good indication as to the number of vehicular trips that are generated during the peak hours of traffic relative to the number of parking stalls.

The parking study concluded that there are currently 3,509 stalls in the lower campus area. The proposed Phase IIB quarry parking lot will increase this number by 900 to 4409. Therefore, it is reasonable to assume that the total number of trips entering and exiting each of the three primary entrance/exits will increase by a factor of (900/3509), or twenty-six percent. Note that this should be conservative, given that trips entering/exiting the Dole Street/Lower Campus Road intersection also include drop-off/pick-up's via the music building parking lot.

Likewise, the Kennedy Theatre parking lot, while creating an additional 480 stalls, will be partially tempered by the removal of 140 stalls within the 10 year horizon, effectively increasing the central campus parking by approximately 300 stalls. Currently, there are 1991 stalls in the central campus. This number will be increased by 300, or fifteen percent.

C. Trip Distribution/Assignment

The additional traffic generated by the new parking facilities were distributed based on existing travel patterns, within the aforementioned segments of Dole Street and University Avenue.

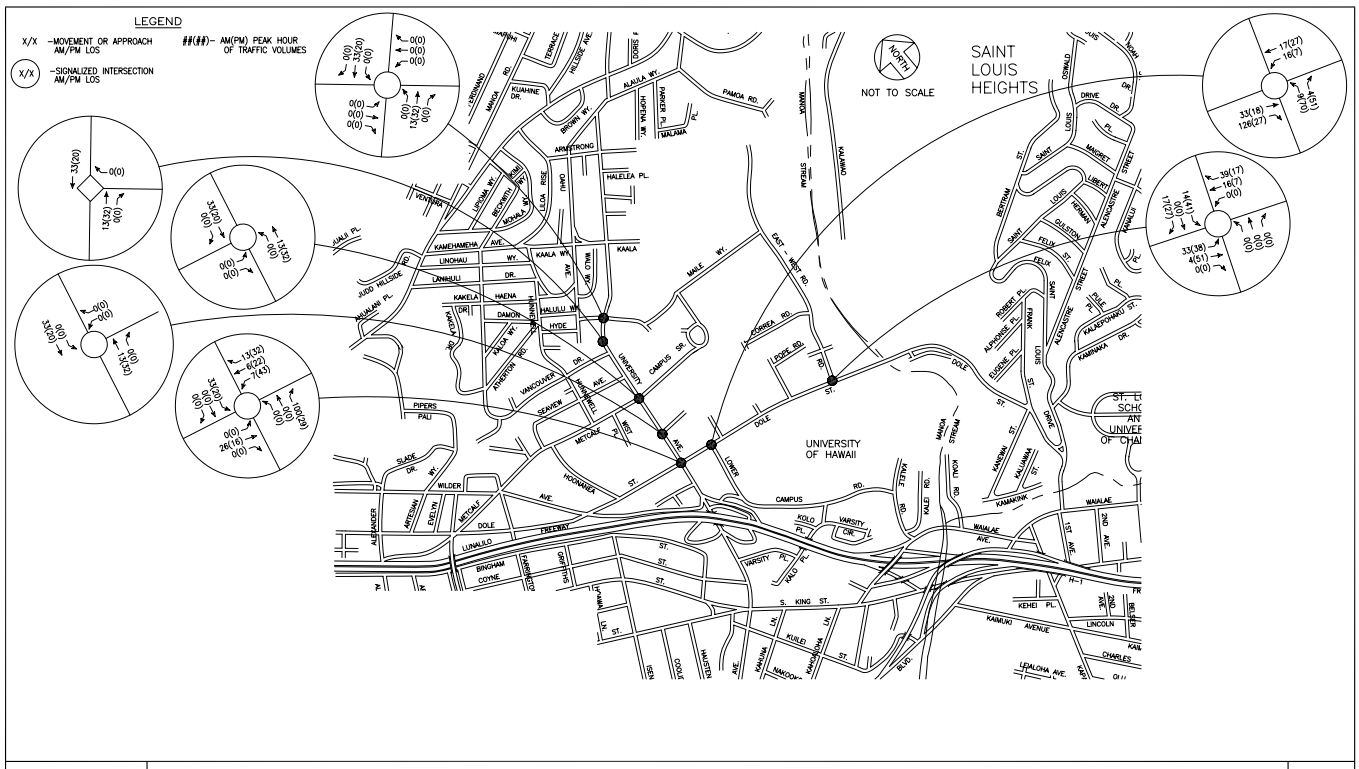
D. Year 2017 with Project Analysis

The following discussion considers incremental traffic impacts of the LRDP, and based on the preceding discussion, is limited to the segment of University Avenue between Dole Street and Maile Way, and the segment of Dole Street between University Avenue and west of Saint Louis Heights Drive. Hereinafter, these segments shall be collectively referred to as the "affected region."

Operations at all of these intersections within the affected region will continue to operate at LOS E or better, with the exception of the University

Avenue/Maile Way intersection, which will continue to experience LOS F in the westbound direction as a result of signal coordination. However, the delay at this intersection is projected to be 91 seconds, which is only slightly higher than the 80 second LOS F threshold.

HCM analysis indicates that the University Avenue/Dole Street and Dole Street/Lower Campus Road intersections will be able to accommodate the projected increase in traffic, while maintaining LOS E or better and under-capacity conditions at all approaches. However, as stated earlier, the effectiveness of the proposed mitigative measures at the University Avenue/Dole Street intersection will be tempered by conditions downstream of the intersection, particularly in the southbound direction toward the H-1 Freeway onramps and the South King Street/Beretania Street/University Avenue intersection, all of which experience prevailing regional congestion during the AM and PM peak hours of Traffic. See Figures 10 and 11 for project traffic and overall LOS. See Table 3 for individual turning movement LOS.



UH LRDP UPDATE

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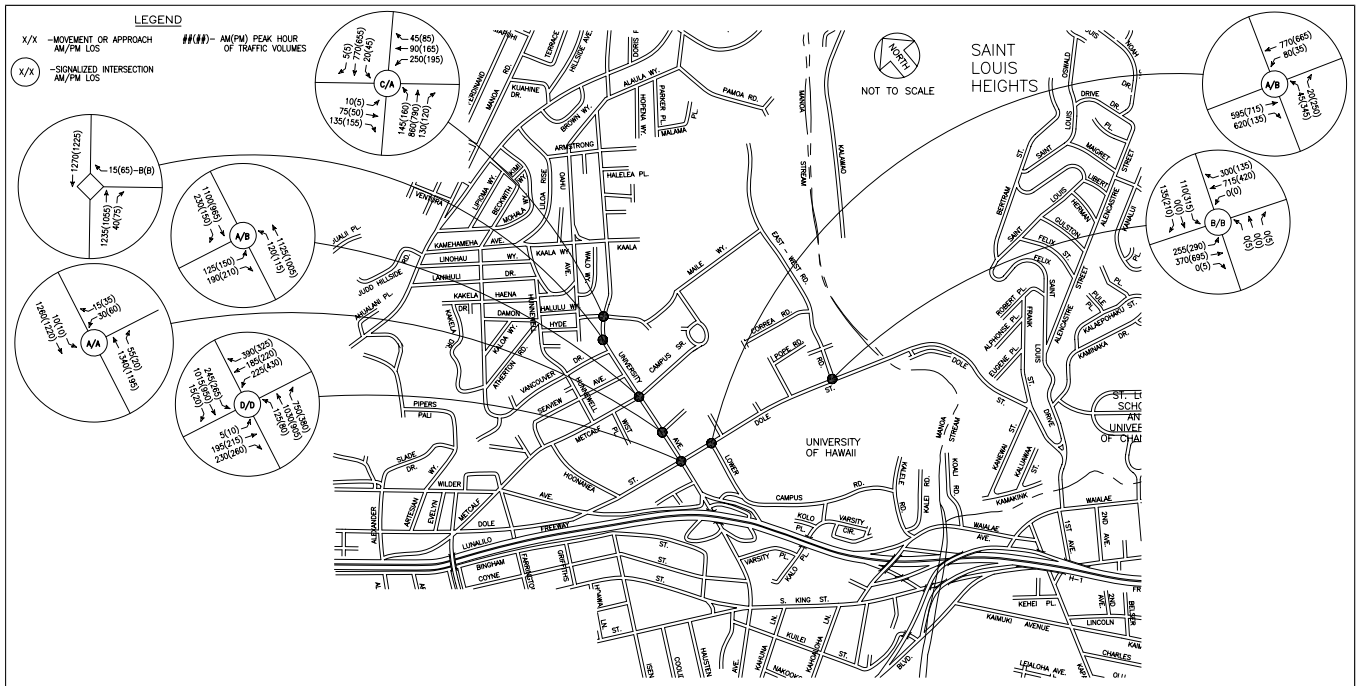
FIGURE 10

UH LRDP UPDATE PROJECT TRAFFIC VOLUMES AND LEVEL OF SERVICE



UNIVERSITY OF HAWAII AT MANOA LRDP UPDATE 2007

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FIGURE 11

YEAR 2017 WITH UH LRDP UPDATE TRAFFIC VOLUMES AND LEVEL OF SERVICE

TABLE 3
Year 2017 with LRDP Update (Category 1 - 5-10 Years)

Intersection	Base 2017 (Timings Optimized) AM LOS	Base 2017 (Timings Optimized) PM LOS	Base 2017 with Mitigation AM LOS	Base 2017 with Mitigation PM LOS	2017 with LRDP Update AM LOS	2017 with LRDP Update PM LOS
South King Street/Beretania Street/University Avenue						
EB LT	F*	E				
EB TH	C	F*				
EB RT	B	C				
WB LT	F	F*				
WB TH/RT	F	E				
NB LT	F*	F*				
NB TH	F*	E				
NB RT	D	D				
SB LT	F*	F*				
SB TH	D	D				
SB RT	D	D				
OVERALL	F*	F*				
University Avenue/Varsity Place						
EB LT/TH/RT	C	C				
WB LT/TH	D	D				
WB RT	C	C				
NB LT	A	A				
NB TH	A	B				
NB RT	A	C				
SB LT	A	A				
SB TH	A	A				
OVERALL	F**	F**				
University Avenue/Dole Street						
EB LT/TH	E	E	E	E	E	E
EB RT	D	D	D	D	D	D
WB LT			D	D	D	D
WB LT/TH/RT	E	E				
WB LT/ TH			D	D	D	D
WB RT			D	B	C	C
NB LT	E	E	E	E	E	E
NB TH			D	D	D	E
NB TH/RT	F*	F*				
NB RT	B	B	B	B	B	B
SB LT	E	E	E	E	E	E
SB TH/RT	D	D	C	C	C	C
OVERALL	*E*	*E*	*D*	*D*	*D*	*D*
University Avenue/Sinclair Parking Lot						
WB LT	F**	F**	E	E	E	E
WB RT			E	E	E	E
NB TH/RT			A	A	A	A
SB LT	B	A	A	A	A	A
SB TH			A	A	A	A
OVERALL			A	A	A	A

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

TABLE 3
Year 2017 with LRDP Update (Category 1 - 5-10 Years)

Intersection	Base 2017 (Timings Optimized) AM LOS	Base 2017 (Timings Optimized) PM LOS	Base 2017 with Mitigation AM LOS	Base 2017 with Mitigation PM LOS	2017 with LRDP Update AM LOS	2017 with LRDP Update PM LOS
University Avenue/Metcalf Street						
EB LT	C	B	E	E	E	E
EB RT	C	B	E	A	E	E
NB LT	A	B	B	A	B	A
NB TH	A	A	A	A	A	A
SB TH/RT	A	A	A	A	A	A
OVERALL	*A*	*A*	*A*	*B*	*A*	*B*
University Avenue/School of Architecture						
WB RT	B	B	B	B		
University Avenue/Maile Way						
SEB LT/TH/RT	C	B	D	B	D	C
NWB LT	E	C	F	D	F	D
NWB TH	C	B	C	C	C	C
NWB RT	B	B	C	B	C	B
NEB LT	C	B	C	B	C	B
NEB TH	A	A	A	A	A	A
NEB RT	A	A	A	A	A	A
SWB LT	A	A	B	A	B	A
SWB TH/RT	B	A	C	B	C	B
OVERALL	*C*	*B*	*C*	*B*	*C*	*B*
Dole Street/Wilder Street						
EB LT/TH	F	F				
WB TH	F	F				
WB RT	C	C				
NB LT/TH	A	A				
SB LT	B	B				
Wilder Street/Metcalf Street						
EB LT/TH/RT	C	E				
WB TH/LT	D	D				
WB RT	B	B				
SEB LT	B	B				
SEB TH/RT	B	A				
NWB LT/TH/RT	C	C				
OVERALL	*C*	*C*				
Dole Street/Lower Campus Road						
EB TH	A	A	A	A	A	B
EB RT	A	B	A	A	A	C
WB LT/TH	A	A	A	A	A	A
NB LT	C	F**	E	E	E	D
NB RT	C	D	E	D	E	D
OVERALL	*A*	*F**	*A*	*B*	*A*	*C*

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

TABLE 3
Year 2017 with LRDP Update (Category 1 - 5-10 Years)

Intersection	Base 2017 (Timings Optimized) AM LOS	Base 2017 (Timings Optimized) PM LOS	Base 2017 with Mitigation AM LOS	Base 2017 with Mitigation PM LOS	2017 with LRDP Update AM LOS	2017 with LRDP Update PM LOS
Dole Street/East-West Road						
EB LT/TH	A	A			A	A
WB TH/RT	B	C			B	C
NB LT/TH/RT	A	B			A	B
SB LT/TH	C	D			D	D
SB RT	D	B			D	B
OVERALL	*B*	*B*			*B*	*C*
Dole Street/Saint Louis Heights Drive						
NB LT	C	A				
SEB LT	F	F				
Waialae/Saint Louis Heights Drive						
EB LT	D	D				
EB TH	A	B				
WB TH/RT	F*	D				
SB LT	B	D				
SB TH	B	D				
SB RT	B	C				
OVERALL	*f***	*f***				

* V/C ratio > 1.0
** Effective LOS F Due to Downstream Conditions

E. Year 2017 with Project Recommended Improvements

No improvements are recommended beyond those outlined in Section IIIC. Operations at the affected intersections will remain relatively constant without any substantial increase in delay.

While the potential for improving the Old Waialae Road and Varsity Place Exits was considered, these improvements are generally not recommended. Discussion follows:

Old Waialae Road Entrance/Exit

As an entrance, this access point services vehicles originating in Waikiki, Kaimuki, or Kapahulu Areas. Any vehicles from areas further east will likely utilize the Freeway exit to access the Makai Campus. Currently, incoming flow does not experience significant difficulty entering the Entrance/Exit.

As an exit, this access point services vehicles either destined for the H-1 freeway (westbound), South King Street (westbound), or the Kapahulu Area/H-1 Freeway (Eastbound – Indirect connection). The limited number of vehicles that utilize this exit during the PM peak hour of traffic immediately experience difficulty making this maneuver during the PM peak hour of traffic (when vehicles are more likely to exit), due to the following conditions:

- When accessing the H-1 Freeway Onramp (westbound), the queue from the H-1 Freeway spills back to beyond the Old Waialae Road Entrance/Exit.
- When accessing South King Street (westbound), there is difficulty finding an acceptable gap in the prevailing flow along Old Waialae Road to immediately cross the two (2) lanes necessary to make this movement.
- The H-1 Freeway onramp (westbound) has a very short acceleration lane, which makes it difficult to enter the freeway at this location.

Improvement of this vehicular gateway would require the installation of a traffic signal at the Old Waialae Road/Kalele Road intersection. This is not recommended, due to a lack of sight distance along Old Waialae Road.

Figure 12: Old Waialae Road

Varsity Place Entrance/Exit

Access to this entrance/exit is relatively limited due to the limitation on ingress/egress. Currently, Lower Campus Road intersects with Varsity Circle, and Ultimately Varsity Place. Varsity Place connects with University Avenue, where congestion is currently a problem. While roadside parking could be cleared, and the road widened to facilitate vehicular flow along Varsity Place to incorporate two lanes in the westbound direction towards University Avenue, these vehicles the benefits of such a change would only be realized during the PM peak hour of traffic, and could potentially decrease the capacity of University Avenue during the PM peak hour of traffic.

True improvement of this entrance/exit would necessitate the acquisition of Rights-of-Way (ROW) from a variety of owners of property that front South King Street, in order to provide a direct connection between Lower Campus Road and King Street. Such a modification would also require sufficient lane

channelization be provided, as not to further impede vehicular flow along South King Street. It is likely that eastbound double left-turn lanes, an exclusive westbound right-turn lane, and dedicated southbound left and right-turn lanes would be necessary. In conjunction with this, a traffic signal would have to be installed at the new intersection. See Figure 13 below for an aerial photograph of the area surrounding the Varsity Place Entrance Exit.

Figure 13: Varsity Area

V. CONCLUSIONS AND RECOMMENDATIONS

The University of Hawaii at Manoa Long Range Development Plan, 2007 Update, Category I (LRDP) (5-10 year horizon) will work towards creating a livable campus community with useable green space and a more pedestrian friendly central campus. Pursuant to this ideal, new buildings, pedestrian malls, and parking lots will be constructed throughout the campus.

Existing Conditions

The University of Hawaii at Manoa (UHM) campus, as a result of being situated at the gateway to the mature residential community of Manoa, near the H-1 Freeway, and Major Arterials South King Street, Beretania Street, and Waialae Avenue, experiences its fair share of traffic (both regional and local in origin).

With Level-of-Service (LOS) used as the Measure of Effectiveness (MOE) at intersections of interest within the vicinity of UHM, the following key study intersections were identified as problematic:

- South King Street/Beretania Street/University Avenue – King Street and Beretania Street belong to a greater east-west corridor, which also includes the H-1 Freeway, Kapiolani Boulevard, and Ala Moana Boulevard. Therefore, these major arterials experience a significant regional traffic component. Furthermore, this intersections' adjacency to numerous H-1 Freeway On-ramps and Off-ramps, UHM traffic, and Manoa Traffic, generates a significant turning movement demand in a location which is not capable of further roadway widening. The efficiency and capacity of this intersection is also negatively impacted by the permitted left-turn movements into driveways, despite the absence of dedicated left-turn lanes.
- University Avenue/Dole Street – the busiest intersection along UHM's perimeter, vehicular queues in the northbound (mauka) direction extend southward towards South King Street and onto the H-1 Freeway Off-ramps, during the AM peak hour of traffic. During the PM peak hour of traffic, vehicular queues in the westbound direction queues beyond the Lower Campus Road intersection, and into Lower Campus Road itself.

- University Avenue/Sinclair Parking Lot – While HCM analysis indicates that this intersection currently operates smoothly, the express bus traffic that utilize this exit often have difficulty making the westbound left-turn out of the driveway. This is in part due to the wide turning angles required, and the prevailing queue in the southbound direction at the University Avenue/Dole Street intersection, which should be improved as a result of the mitigative measures at that intersection.
- University Avenue/Maile Way – According to HCM analysis, this intersection operates smoothly at an overall LOS C or better during the AM and PM peak hours of traffic for both existing and future conditions. However, HCM analysis does not account for the congestion downstream in the northbound direction along University Avenue. During the AM peak hour of traffic especially, conditions at the signalized intersection of Kaala Street, which provides access to the Mid Pacific Institute are extremely congested during the AM peak hour of traffic. To exacerbate problems, immediately north of the University Avenue/Maile Way intersection, the two (2) northbound lanes merge into one (1). Therefore, this intersection likely operates at LOS E or F during its worst peak periods.
- Wilder Avenue/Dole Street – The northbound approach to this intersection is formed by the H-1 Freeway Wilder Street Off-Ramp, which provides access to the Makiki Area, which includes residential land uses, Punahou School, and Maryknoll Schools. This off-ramp is given the right-of way, in order to maintain conditions along the H-1 Freeway. However, this is done at the expense of Dole Street traffic, which has a relatively low demand.
- Dole Street/Lower Campus Road – The majority of the vehicles entering/exiting the Makai Campus utilizes this vehicular gateway, due to the fact that it offers the greatest accessibility. During the PM peak hour of traffic, many of the commuters, dorm residents, and faculty that utilize the existing 3509 Makai Campus parking stalls exit through Lower Campus Road and turn Left onto Dole Street, where they immediately encounter the queue generated by the University Avenue/Dole Street

intersection. This causes vehicles to queue back to the parking guard shack and beyond at times.

- Dole Street/Saint Louis Heights Drive – This intersection operates relatively well during the peak hours of traffic. Although HCM analysis indicates that the southeastbound left-turn operates at LOS F during the AM and PM peak hours of traffic, this turning movement volume is relatively low, and would therefore not warrant a traffic signal.

- Waialae Avenue/Saint Louis Heights Drive – During the AM peak hour of traffic, congestion was observed to occur in the westbound direction, where queues were observed to extend as far as 10th Avenue during the AM peak hour of traffic, primarily in the right and center lanes. During the PM peak hour of traffic, similar congestion occurs in the westbound direction along Waialae Avenue. Although there is a brief reprieve west of Saint Louis Drive, congested conditions resume along Old Waialae Road, the H-1 Freeway and King Street further westward.

Base Year 2017

Based on data obtained from the State DOT, regional traffic is projected to increase by approximately 1% annually along the Regional Arterials. Traffic growth within the vicinity of UHM is not projected to occur, due to the fact that most of the area has already been built out, and that the UHM student population is not projected to increase. Furthermore, vehicular traffic decreased during the PM peak hour of traffic and remained constant during the AM peak hour of traffic between 2004 and 2007 at the University/Dole Street intersection based on field counts conducted by ATA.

LOS F conditions will continue to occur during Base Year 2017 at the following locations:

- South King Street/Beretania Street/University Avenue*
- University Avenue/Varsity Place*
- University Avenue/Dole Street*
- University Avenue/Sinclair Parking Lot*

- Dole Street/Wilder Avenue – Mitigation would result in the reduction of traffic flowing from the H-1 Freeway On-Ramp, which is not recommended. Furthermore, the Dole Street traffic that experiences LOS F exhibits a relatively low demand due to further downstream obstructions and better alternative routes. Therefore, mitigation is not recommended.

- Dole Street/Lower Campus Road*

- Dole Street/Saint Louis Heights Drive – While the southeast-bound left-turn currently experiences and will continue to experience LOS F during the AM and PM peak hours of traffic, the demand for this movement is relatively low, and would not warrant a Traffic Signal. Mitigation is not recommended.

- Waialae Avenue/Saint Louis Heights Drive – Due to limited right-of-way, no geometric improvements can be made at this intersection.

* Indicates that mitigative measures are recommended and discussed in the next section.

Base Year 2017 Mitigative Measures

University Avenue/Dole Street Intersection

Phase I

Reconfigure the westbound approach to the University Avenue/Dole Street intersection to incorporate an exclusive left-turn lane, a shared left-turn/through lane, and an exclusive right-turn lane, with storage extending approximately 100 feet east of the University Avenue/Lower Campus Road intersection. This mitigative measure could potentially necessitate the relocation of the historic Gateway structures located along University Avenue.

The effect of Phase I would be to eliminate over-capacity conditions. However, the southbound left-turn movement would still expericnce LOS F during the PM peak hour of traffic.

Phase II

Reconfigure the northbound approach to the University Avenue/Dole Street intersection to incorporate three (3) exclusive through lanes and two exclusive right-turn lanes, the rightmost of which would directly connect with the H-1 Freeway Westbound Off-Ramp. In conjunction with this, modify the Dole Street/Lower Campus Road intersection to incorporate one (1) Eastbound through lane, an eastbound shared through/right-turn lane, and an exclusive right-turn lane. Note that these modifications could potentially necessitate the relocation of the existing monkeypod trees along University Avenue, and reduce the available parking within the Music Building Complex.

Phase II, when implemented without Phase I, would produce a similar result as phase I, in that over-capacity conditions would be eliminated, and that the southbound left-turn movement would continue to experience LOS F, while the eastbound and westbound approaches would experience LOS E during the PM peak hour of traffic.

Phase I & II

HCM analysis indicates that the effect of implementing phases I and II in combination would improve the overall delay of the intersection from 73.1 (56.6) seconds during the AM (PM) peak hours of traffic to 38.8 (39.9) seconds, with all movements at the intersection operating at LOS E or better during both periods. It should be noted that at the Dole Street/Lower Campus Road intersection, the lane modification will reduce the number of lanes that drivers need to cross to enter the Lower Campus Road, thereby reducing capacity reductions caused by weaving movements.

It is recommended that Phases I and II be implemented as a mitigative measure, while recognizing that the intent of this geometric augmentation would be to improve conditions for vehicles traveling northbound along University Avenue. Although vehicular flow will also improve in the westbound direction during the PM peak hour of traffic,

such benefits would generally be realized locally, given that existing bottlenecks occur downstream at the following locations:

- University Avenue/H-1 Freeway Eastbound On-ramp
- University Avenue/H-1 Freeway Westbound On-ramp
- South King Street/Beretania Street/University Avenue
- Dole Street/Wilder Street
- University Avenue, south of Maile Way

Mitigation of these problems would require costly modifications, including improving congestion along the entire corridor. The H-1 Freeway, Beretania Street, and South King Street would all have to be widened to accomplish this. However, the implementation of the Rapid Transit System will ultimately reduce future vehicular traffic demand.

Figure 14: Existing Lane Configuration at University Avenue Intersections with Dole Street and Lower Campus Road

Figure 15: Phases I and II Modifications

Turning Movement Restriction

During field observations, it was noted that along South King Street, east of University Avenue, and University Avenue in the Varsity Area, vehicular flow was hampered by the allowing of left-turns into driveways and small side streets.

Varsity Area

Vehicles turning left from the southbound direction cause other vehicles to switch lanes to maneuver around them. Due to the lack of an acceptable gap in northbound traffic, these vehicles often cause those behind them to arrive at the South King Street/Beretania Street/University Avenue intersection after the signal indication has turned red. The resulting flow interruptions have major implications along University Avenue in this area, due to the fact that the current cycle length at that intersection is 170

seconds. Effectively, all of the vehicles impacted by this problem will be delayed by a additional two minutes, fifty seconds as the traffic signal cycles through all of its phases again. Operations at the University Avenue/Varsity Place intersection are also affected by this problem.

Similarly, in the northbound direction left-turns impede the flow of the approximately 1,000 vehicles (for both AM and PM peak hours of traffic) traveling in the northbound direction, sometimes reducing the upstream capacity of the South King Street/Beretania Street/University Avenue intersection.

South King Street – University Avenue to Humane Society

South King Street, east of University Avenue has become a bottleneck for eastbound traffic during the PM peak hour of traffic. It has been observed that vehicles traveling eastbound along South King Street are affected by vehicles making left-turns into driveways, and at the signalized intersection near the Seven Eleven/Aloha Gas station.

Based on the conditions described above, it is recommended that a dialogue be initiated between community members and the City to assess the potential for left-turn prohibitions during the PM peak hour of traffic for:

- Northbound and southbound University Avenue traffic, south of Varsity Place, and north of King Street
- Eastbound South King Street traffic, East of University Avenue and west of the Humane Society.

It is recognized that the merit of this mitigative measure will have to be balanced with the needs of the local community and businesses.

It should be noted that should these prohibitions be implemented, they would not eliminate LOS F at the South King Street/Beretania Street/University Avenue intersection. However, they would improve the

efficiency of the intersection and the capacity of University Avenue and South King Street in the area.

University Avenue/Sinclair Library Driveway

While this intersection experiences a relatively low turning movement volume and operates at LOS B, the bus traffic that passes through the turnaround often have difficulty making the westbound left-turn out of the driveway. Therefore, it is recommended that a traffic signal be installed to facilitate this movement. In conjunction with this, it is recommended that the bus stop located along University Avenue, just north of Dole Street be relocated to the existing bus turnaround at this intersection.

University Avenue/Maile Way

Although HCM analysis indicates that this intersection operates at LOS C(B) during the AM (PM) peak hours of traffic, existing operations have been observed to be worse, especially during the AM peak hour of traffic, where vehicles destined towards the Mid Pacific Institute and Saint Francis cause the downstream intersection (Kaala Street) to be overburdened. Currently, this intersection only provides a single lane at each approach, with no channelization (turning lanes). It is therefore recommended that a dialogue be initiated between community members and the City to assess the feasibility for widening the segment of University Avenue between Kaala Street and Maile Way to incorporate a second northbound lane. This lane would terminate at Kaala Street as an exclusive right-turn lane.

Traffic Signal Coordination along University Avenue and Dole Street/Lower Campus Road

All of the signalized intersections along University Avenue between Dole Street and Maile Way, and the Dole Street/Lower Campus Road intersection are within approximately 1000 feet or less of each other. Therefore, in order to facilitate flow between these intersections, it is recommended that the following intersections be coordinated:

- University Avenue/Maile Way

- University Avenue/Metcalf Street
- University Avenue/Sinclair Library Parking Lot (New Signal)
- University Avenue/Dole Street
- Dole Street/Lower Campus Road

Year 2017 with LRDP

While the LRDP includes new parking structures, the number of students is not projected to increase as a result of these additions. Ultimately, as based on standard methods for generating trips for Universities, this would mean that the number of vehicular trips generated by the LRDP will remain the same. However, a redistribution of the existing trips will occur, in this case more heavily concentrating traffic at the University Avenue/Dole Street, Dole Street/Lower Campus Road, and Dole Street/East-West Road intersections. However, given the improvements recommended in Base Year 2017 Mitigation Measures, these intersections will continue to operate at LOS E or better and under capacity.

As stated earlier, one caveat to this statement is that downstream conditions along University Avenue and subsequently the H-1 Freeway, Beretania Street, and South King Street will continue to experience congestion, and may therefore limit the incoming/outgoing capacity in the area.

Year 2017 with Project Recommended Improvements

No improvements beyond those recommended in Base Year 2017 Mitigative Measures are recommended.

Improvements at the Old Waialae Road Entrance/Exit and at the Varsity Place were investigated, and are generally not recommended. See discussion in Section IV.E.

VI. REFERENCES

1. Federal Highway Administration, Manual on Uniform Traffic Control Devices for Streets and Highways, including Revision 1, 2004.

2. Institute of Transportation Engineers, Trip Generation, 7th Edition, 1997.

3. Institute of Transportation Engineers, Trip Generation Handbook, and ITE Recommended Practice, 2001

4. Transportation Research Board, Highway Capacity Manual, 2000.

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APPENDIX E.
FILED REQUEST FOR STATE HISTORIC PRESERVATION REVIEW (OCTOBER 2008)

ARCHAEOLOGICAL LITERATURE REVIEW AND FIELD INSPECTION REPORT FOR THE UNIVERSITY OF HAWAIʻI AT MĀNOA LONG RANGE DEVELOPMENT PLAN PROJECT (MAY 2008)

CENTER FOR MICROBIAL OCEANOGRAPHY RESEARCH AND EDUCATION BUILDING

TMK 2-9-004:005 (por.)
Mānoa Valley, Oʻahu, Hawaiʻi

Request for State Historic Preservation Review

Applicant:
Facilities Management Office
University of Hawaiʻi at Mānoa
2002 East-West Road
Honolulu, HI 96822

Prepared by:
Group 70 International, Inc.
Architecture • Planning & Environmental Services • Interior Design • Assets Management
Honolulu, Hawaiʻi

October 2008

TABLE OF CONTENTS

SECTION		PAGE
A	PURPOSE OF PROJECT REQUEST	1
B	PROJECT PURPOSE AND NEED	1
C	PROJECT LOCATION AND DESCRIPTION OF BIOMEDICAL SCIENCE BUILDING	1
D	OVERVIEW OF PROPOSED C-MORE PROJECT DESIGN	2
E	EXISTING USES AND ALTERATIONS OF BSB	3
F	RECENTLY COMPLETED ARCHAEOLOGICAL INVESTIGATION, FINDINGS, AND RECOMMENDATIONS FOR UHM CAMPUS	3
G	KNOW TRADITIONAL LAND USES ACTIVITIES AND PATTERNS WITHIN AND NEAR THE PROJECT AREA	6
H	PRELIMINARY CONSIDERATIONS TO THE POTENTIAL OF BURIAL FINDS	7
I	SUMMARY OF ARCHITECTURAL CONTEXT AND PRELIMINARY ANALYSIS OF SIGNIFICANCE	8
J	CONCLUSIONS	11
	REFERENCES	12

ATTACHMENTS

A. REFERENCED FIGURES

B. SELECTED COPIES OF BIOMEDICAL SCIENCE BUILDINGS, ORIGINAL DRAWINGS, & SITE PLANS

C. COPY OF 11 SEPT 2008 SCHEMATIC DESIGN PACKET, PROPOSED CMORE BUILDING

D. VISUAL EXPOSITION OF EXISTING CONDITIONS, BIOMEDICAL SCIENCES BUILDING

E. COPY OF WAIHONA DATABASE FILE OF LAND COMMISSION AWARDS, ROYAL PATENTS, AND LAND GRANTS FOR PROJECT AREA

F. SELECTED RECORD OF EDWARD D. STONE'S PROMINENT WORKS

A. Purpose of Project Request

Filed on behalf of the University of Hawai'i at Mānoa (UHM), Facilities Management Office to the State of Hawai'i, Department of Land and Natural Resources, State Historic Preservation Division (SHPD), this summary serves as a formal request to initiate the historic preservation review process under the authority promulgated under Hawai'i Revised Statutes, §6E-8 (Review of effect of proposed state projects).

Under §6E-8(a), before any agency (UHM) commences any project which may affect a historic property, aviation artifact, or a burial site, the agency (UHM) shall advise and provide SHPD an opportunity to review the effect of the proposed project on historic properties. SHPD is to provide its written concurrence or non-concurrence within 90 days after the filing of a request.

This submittal includes a series of attachments, whose contents are detailed in the summary provide below. *Attachment A* provides a series of figures which are referred to in this section.

B. Project Purpose and Need

UHM is ranked as one of the top public universities for engineering and science and is one of only 13 institutions in the nation to hold the unique distinction of being a land, sea, and space grant research institution. UHM has focused its efforts to support research and graduate education programs, such as the Center for Microbial Oceanography Research and Education (C-MORE) as the associated need for laboratory, conference, library, and research space.

Established in 2006 under the UHM School of Ocean and Earth Science and Technology, the goal of C-MORE is to facilitate a more comprehensive understanding of the diverse microorganisms in the sea. The proposed project will support an expansion of research and educational opportunities that are part of C-MORE's own maturation. Support for programs such as C-MORE is critical to the continued success of the University and its ability to provide world leading research and education.

The primary guiding document for development on the UHM campus is 2007 Long Range Development Plan (LRDP). (*Figure 1*) The purpose of the LRDP update is to reflect current and upcoming educational priorities. Future buildings and projects, with emphasis given to the next 5-10 years, are projected into the plan. The realization of this Center is one of the prioritized projects in the LRDP and commitments of the University.

C. Project Location and Description of Biomedical Science Building

The UHM Campus is located in the traditional moku of Kona and ahupua'a of Waikīkī. (*Figure 2*) The campus occupies approximately 304 acres in lower Mānoa Valley, and is bounded by the Mānoa, St. Louis Heights, Mō'ili'ili and McCully communities. The project site for the proposed C-MORE Building is located on the ma uka portion of UHM on the LRDP-designated Upper Central Campus (TMK 2-9-004:005 por). (*Figure 3*)

The proposed 28,004 square feet facility will be part of the existing Biomedical Science Building (BSB), which is adjacent to the Pope Laboratory, Sherman Laboratory, Auxiliary Services, and Agricultural Science Institute. (*Figure 4*) The C-MORE facility will be an addition within the south

entrance courtyard of the BSB. The project is an infill of existing open space fronting the entry and will be a significant feature the Upper Central Campus.

The BSB was originally designed as a 7-story tower building, centered and surrounded by an exterior facade. From an outlying view, the design created the illusion of an enclosed fort. Six courtyards comprised the interior area between the outer perimeter and the tower, providing internal circulation and connection between the structures. Four courtyards were located in each major corner of the squared design. Each cardinal side of the building also had a primary entry leading to its own courtyard. Specific scoring patterns were utilized throughout the design of the concrete walls and walks, emphasizing a sense of linear balance and connectivity between the tower and the courts.

The BSB was designed by renowned architect Edward Durell Stone. Original construction drawings date back to October 1967 and the building's first tenants began operations in the BSB in 1971. Although discussed in further detail below, some of Edward Durell Stone's most famous and notable buildings include Radio City Music Hall (New York, 1932), the United States Embassy (New Delhi, India, 1958), and the Kennedy Center for the Performing Arts (Washington, D.C., 1971).

One important note to make here is that under HRS §6E-2, a historic property is defined as "any building, structure, object, district, area, or site, including heiau and underwater site, **which is over fifty years old**." (emphasis added). Although the University is filing this request for SHPD review, it is the University's position that, as defined under State preservation law, **the BSB fails to meet the basic legal definition of a historic property**.

See *Attachment B* for selected copies of the original site plans and drawings of the BSB.

D. Overview of Proposed C-MORE Project Design

Consisting of 28,004 square feet, the proposed C-MORE building will be a two-story structure with a roof that contains a penthouse area for mechanical equipment. The two-story limit on the building height meets the design criteria standards set in the 2007 LRDP Update. As stated, the building would be sited at the front of the existing south entry of the BSB.

The proposed building is designed to be consistent with the existing BSB through the use of building materials such as stone or precast concrete that will match the existing building. However, there is a planned intent to create a distinctive but respectful contrast to the existing architecture. The proposed building is designed to visually maintain an appropriate sense of scale along its base and articulate a contrasting yet integrated design vocabulary to the existing BSB design. The primary design feature of the proposed building is a purposeful and predominant use of transparent curving glass walls that lends to the sustainable nature of the design and allowing for visual continuity between interior and exterior space. The south facade of the proposed building with its prominent expression of glass would reflect the existing landscape of the welcoming plaza and court entry, thereby accenting a contemporary appearance that does not diminish the overall character of the BSB. Layouts for each level of the facility have been planned to provide a space that accommodates the needs of the Center and fulfills their research goals.

The foundations for the C-MORE addition will consist of spread and continuous footings. The depth of the footings will vary. The top of the footings will be 16″ below the slab on grades and

the footings thickness will vary from 16″ thick to 30″ thick. The bottom of the footings adjacent to the BSB building will match the existing footings.

Access would be maintained through a passageway that utilizes the existing south entry. It is envisioned that exterior landscaped area leading to the entry could include a circular plaza that reinforces the geometry of the C-MORE Building and would thematically be programmed to link to the C-MORE mission and/or to other considerations, as appropriate, to the general area's natural and cultural landscapes.

See *Attachment C* for site plans and elevations for the proposed C-MORE building.

E. Existing Uses and Alterations of BSB

The existing BSB served as the primary center for the UHM John A. Burns School of Medicine (JABSOM), which began operations at the BSB in 1971. In September 2005, JABSOM relocated to its current Kaka'ako facility. Since then, the BSB is currently used for life science studies and supports several faculty, students, and staff in remaining departments within JABSOM, the Pacific Bioscience Research Center, the College of Social Sciences, and the Office of Research and Graduate Education. Additionally, in September 2000, the BSB welcomed a new tenant with the opening of a new research facility for the Institute for Biogenesis Research (IBR).

The IBR was built in honor of one of the university's most distinguished scientists, Dr. Ryuzo Yanagimachi, whose forty year career included significant advances in reproduction. The purpose of the IBR is to be a world class center for the study of reproductive biology that builds upon Dr. Yanagimachi's work. Developing the IBR Center required an extensive alteration of the BSB that included enclosing the east entry and the courtyards. Additionally, since the relocation of JABSOM, several major renovation and improvement projects to the exterior and interior of the BSB have been completed and are currently ongoing.

Detailed information will be provided to SHPD as a future supplement to this submittal that will identify the extent of past and ongoing improvement and renovation projects that have cumulatively altered or modified the existing building.

See *Attachment D* for a photo log of existing conditions at the BSB, including existing alterations.

F. Recently Completed Archaeological Investigation, Findings, and Recommendations for UHM Campus

In May 2008, an *Archaeological Literature Review and Field Inspection Report for the University of Hawai'i at M noa Long Range Development Plan Project* was completed by Cultural Surveys Hawai'i. This study was designed to provide a comprehensive report of known historic properties and resources and to outline future recommendations for archaeological work to be completed on the UHM campus. The scope of work of the study included the following tasks:

1. Historical research to include study of archival sources, historic maps, Land Commission Awards and previous archaeological reports to construct a history of land use and to determine if archaeological sites have been recorded on or adjacent to the subject property.

2. Limited field inspection of the project area to identify any surface archaeological features and to investigate and assess the potential for impact to such sites. This assessment identified sensitive areas that would require further investigation or mitigation before a project proceeds.

3. Preparation of a report to include the results of the historical research and the limited fieldwork with an assessment of archaeological potential based on that research, with recommendations for further archaeological work, if appropriate. It will also provide mitigation recommendations if there are archaeologically sensitive areas that need to be taken into consideration.

In short, the findings identified the historic properties around and within the boundaries of the University of Hawai'i at Mānoa's (UHM) campus. (*Figure 5*) Specific sites have been previously assessed as eligible and/or included on the Hawai'i Register of Historic Places (HRHP):

1. The historic core of the campus (State Inventory of Historic Properties [SIHP] No. 50-80-14-1352), consists of Hawai'i Hall, George Hall, Dean Hall, Gartley Hall, Crawford Hall, Varney Circle, Founder's Gate, Andrew's Outdoor Amphitheater, Wist Hall and the Pineapple Research Center. These historic structures were added to the HRHP in 1984.

2. Kānewai Cultural Garden (SIHP No. 50-80-14-4498), consisting of modern surface features (irrigation ditches feeding into taro pond fields) overlying centuries-old deposits consistent with a long history of gardening at this spot along the M□noa Stream. Subsurface testing (archaeological excavation), radiocarbon dating and pollen analysis by International Archaeological Research Institute, Inc. demonstrate use of the area as a taro lo'i from the middle 1400s, and perhaps earlier. It is also important to state previously discovered burials documented by CSH in 1991 are reburied on the grounds of the Kamakakūokalani Center for Hawaiian Studies.

3. SIHP No. 50-80-14-4191 is a traditional-style presumably pre-Contact-era burial discovered during construction activities at Keller Hall in 1991.

Additionally, the following historic properties located within the boundaries of the UHM campus have not been previously assessed for eligibility for the HRHP:

1. Koana Cave, which has apparently never received a site number designation (see recommendations below), has yielded human skeletal remains (accessioned by the Bishop Museum in the 1960s), and probably contains as yet undiscovered historically-significant cultural materials consistent with habitation and / or gardening, in addition to more human skeletal remains.

2. Hipawai Heiau was designated by McAllister (1933) as "Site 63," that is, SIHP No. 50-80-14-63, but no archaeological observations were made since the site was reported as "torn down" earlier by Thrum. CSH archaeologists may have identified a remnant section of stone wall associated with this heiau, however, as discussed in some detail above, this feature is located just outside the boundaries of the UH property.

In addition to the aforementioned historic properties located on the UHM campus, two areas in the Wa'ahila Ridge portion of the campus containing possible rock shelters were identified during the course of the subject field inspection. Additional testing (controlled archaeological excavations) would be needed to more accurately determine whether these possible rock shelters contain any historically-significant cultural materials.

The conclusion of this study offered the following specific recommendations:

1. Alterations to, or near, the historic structures included in SIHP No. 50-80-14-1352 should be assessed by a qualified Architectural Historian. Potential impacts to historic structures include not only direct effects, but indirect effects as well (e.g., view plane issues affecting historic buildings and areas of campus).

2. Any major (deep) excavations or ground disturbance at Kānewai Lo'i should be preceded by additional archaeological testing (controlled excavation) and/or should be conducted in association with monitoring by a qualified Archaeologist, in order to mitigate the potentially negative impacts of damaging or destroying as yet undocumented historically-significant cultural resources in subsurface deposits. Plans or proposals for any such work (including the flood-control project along the Mānoa Stream) should be conducted in full cooperation and consultation with the Center for Hawaiian Studies.

3. Given the Keller Hall burial discovery (SIHP No. 50-80-14-4191), in particular, it is possible that as yet undiscovered burials may still be present at some locations on the UHM campus; however, it is fairly difficult to predict with any specific certainty where burials might occur. Recent work in the "Old Quadrangle" portion of campus and earlier work near the School of Architecture Building did not find burials or any other historic resources; thus, CSH recommends consultation with the SHPD on future excavation projects on the UHM campus.

4. Koana Cave should be formally assessed by a qualified Archaeologist and assigned a State Site number. Given reports of human skeletal remains from this cave, it should also be preserved and protected from those who might disturb or desecrate its contents. Archaeological testing (excavation) of the cave might yield important evidence (e.g., radiocarbon dating samples), but this work would have to be balanced against the possibility of encountering / discovering additional human skeletal remains. From a scientific perspective, the cave has relatively low potential for advancing archaeological knowledge of the area, given its relatively small size and apparently shallow soil.

5. No further work is recommended for the rock wall remnant that may be a portion of the Hipawai Heiau; however, should deep excavation or major development be planned for the adjacent Magoon Property, against which the wall remnant rests, archaeological monitoring or preliminary subsurface testing (excavation) might be warranted in order to ensure that no historically-significant cultural resources associated with the old heiau are damaged. Thrum's comments in reference to Hipawai Heiau, made approximately 100 years ago are instructive: "…partly destroyed many years ago, then used as a place of burial."

6. Finally, if the Wa'ahila Ridge area is slated for major development, the two possible rock shelter areas should be subject to formal archaeological inventory, including subsurface testing (excavation), prior to any substantial ground disturbance.

The proposed project is not located near the historic structures included in SIHP No. 50-80-14-1352. Further, there BSB has not been identified or suggested to be included as a historic property by any recent or past planning process for the UHM campus. However, recommendation **(3)** from the 2008 study does warrant additional commentary as to the preliminary evidence and means to address the potential for unknown or unidentified subsurface remains within the general vicinity of the existing BSB. This issue is further discussed in item (G) and (H) below.

G. Known Traditional Land Uses Activities and Patterns Within and Near the Project Area

Mānoa Valley was once traditionally demarcated into two sections, one for the ali'i and their retainers and one for the maka'āinana commoners. The ali'i lived on the high, cooler western slopes; the commoners lived on the warmer eastern slopes and on the valley floor where they tended irrigated taro fields. Mary Kawena Pukui, noted scholar and historian quotes the following:

In Mānoa valley a low hill at the head of the valley and Rocky hill above Punahou are said by a kinswoman of mine to have marked the division between the chiefs and the commoners in that valley. The chiefs lived on the west half, the commoners on the east…The imaginary line from Puu-o Mānoa to Ka-pali luahine marks the division of Mānoa; on the left called Mānoa-ali'i, and on the right, Mānoa-Kanaka.

Mānoa is watered by five streams in the upper mountain regions that merge into the lower Mānoa stream. Much of the documented history details that due to its vast water supply, Mānoa valley was comprised of a vast agricultural terrace system for the production of kalo and other wetland crops. The proposed C-MORE project area is located in what traditionally was known as Wailele, literally translated to mean spring waters. The general vicinity of the existing BSB to the present day athletic field of the Mid-Pacific Institute was part of a pūnāwai, or freshwater spring system.

Mānoa was given to the Maui chief Kame'eiamoku by Kamehameha I after his conquest of O'ahu. After Kame'eiamoku's death, the land was inherited by his son Ulumāheihie (or Hoapili), who became the governor of Maui during the reigns of Kamehameha II and Kamehameha III. Liliha, the daughter of Hoapili, inherited the lands in 1811 and brought them with her to her marriage with the high chief Boki, governor of O'ahu.

Based upon rectification of old maps and modern Geographic Information Systems software, the C-MORE project area has been sited along the border line of two pieces of property that were granted to two individuals by Kalaimoku and Boki. (*Figure 6*) The project area includes a property that was recorded under Land Commission Award (LCA) 819, which was awarded to George Beckley. In review of genealogical records, the referenced George Beckley is George Charles Beckley (b. 1787, d. 1825). He married Ahia Kalaikumaikiekie, who was the hānai daughter of Ka'ahumanu and the two had seven children. According to accounts, he made numerous voyages between Hawai'i, Mexico, and China and is noted to have been a trusted advisor of Kamehameha I. Beckley has also been ascribed as designing the first Hawaiian flag.

Supplemental information indicates that LCA 819 was known as Kawailole [sic] and was sold to Beckley by Kalaimoku, who was then Governor of Oahu around 1815. Upon his death, the land was transferred to his heirs until March 1827, when the land was left to Richard Charlton by Boki, who retained these lands for approximately 28 years. The land then returned to Beckley's heirs at the expiration of the Charlton's term. The attached Royal Patent (RP 4546) for the property indicates that the area was surrounded by stone walls, water runs, and kalo patches; indicating that this portion of land was probably still in active agricultural cultivation as late as 1862.

The other parcel was awarded under a Grant (LG) 24 to Theophilus Metcalf. Theophilus Metcalf was a sugar planter and government surveyor who married chiefess Kaili Kapuolono. Their daughter was Emma Metcalf, who married Frederick William Beckley, a descendant of George Beckley, who was chamberlain under King Kalākaua. This grant also validates the information recorded in the adjoining LCA 819/RP 4546 records that this land was surrounded by lo'i kalo, auwai, and stone walls.

See *Attachment E* for copies of LCA 819, RP 4546, and Grant (LG) 24.

H. Preliminary Consideration to the Potential of Burial Finds

The division of Mānoa valley into Mānoa-ali'i and Mānoa-kanaka suggests that the maka'āinana, who comprise the vast majority of the populace, would have been buried on the Mānoa-kanaka side, the east side of the valley. The known stewardship practices of maka'āinana would also suggest that the deceased would have been buried in close proximity to a family house as the ascribed kuleana would be for a designated family member to tend to the physical and spiritual well-being of the burial site. The generally known method of burial practices for areas such as Mānoa would include earth and cave burials.

Soil conditions sometimes lend to predictability and probability of possible burial encounters. The project area is comprised of Makiki Stony Clay Loam (MIA), 0 to 3% slopes. (*Figure 7*) This series consists of well-drained soils on alluvial fans and terraces. These soils formed in alluvium mixed with volcanic ash and cinders. The surface layer is dark-brown clay loam about 20 inches thick. The subsoil, about 10 inches thick, is dark-brown clay that contains cinders and rock fragments. Although not in the immediate vicinity, Hanalei Silty Clay, 0 to 2% slopes, are found immediately west of the BSB. The overall soil conditions do confirm the project area was once part of a vast tributary system.

Archaeological records indicate that there have been limited past discoveries of human remains within or near vicinity to the overall UHM campus area. The largest discovery of iwi kūpuna was along Dole Street near Kānewai, where 18 kūpuna were discovered during trenching by the Board of Water Supply. However, the most notable find within the same soil context as the project area was the discovery of partial remains of a single kūpuna at Keller Hall (SIHP No. 50-80-14-4191). The only noteworthy piece of information was that "a single water worn stone and a fragment of a cracked rock" were found with the burial but no additional information was provided to indicate if these associated materials were burial markers. It is not clear if this burial was in situ or a secondary context that could have been attributable to original construction activity of Keller Hall or some other near vicinity construction. Review of the filed report for this discovery did not indicate any specific information of the burial context that could provide input to the probability of future discoveries on the campus grounds.

Past activities within or near vicinity of the BSB, including its original construction as well as other facilities, roads, or utility infrastructure; the expansion of Hamilton Library; other building projects in the upper campus did not record any known burial discoveries. Further, given the overall nature and composition of the C-MORE project site, which is well documented as part of a pūnāwai system and the recorded tenure patterns of the immediate area being used in active lo'i cultivation and lack of house lots in the immediate vicinity, preliminary findings suggest this area may not be a high risk area for burial finds.

It is fairly difficult to predict with any specific certainty where burials might occur and it is a fair statement to highlight that there may be a possibility that undiscovered burials may still be present anywhere on the UHM campus. As such, it is suggested that an appropriate mitigative strategy would be to develop an archaeological monitoring plan prior to conducting any construction-related activity, subject to the review and approval of SHPD and consultation with other parties of interest, as appropriate, including but not limited to the Office of Hawaiian Affairs, and the O'ahu Island Burial Council.

I. Summary of Architectural Context and Preliminary Analysis of Significance

The existing BSB was originally designed in 1967 and its construction was completed in 1971; therefore, the building is approximately 37 years old.

Under the US Department of the Interior, National Park Service (NPS) *National Register Bulletin Guidelines for Evaluating and Nominating Properties that Achieved Significance within the Past Fifty Years*, there are specific issues relating to time that can be addressed in evaluating a property that is less than 50-year old to consider its inclusion on the National Register of Historic Places.

Under the US Department of the Interior, National Park Service (NPS) *National Register Bulletin Guidelines for Evaluating and Nominating Properties that Achieved Significance within the Past Fifty Years*, there are specific opportunities and issues to evaluate a property that is less than 50-year old to consider its inclusion on the National Register of Historic Places. Under the NPS guidelines, the 50-year benchmark is an arbitrary span of time, designed as a filter to ensure enough time has passed to evaluate the property in a historic context. Important periods of history that have occurred within the last 50-years do need to be considered in their context of the contribution made of the events or persons historically significant and related to the area in question, which includes a district, site, building, structure, or object. However, it is important to restate that under HRS §6E-2, a historic property is defined as "any building, structure, object, district, area, or site, including heiau and underwater site, **which is over fifty years old**." (emphasis added). Accordingly, the BSB fails to meet the basic legal definition of a historic property under State law.

Nonetheless, under the NPS guidelines, a property less than 50 years can be considered as historically significant only if the property is of "exceptional importance," or if it is an integral part to a historic district that is eligible for listing in the National Register. This statement is intended to safeguard against listing properties which are of only a contemporary value and ensures the National Register is one of truly historic places. A case example in Hawai'i would be the State Capitol Building, which is a building less than 50 years old but was added to the National Register in 1973 and is part of the Hawai'i Capitol Historic District, which includes 20 sites such as 'Iolani Palace, the Territorial Office Building, Honolulu Hale, etc.

The significance criteria do not define what is of "exceptional importance" but by its definition, the term "exceptional" refers to being of rare or superior quality or deviating from the norm. So the simple question to ask is does the BSB, being less than 50 years olds, possess "exceptional importance" to achieve significance under any of the criteria that is used to evaluate historical significance? Under 36 Code of Federal Regulations 60 (National Register of Historic Places), Section 60.4, the quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of persons significant in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in prehistory or history.

The only viable consideration of the BSB as a potential property of historical significance is possibly under criterion (c). However, the point of further discussion is to determine whether the BSB is of "exceptional importance" as a representation of work by Edward Durell Stone. Although Edward Durell Stone is a noted architect, whose works are contributions to the world of design and architecture, the context of the BSB in relation to other comparable works over the span of his career may be subjective but seemingly does not meet the merits to be of "exceptional importance" to Stone's portfolio. In review of Stone's cumulative works during the 1960s and 1970s, some of the notable works of this time include the:

- Museum of Arts and Design (New York, 1965);
- General Motors Building (New York, 1964);
- Kennedy Center for Performing Arts (Washington D.C., 1971);
- Georgetown University Law Center (Washington D.C.; 1971);
- Aon Center (Chicago, 1972).

The evaluation criteria do not define what is of "exceptional importance" but by its definition, the term "exceptional" refers to being of rare or superior quality or deviating from the norm. So the simple question to ask is does the BSB, being less than 50 years olds, possess "exceptional importance" to achieve significance under Evaluation criterion (c). This criterion evaluates whether or not a property embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction. The point of discussion is whether the BSB is of exceptional importance as a representation of work by Edward Durell Stone. Below is a succinct summary of Stone's career.

Born on March 9, 1902 in Fayetteville, Arkansas, Edward Durell Stone is recognized as one of the foremost architects of the mid-twentieth century. Stone attended the University of Arkansas from 1920 to 1923 before moving to Boston, Massachusetts, where he worked as a draftsman and was mentored under Henry R. Shepley. He attended Harvard Architectural School (1925-1926) and then Massachusetts Institute of Technology (1926-1927). He then traveled and studied in Europe for two years as part of the Rotch Traveling Scholarship he had received. While in Europe, Stone produced exquisite watercolor drawings in the Beaux-Arts style. Stone returned to the United States in 1929 at the onset of the Great Depression, where he settled in New York City. During this time, he was noted to have designed Radio City Music Hall and portions of the Waldorf-Astoria Hotel. In 1936, he established his own firm, Edward Durell Stone & Associates, which expanded later to Edward Durell Stone, Inc.; Hicks Drafting Corporation, and Torch Realty.

Influenced by his study of European architecture, Stone became an early advocate of International Style architecture. The style is known to originate in Europe in the 1920s and emerge in the U.S in the 1930s in primarily commercial and institutional buildings. The identifying features of the International Style includes modern structural principles and materials such as concrete, glass, and steel with emphasis on a radical simplification of form with many instances of exposing the structure and frame of construction; rejecting non-essential decoration; and the use of corner windows as a hallmark of the style. He helped transform the International Style modernism of the 1950s into the postmodernism of the 1960s and 1970s by substituting formalism for functionalism.

Some of his first designs include the Mandel House in Mount Kisco; the Museum of Modern Art in New York City.

During World War II, Stone served as the chief of planning and design in the U.S. Army Air Forces. After the war, he returned to Arkansas to design the Fine Arts Center at UA, the University of Arkansas for Medical Sciences Medical Center, the Sigma Nu Fraternity house in Fayetteville, and several private residences. After Stone's first marriage ended in divorce, he married again in 1954. During this time, there is a noted change in his architectural style. Austere modernism was replaced by the ornate formality exemplified by his design of the U.S. Embassy in New Delhi, India. For the remainder of his career, it is noted that Stone designed buildings to reflect universal values rather than "transient enthusiasms" of modernism.

In review of various biography sources, the following are noted as Stone's principal works: El Panama Hotel in Panama City, Panama; Stanford University Medical Center in Palo Alto, California; the U.S. Pavilion at the World's Fair in Brussels, Belgium; the Gallery of Modern Art in New York City; the National Geographic Society headquarters in Washington DC; the State University of New York at Albany, New York; the John F. Kennedy Center for the Performing Arts in Washington DC; the General Motors building in New York City; and the National Assembly and Presidential Palace in Islamabad, Pakistan.

Stone died on August 6, 1978 in New York. It has been noted that Stone's early buildings are important examples of modern architecture, but some critics dismiss his later works. In some of the critique, Stone was quoted as being a "conveyor of banality" who produced "a plague of dreadful buildings." Others though praised him for breaking from the mainstream and seeking to restore a sense of history to architecture.

No further information aside from the copies of the BSB original plans is available as to providing a basis of Stone's rationale of the building's design and intent. In past discussions and processes of UHM's campus plans, including the recent 2007 LRDP update, key buildings of historical significance have been identified for eligibility for inclusion on the National and State Historical Register. Insofar, through all these discussions and reviews by UH Board of Regents and its subcommittees; UH administration; and UH faculty, both in architecture and historic preservation, the BSB has not been identified as one of these key buildings.

The project team did contact UHM Professor A. Spencer Leineweber, FAIA, who is a recognized authority in design, the history of architecture, and historic preservation. Leineweber commented that the BSB was not looked at as part of the UHM campus Heritage Plan that was recently completed primarily because the BSB was built in 1971. The cutoff date for the Heritage Plan review for potential historic buildings was 1970, which provided a "life" to the historic review for the campus until 2020. Leineweber did point out that the "50-year requirement" for reviewing the historical significance of a building can be adjusted for sites of unusual significance and cited the Hawai'i State Capitol as an example. Leineweber suggested that the BSB would need to be placed in the context of other works of Edward Stone and whether the building currently has the integrity of Stone's original design.

It is the applicant's position that although Edward Stone is a noted architect that had a tremendous influence on the world of architecture, a review of his cumulative during the 1960s and 1970s would suggest that the BSB is perhaps <u>not</u> the most notable of his contributions during this period of his work. In review of other buildings that Stone designed during the same period, a selection of his more notable work includes: the Museum of Arts and Design (New York, 1965); the General

Motors Building (New York, 1964); the Kennedy Center for Performing Arts (Washington D.C., 1971); the Georgetown University Law Center (Washington D.C.; 1971); and the Aon Center (Chicago, 1972). Further, although the BSB does have its own unique design character, it has undergone alterations and renovations since its original construction. Finally, the proposed C-MORE building is designed to be contrast but complementary accent to the overall character of the existing BSB.

See *Attachment F* for a selected sample of signature works of Edward Stone throughout his career as well as prominent projects that he completed at or around the same time the BSB was designed and built.

J. <u>Conclusions</u>

In conclusion, we request SHPD to review the provided information in the process of its determination of the archaeological and architectural context. It is the position of the University that the legal definition of "historic property" under HRS §6E-2 can not be applied to the architectural context of the existing BSB due to the age qualifications of the statute.

Further, in review of the potential of the BSB to be historically significant under criterion (c) of the evaluation criteria, it is also the position of the University that although Edward Durell Stone is a noted architect that has significantly contributed to the world of design and architecture, the context of the BSB in relation to other comparable works of this period of his career is perhaps of a lesser quality and does not serve to meet the clause of "exceptional importance" to Stone's contributions.

Finally, the traditional land use patterns suggest that this area, traditionally known as Wailele, was part of the once predominant wetland terrace field system and that the area was a pūnāwai, or primary spring source that fed other field intakes. Review of available land awards suggest that the area remained in cultivation through the 1860s. Given the overall nature and composition of the C-MORE project site, which is well documented as part of a pūnāwai system and the recorded tenure patterns of the immediate area being used in active lo'i cultivation and lack of house lots in the immediate vicinity, preliminary findings suggest this area may not be a high risk area for burial finds.

It is fairly difficult to predict with any specific certainty where burials might occur and it is a fair statement to highlight that there may be a possibility that undiscovered burials may still be present anywhere on the UHM campus. As such, it is suggested that an appropriate mitigative strategy would be to develop an archaeological monitoring plan prior to conducting any construction-related activity, subject to the review and approval of SHPD and consultation with other parties of interest, as appropriate, including but not limited to the Office of Hawaiian Affairs, and the O'ahu Island Burial Council.

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Attachment A
Referenced Figures

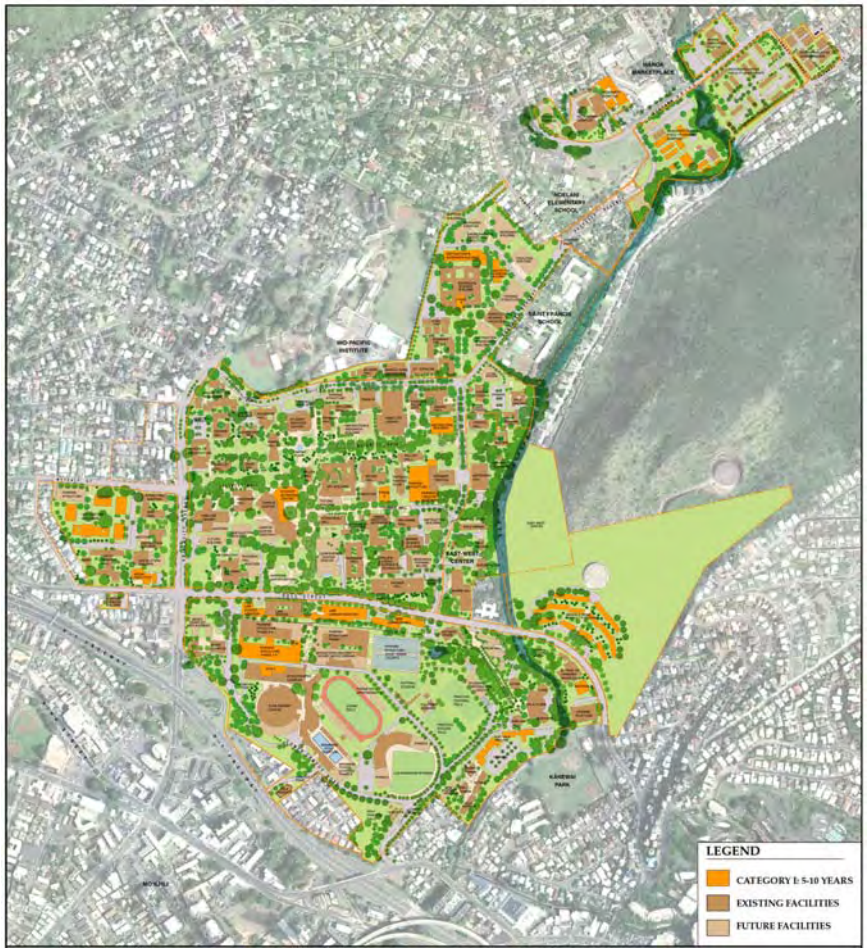


Figure 1 University of Hawai'i, Mānoa, Long Range Development Plan

Figure 2 C-MORE Project Location within Waikīkī Ahupua'a

Figure 3 C-MORE Project Location in Tax Map Key 2-9-004:005 (por.)

Figure 4 C-MORE Project Location in LRDP Campus Designation (Upper Central)

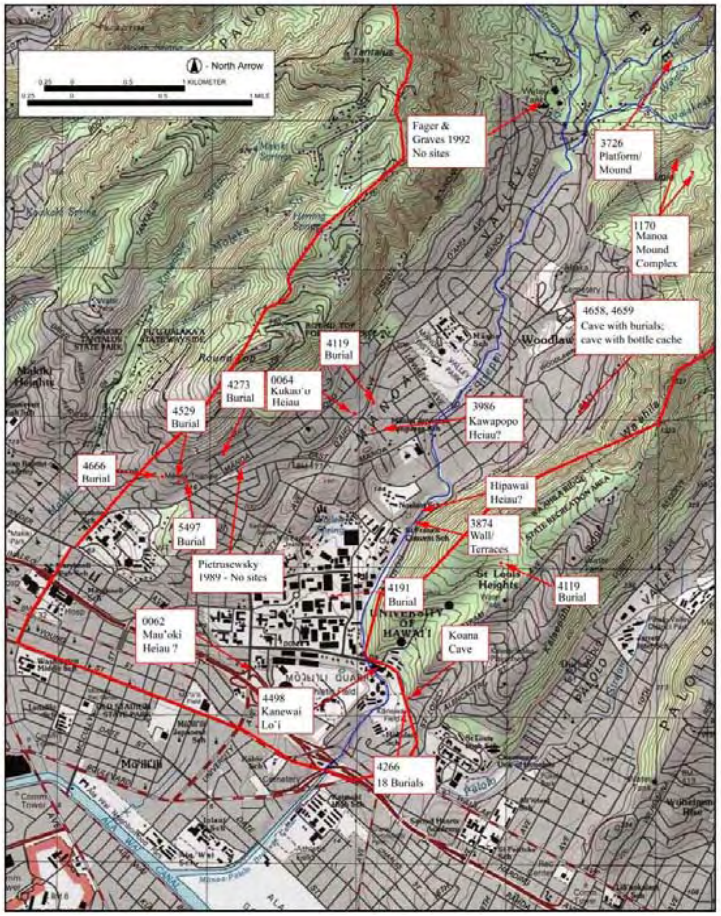


Figure 5 Summary of Identified Archaeological Sites Within Mānoa
Source: Cultural Surveys Hawai'i, 2008

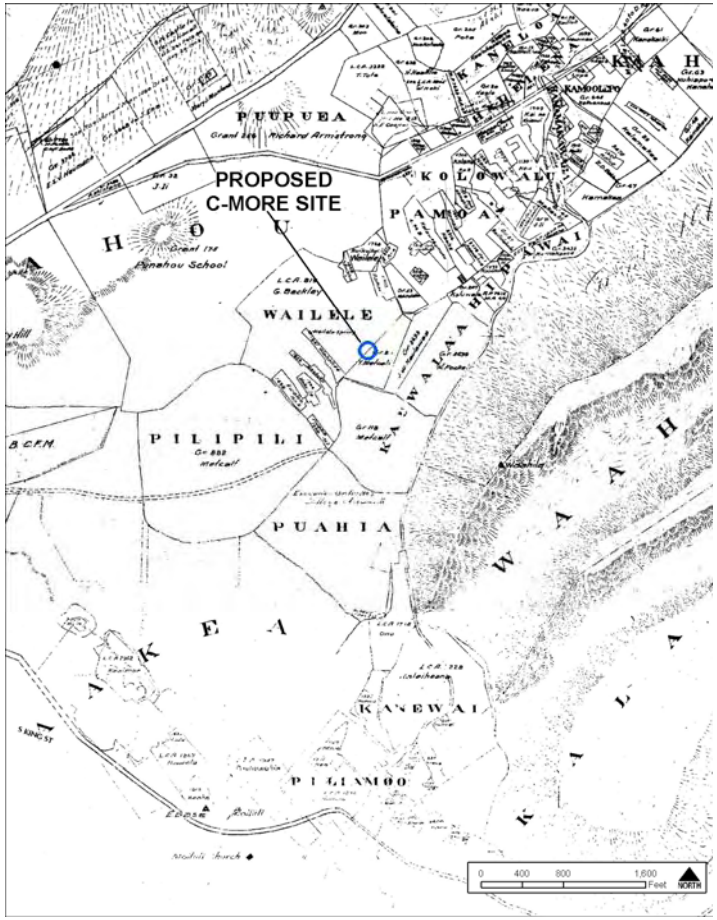


Figure 6 C-MORE Project Location Identified on Hawaiian Government Survey, W.D Alexander Surveyor General, Mānoa Valley 1882

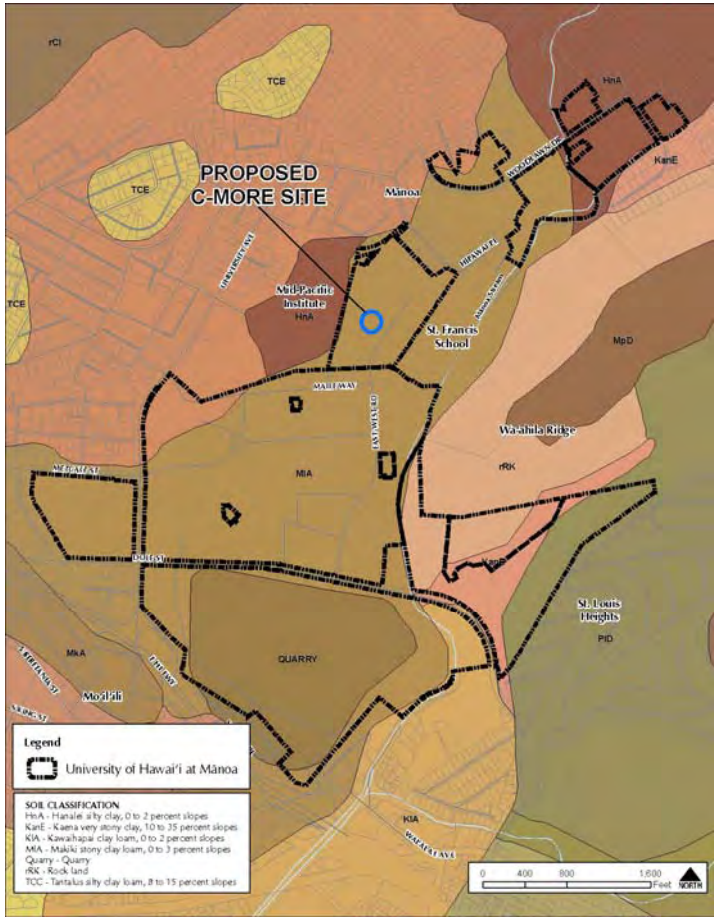
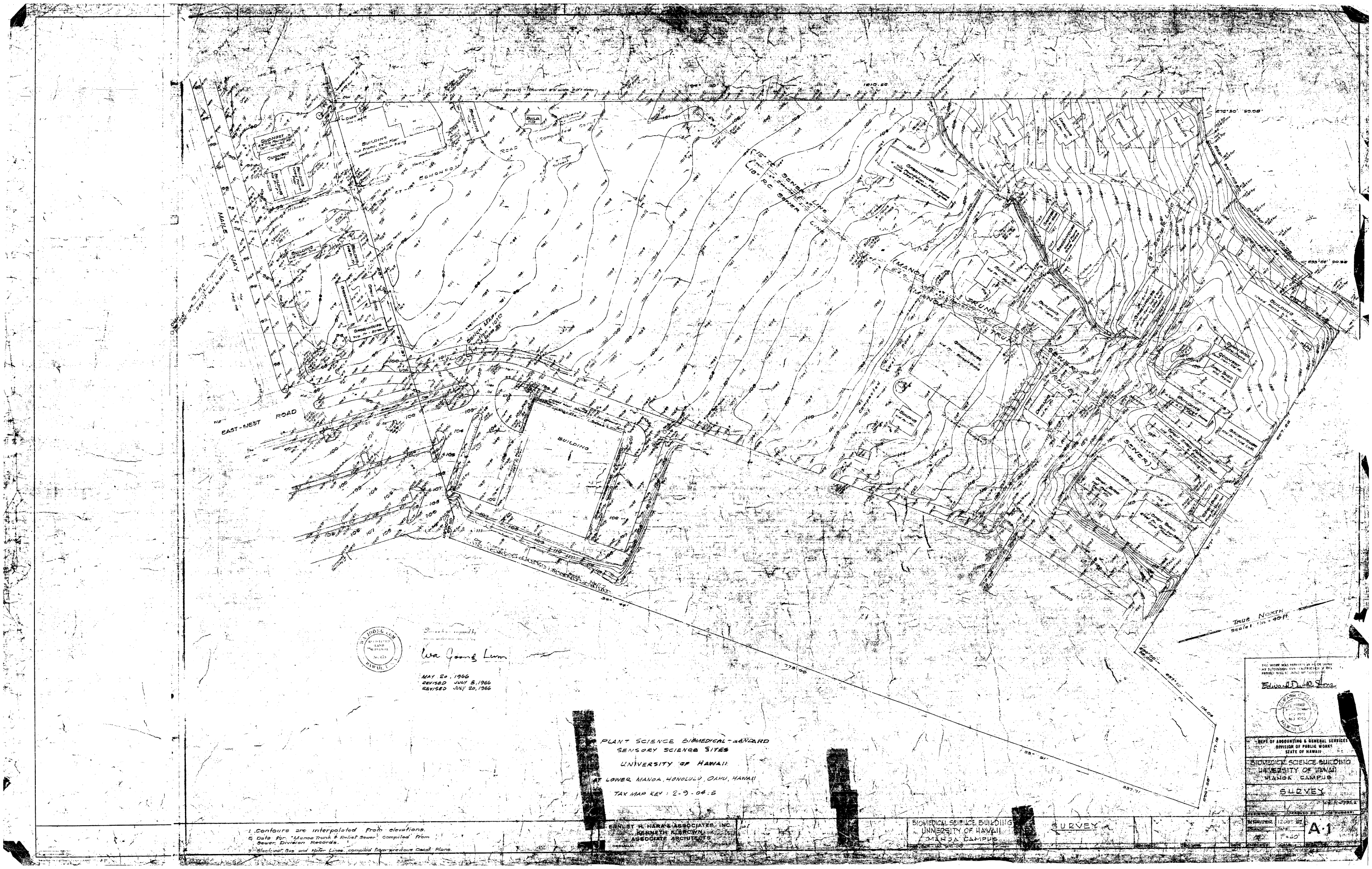
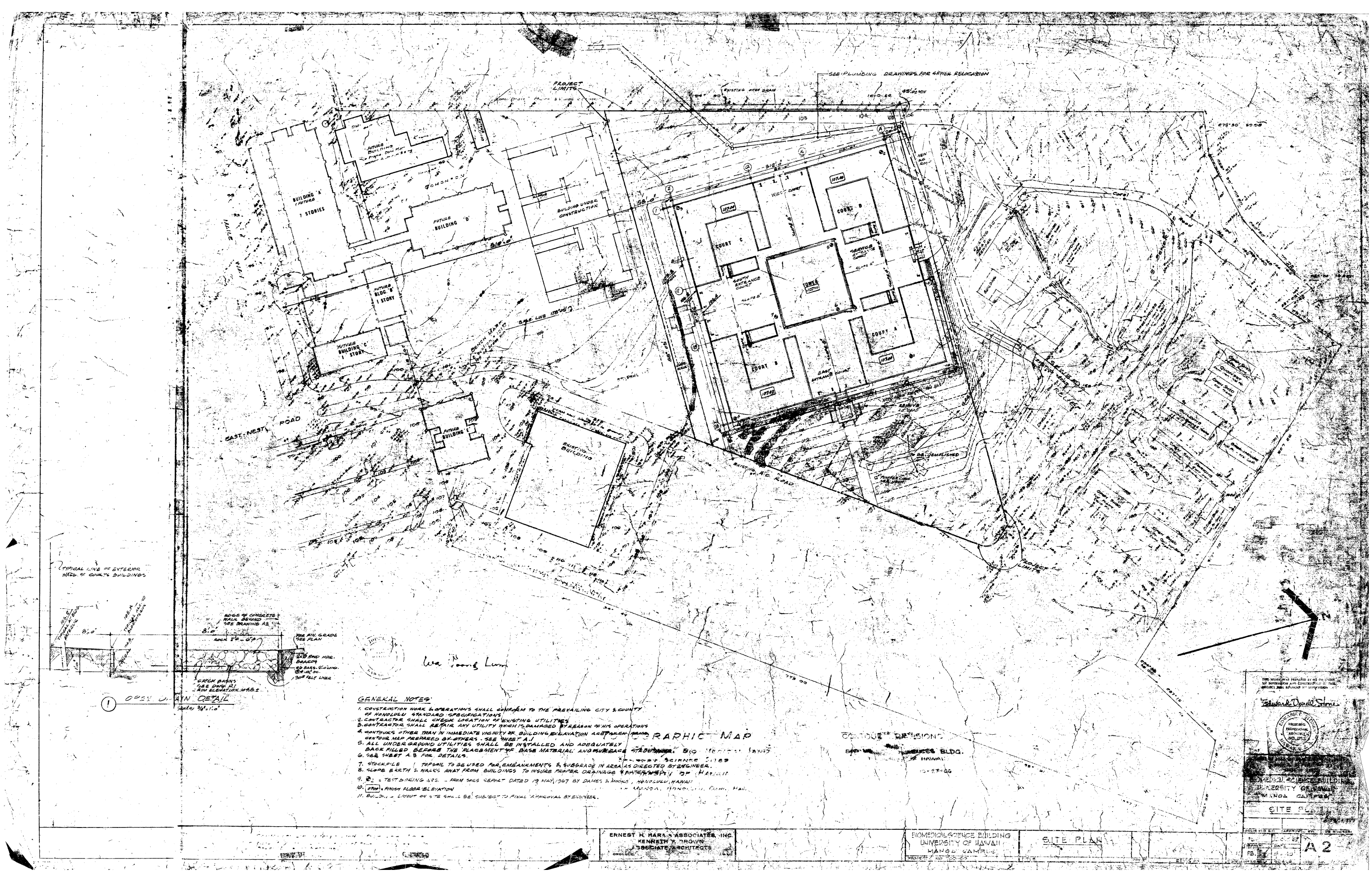
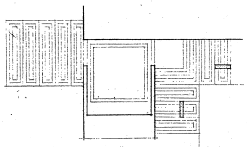


Figure 7 Soil Classification Map

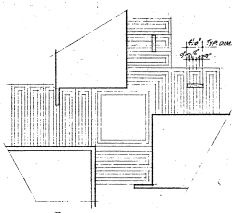
Attachment B
Selected Copies of Biomedical Science Buildings
Original Drawings and Site Plans


1. Contours are interpolated from elevations.
PLANT SCIENCE BIOMEDICAL SENSORY SCIENCE SITES
UNIVERSITY OF HAWAII
LOWER MANOA, HONOLULU, OAHU, HAWAII
TAX MAP KEY: 2-9-04-6
MAY 20, 1966
REVISED JUNE 8, 1966
REVISED JULY 20, 1966
TRUE NORTH
EAST-WEST ROAD
BUILDING
ERNEST H. HARA & ASSOCIATES, INC.
KENNETH K. BROWN
ASSOCIATE ARCHITECTS
BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS
SURVEY
A-1

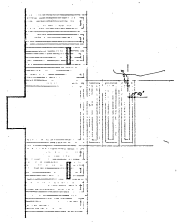

PROJECT LIMITS
SEE PLUMBING DRAWINGS FOR ACTIVE RELOCATION
BUILDING A
7 STORIES
FUTURE BUILDING D
BUILDING UNDER CONSTRUCTION
COURT
EAST-WEST ROAD
GENERAL NOTES
TOPOGRAPHIC MAP
ERNEST H. HARA & ASSOCIATES, INC.
KENNETH K. BROWN
ASSOCIATE ARCHITECTS
BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS
SITE PLAN
A 2



1 PATTERN AT COURTS

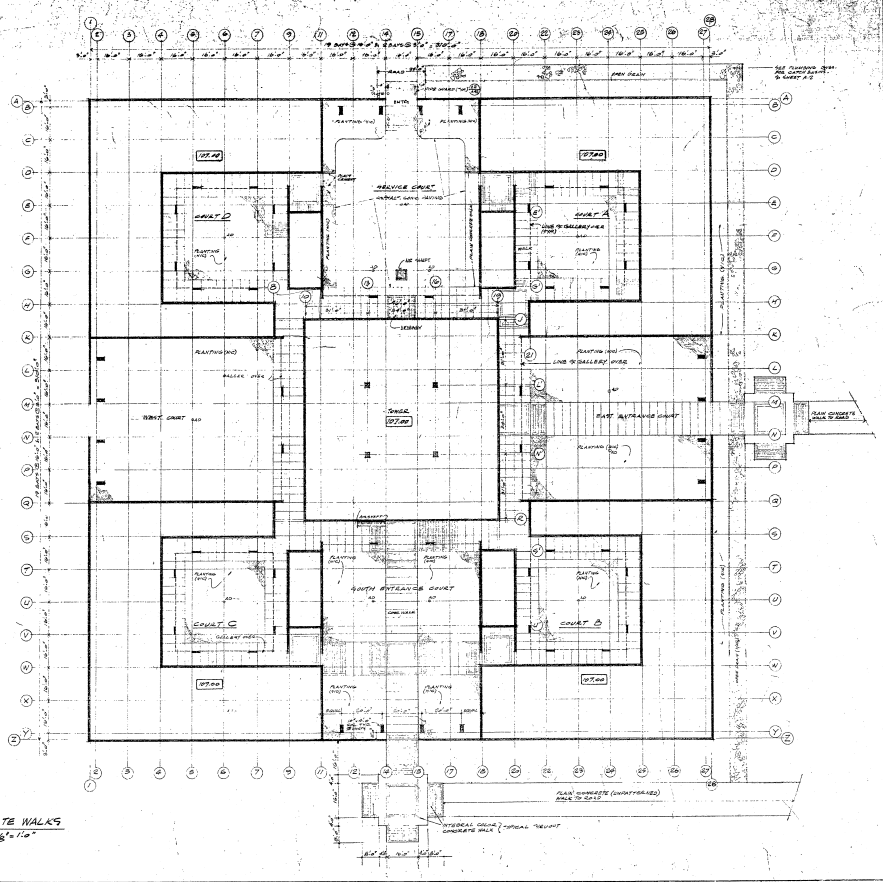


2 PATTERN AT TOWER-COURT CONNECTION

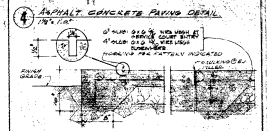


3 PATTERN AT TOWER

TYPICAL SCORING PATTERNS FOR CONCRETE WALKS
INTEGRAL COLOR AS SPECIFIED SCALE 1/8" = 1'-0"



4 ASPHALT CONCRETE PAVING DETAIL
1/4" = 1'-0"



5 TYPICAL CONCRETE EDGE DETAIL
1/4" = 1'-0"
NOTE: SLOPE ALL WALKS AWAY FROM ADJACENT BUILDINGS.

Edward Durell Stone

DEPT. OF ACCOUNTING & GENERAL SERVICES
DIVISION OF PUBLIC WORKS
STATE OF HAWAII

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS

COURT PAVING PLANS & DETAILS

ERNEST H. HARA & ASSOCIATES, INC.
KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU HAWAII

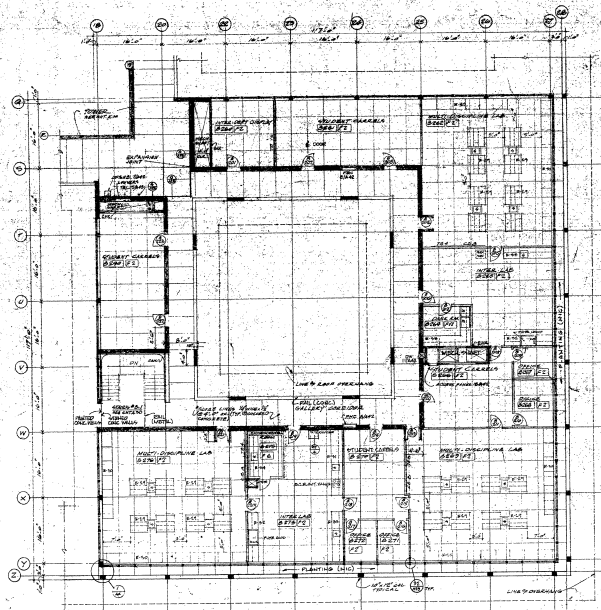
EDWARD DURELL STONE, ARCHITECT
NEW YORK, N.Y.
PALO ALTO, CALIFORNIA

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS

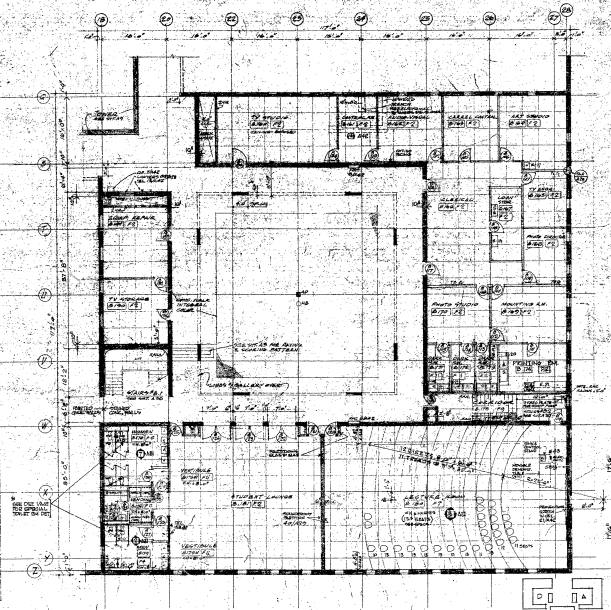
COURT PAVING PLANS & DETAILS

FS-
1" = 1'-0"
1/8" = 1'-0"

A-3



SECOND FLOOR
1/8" = 1'-0" FIN. FLR. 100.25



FIRST FLOOR
1/8" = 1'-0" FIN. FLR. 100.00

KEY PLAN

ABBREVIATIONS
AC = ACOUSTIC
SP = SHEET - SEE SPECS.
GYP BD = GYPSUM WALL BOARD
L = LAMINATED
SCHD = SCHEDULE
CT = CERAMIC TILE FOR TOILET ROOMS WALLS ONLY
GP = GYPSUM PLASTER
TG = TRAVEL GROUT WITH HARDENER

NOTES:
FINISH CEILING HEIGHT FIRST FLOOR UNLESS NOTED ON PLANS.

DOOR SCHEDULE

DOOR NO.	SIZE	TYPE	ASSEMBLY NUMBER	FRAME	FRAME DETAILS HEAD	JAMB	SILL	TYPE	HARDWARE
101	3'-0" x 7'-0" x 1 3/4"	W 1	69	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
102	3'-0" x 7'-0" x 1 3/4"	W 1	8	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	HP, PLASH
103	3'-0" x 7'-0" x 1 3/4"	W 1	8	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	HP, PLASH
104	3'-0" x 7'-0" x 1 3/4"	W 1	11	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	HP, PLASH
105	3'-0" x 7'-0" x 1 3/4"	W 1	16	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
106	3'-0" x 7'-0" x 1 3/4"	W 1	16	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
107	3'-0" x 7'-0" x 1 3/4"	W 1	49	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
108	3'-0" x 7'-0" x 1 3/4"	W 1	28	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
109	3'-0" x 7'-0" x 1 3/4"	W 1	15	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
110	3'-0" x 7'-0" x 1 3/4"	W 1	50	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
111	3'-0" x 7'-0" x 1 3/4"	W 1	50	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
112	3'-0" x 7'-0" x 1 3/4"	W 1	16	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
113	3'-0" x 7'-0" x 1 3/4"	W 1	50	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
114	3'-0" x 7'-0" x 1 3/4"	W 1	50	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
115	3'-0" x 7'-0" x 1 3/4"	W 1	50	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
116	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	-	
117	3'-0" x 7'-0" x 1 3/4"	W 1 B	49	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
118	3'-0" x 7'-0" x 1 3/4"	W 1 B	50	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
119	3'-0" x 7'-0" x 1 3/4"	W 1 B	57	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
120	3'-0" x 7'-0" x 1 3/4"	W 1 B	57	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
121	3'-0" x 7'-0" x 1 3/4"	W 1 B	58	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
122	3'-0" x 7'-0" x 1 3/4"	W 1 B	158	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
123	3'-0" x 7'-0" x 1 3/4"	W 1 B	58	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
124	3'-0" x 7'-0" x 1 3/4"	W 1 B	58	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
125	3'-0" x 7'-0" x 1 3/4"	W 1	54	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
126	3'-0" x 7'-0" x 1 3/4"	W 1	5	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
127	3'-0" x 7'-0" x 1 3/4"	W 1	5	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
128	3'-0" x 7'-0" x 1 3/4"	W 1	6	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
129	3'-0" x 7'-0" x 1 3/4"	W 1	6	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
130	3'-0" x 7'-0" x 1 3/4"	W 1 B	13	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
131	3'-0" x 7'-0" x 1 3/4"	W 1	14	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
132	3'-0" x 7'-0" x 1 3/4"	W 1 B	19	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
133	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
134	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
135	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
136	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
137	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
138	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
139	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
140	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
141	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
142	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
143	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
144	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
145	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
146	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
147	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
148	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
149	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
150	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
151	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
152	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
153	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
154	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
155	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
156	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	
157	3'-0" x 7'-0" x 1 3/4"	W 1	2	F	1 1/2 HM	1 1/2 HM	1 1/2 HM	T 1	

ABBREVIATIONS
F = FRAME TO REAR - SEE OPSCH FOR NUMBER
T = THRESHOLD - SEE ARTI. A-4
L = LIGHT FRAME
G = GROUND FRAME SEALER

SEE OPSCH. FOR HARDWARE IS GROUP NUMBER

Edward Durell Stone

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COURT B - 1st & 2nd FLOOR PLANS

ERNEST H. HARA & ASSOCIATES, INC.
KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU HAWAII

EDWARD DURELL STONE, ARCHITECT
NEW YORK, N.Y.
PALO ALTO, CALIFORNIA

BIOMEDICAL SCIENCE BUILDING
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FIRST & SECOND FL PLANS
COURT B

A-5

GENERAL NOTES

1. ALL DIMENSIONS SHOWN ARE FOR ROUGH CARPENTRY WORK.
2. ALL WOOD BLOCKING SHALL BE FIRE RETARDANT TREATED.
3. ALL CONCRETE SHALL BE PROPERLY CURED, USE WARNING SIGN SECTION.
4. ALL WINDOW SILLS TO BE CENTERED WITHIN A 4" MODULE.
5. ALL DOOR JAMBS TO BE CENTERED WITHIN A 4" MODULE.
6. ALL CEILING HEIGHTS TO BE CENTERED WITHIN A 4" MODULE.
7. SECTIONS SHOWN THROUGH WINDOWS & DOORS ARE SUBJECT TO INCLUDE OVER EXCAVATION.

FINISH SCHEDULE

NO	ROOM NAME	WALL	FINISH				CEILING	
		NORTH	EAST	SOUTH	WEST	FLOOR		
101	COURT "C"	CONC.	CONC.	CONC.	CONC.	CONC.		
102	COURT "A"	CONC.	CONC.	CONC.	CONC.	CONC.		

ABBREVIATIONS

AC - ACOUSTIC
CONC - CONCRETE
CP - CARPET - SEE SPECS
GYP BD - GYPSUM WALL BOARD
PT - PAINTED
CT - CERAMIC TILE
CF - CLEAR FINISH

NOTES:
1. FIN. CEILING HEIGHT COURT C = 9'-0"

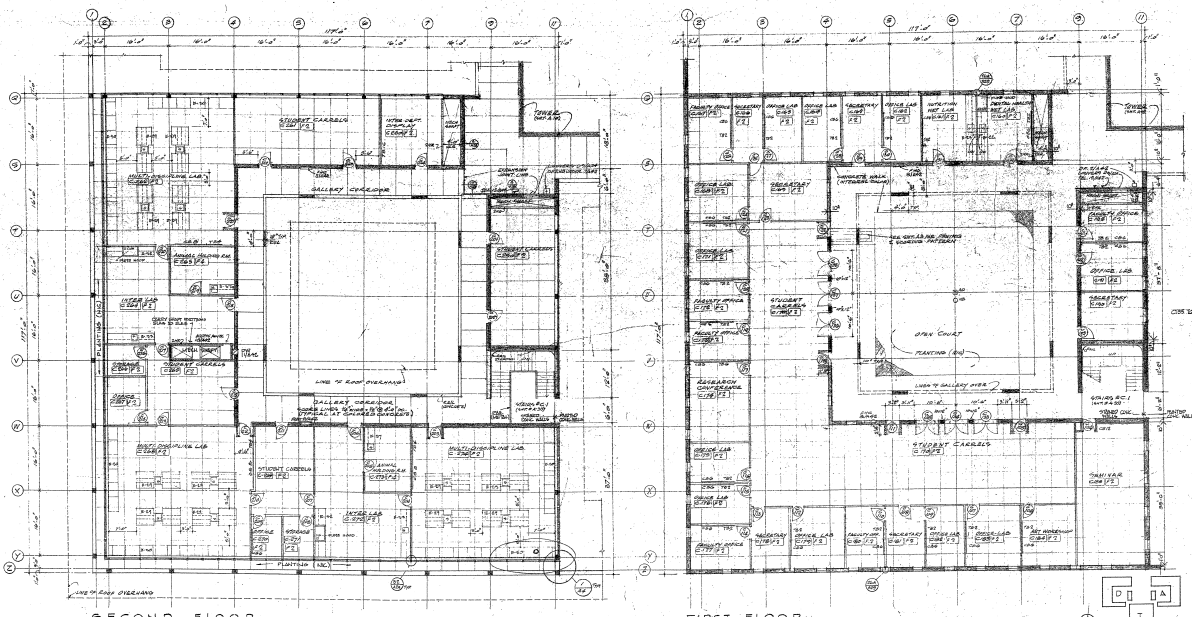
DOOR SCHEDULE

DOOR NO	SIZE	TYPE	HARDWARE GROUP	FIRE	FRAME DETAILS HEAD	JAMB	SILL	TYPE	GLASS	REMARKS
101	3'-0"x8'-0"x1¾"	W 16	15	1P	1/DW8	1/DW8	1/DW8	T-1		
102	3'-0"x8'-0"x1¾"	W 16	15	1P	1/DW8	1/DW8	1/DW8	T-1		
103	3'-0"x8'-0"x1¾"	W 16	15	1P	1/DW8	1/DW8	1/DW8	T-1		
104	3'-0"x8'-0"x1¾"	W 16	15	1P	1/DW8	1/DW8	1/DW8	T-1		
105	3'-0"x8'-0"x1¾"	W 16	58	1P	1/DW8	1/DW8	1/DW8	T-1		BATTEN WOOD DR.
106	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
107	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
108	3'-0"x7'-0"x1¾"	W 1	5	P	5/W4	5/W4	5/W4			
109	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
110	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4	T-1		BATTEN WOOD DR.
111	3'-0"x7'-0"x1¾"	W 1	58	P	5/W4	5/W4	5/W4	T-1		BATTEN WOOD DR.
112	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
113	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
114	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
115	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
116	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
117	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
118	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
119	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
120	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
121	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
122	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
123	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
124	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
125	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
126	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
127	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
128	3'-0"x7'-0"x1¾"	W 1	3	P	5/W4	5/W4	5/W4			
129	3'-0"x8'-0"x1¾"	W 16	19	P	1/DW8	1/DW8	1/DW8	T-1		
130	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
131	3'-0"x8'-0"x1¾"	W 16	58	P	1/DW8	1/DW8	1/DW8	T-1		BATTEN WOOD DR.
132	3'-0"x8'-0"x1¾"	W 16	58	P	1/DW8	1/DW8	1/DW8	T-1		BATTEN WOOD DR.

DOOR NO	SIZE	TYPE	HARDWARE GROUP	FIRE	FRAME DETAILS HEAD	JAMB	SILL	TYPE	GLASS	REMARKS
201	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
202	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
203	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
204	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
205	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
206	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
207	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
208	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
209	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
210	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
211	3'-0"x7'-0"x1¾"	W 1	52	P	1/DW8	1/DW8	1/DW8	T-1		
212	3'-0"x7'-0"x1¾"	W 1	52	P	1/DW8	1/DW8	1/DW8	T-1		
213	3'-0"x7'-0"x1¾"	W 1	52	P	1/DW8	1/DW8	1/DW8	T-1		
214	3'-0"x7'-0"x1¾"	W 1	9	P	5/W4	5/W4	5/W4			
215	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
216	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
217	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
218	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
219	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
220	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
221	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
222	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
223	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
224	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4			
225	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
226	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
227	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
228	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
229	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
230	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
231	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
232	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
233	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		
234	3'-0"x7'-0"x1¾"	W 1	52	P	5/W4	5/W4	5/W4	T-1		

ABBREVIATIONS
F - FRAME
S - STEEL - SEE SPECS, DR NUMBER
T - THRESHOLD, NO. 4HP, ASA
LF - LIGHT FRAME SILL
GF - GROUND FRAME SILLS

SEE SPECS FOR HARDWARE GROUPING



SECOND FLOOR
1/8" = 1'-0"
FIN. FLR. 100.66

FIRST FLOOR
1/8" = 1'-0"
FIN. FLR. 107.00

KEY PLAN

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COURT "C" - 1ST & 2ND FLOOR PLANS

REVISED BY:	CHECKED BY:
DATE: 10/29/67	DATE: 12-DEC-67
DRAWN BY:	SCALE: 1/8" = 1'-0"
DESIGN BY:	JOB NO.
DATE:	SHEET NO. A-6

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KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU, HAWAII

EDWARD DURELL STONE, ARCHITECT
7 EAST 47TH STREET NEW YORK 21, NEW YORK
270 WAVERLEY STREET PALO ALTO, CALIFORNIA

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FIRST & SECOND FLOOR PLANS
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TITLE:

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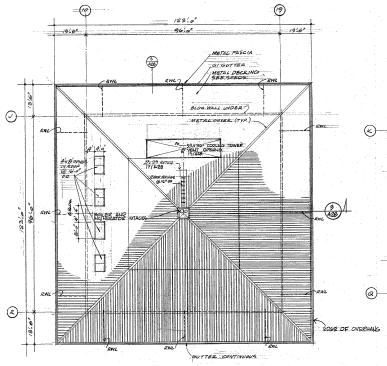
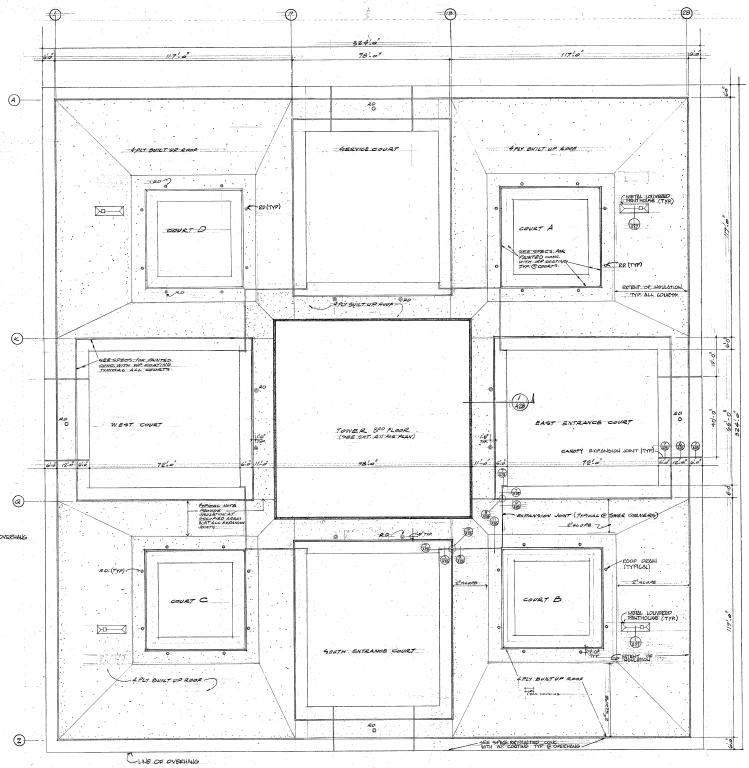


TOWER ROOF PLAN 1/16" = 1'-0"



ROOF PLAN AT COURTS 1/16" = 1'-0"

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ROOF PLAN & DETAILS

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DESIGN BY:	JOB NO.
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KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU, HAWAII

EDWARD DURELL STONE, ARCHITECT
7 EAST 47TH STREET NEW YORK 21, NEW YORK
270 WAVERLEY STREET PALO ALTO, CALIFORNIA

BIOMEDICAL SCIENCE BUILDING
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ROOF PLAN & DETAILS
TITLE:

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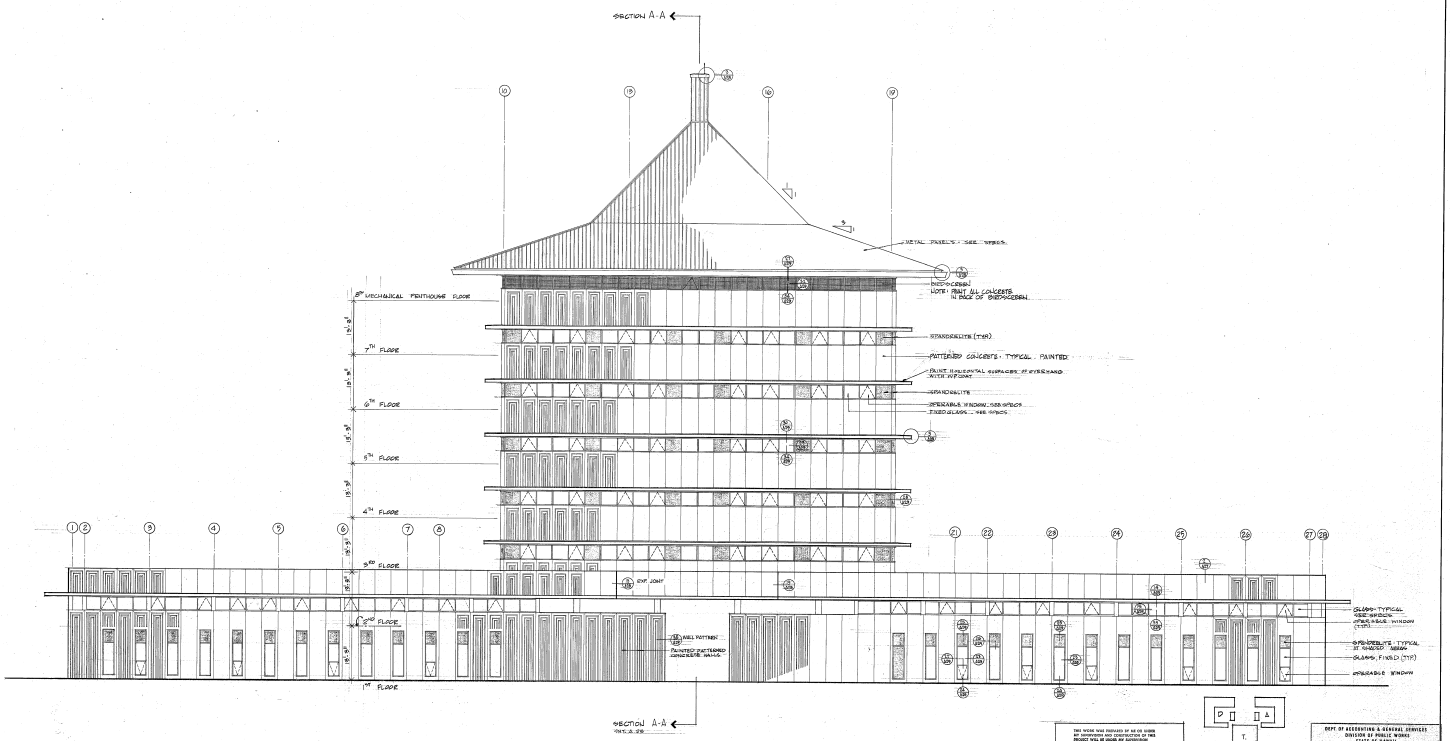

SOUTH ELEVATION

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EDWARD D. STONE, JR. REGISTERED PROFESSIONAL ARCHITECT NO. 1733 HAWAII U.S.A.

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EXTERIOR ELEVATIONS - SOUTH
TOWER & COURTS C & B

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DRAWN BY: Bonsiko | DATE:
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ERNEST H. HARA & ASSOCIATES, INC.
KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU, HAWAII

EDWARD DURELL STONE, ARCHITECT
7 EAST 57TH STREET NEW YORK 22, NEW YORK
370 WAVERLEY STREET PALO ALTO, CALIFORNIA

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UNIVERSITY OF HAWAII
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TITLE: EXTERIOR ELEVATIONS - SOUTH TOWER & COURTS C&B

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Edward D. Stone, Jr.

EDWARD D. STONE, JR. REGISTERED PROFESSIONAL ARCHITECT NO. 1733 HAWAII U.S.A.

DEPT. OF ACCOUNTING & GENERAL SERVICES
DIVISION OF PUBLIC WORKS
STATE OF HAWAII

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS

EXTERIOR ELEVATIONS - TOWER
1ST & 2ND FL. - ENTRANCE COURTS

DESIGNED BY: | APPROVED BY: | DATE SUBMITTED:
DRAWN BY: Bonsiko | DATE:
CHECKED BY: | SCALE: | SHEET NO. A-22

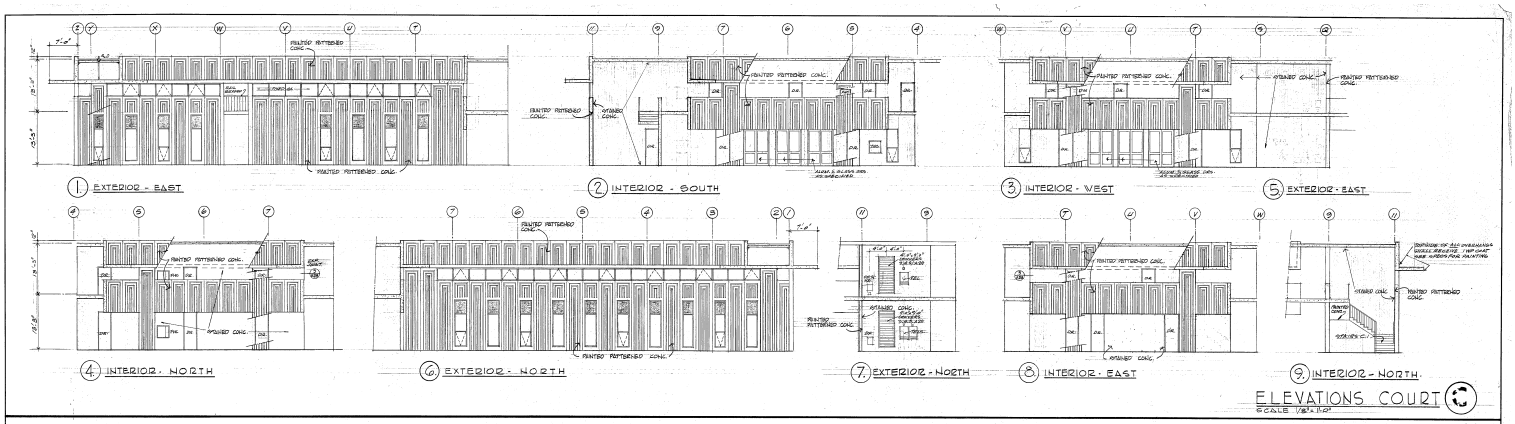
ERNEST H. HARA & ASSOCIATES, INC.
KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU, HAWAII

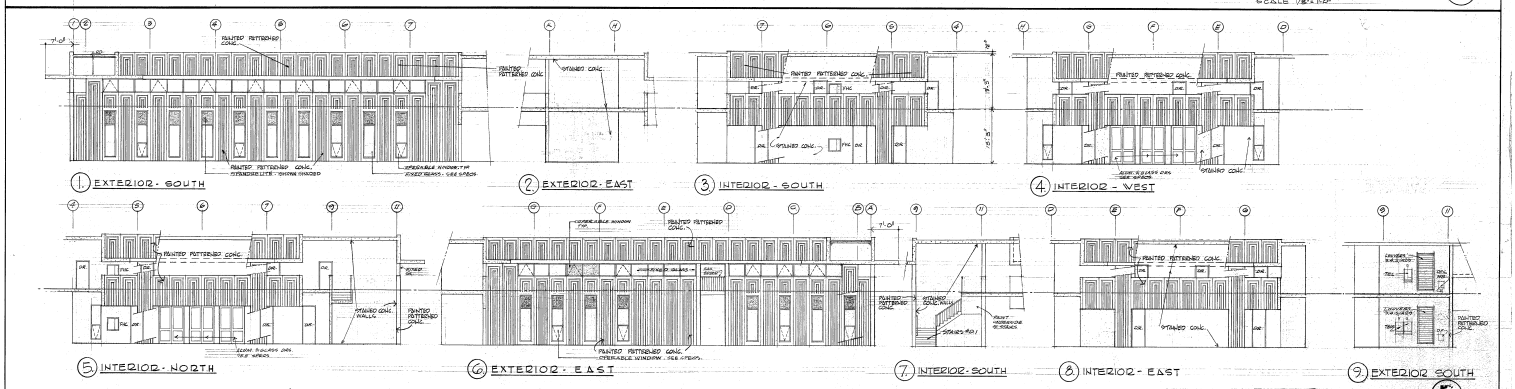
EDWARD DURELL STONE, ARCHITECT
7 EAST 57TH STREET NEW YORK 22, NEW YORK
370 WAVERLEY STREET PALO ALTO, CALIFORNIA

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS
PROJECT NO. 130.103.00

TITLE: EXTERIOR ELEVATIONS - TOWER 1ST & 2ND FLR. - ENTRANCE COURTS

REV. NO. | REVISION | DATE | CHECKED BY | SCALE | SHEET NO.





NOTE: ALL STAINED CONCRETE SHALL BE 1"x8 ROUGH SAWN EQUAL BOARD FRAMED CONCRETE THROUGHOUT - SEE SPECS.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

Edward Durell Stone

REGISTERED PROFESSIONAL ARCHITECT NO. 1313 STATE OF HAWAII

KEY PLAN

DEPT. OF ACCOUNTING & GENERAL SERVICES
DIVISION OF PUBLIC WORKS
STATE OF HAWAII

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS

EXTERIOR ELEVATIONS
COURT C & COURT D

DESIGNED BY: JOHN HUMPHREY
APPROVED BY: JOHN HUMPHREY

DATE	SCALE: 1/8"	
DRAWN BY:	DATE	
FOR	1/8"=1'-0"	A-24

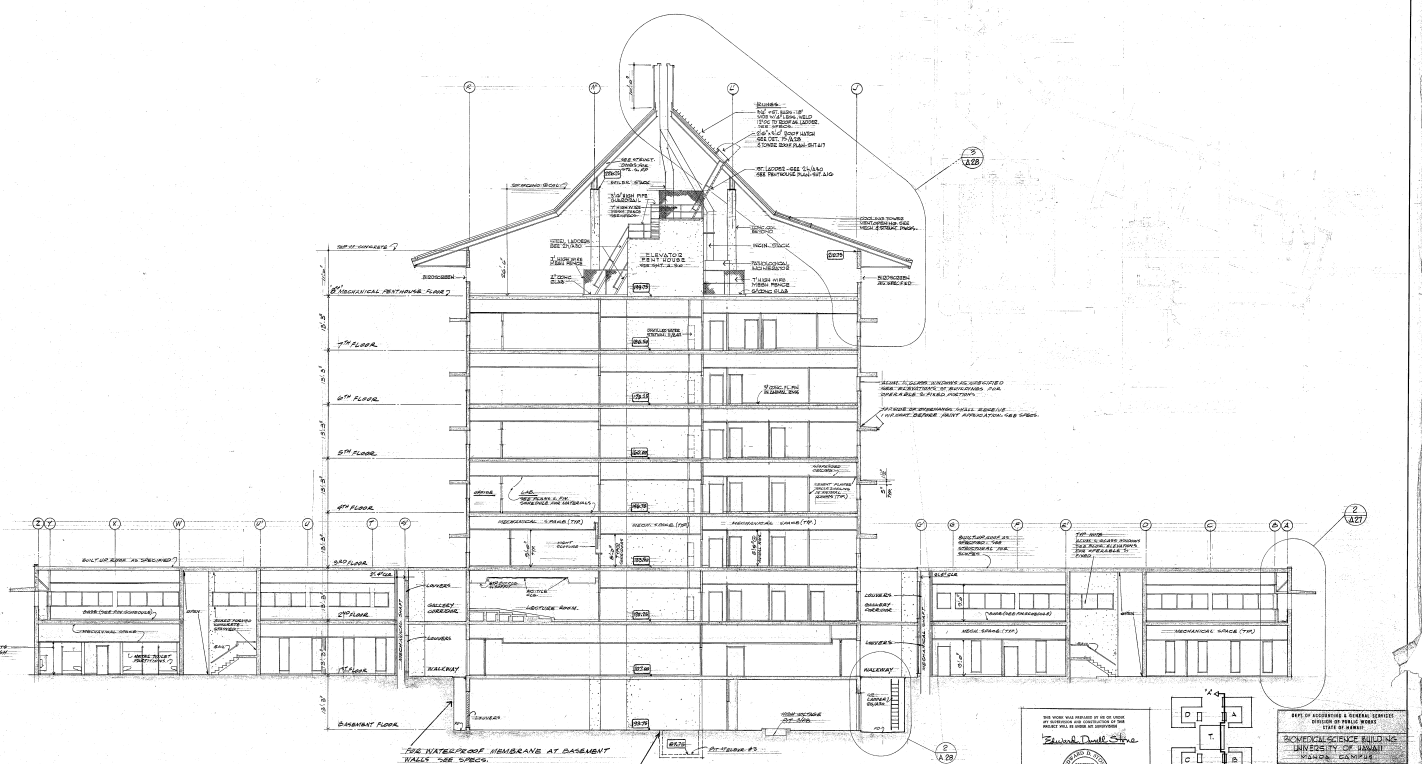
ERNEST H. HARA & ASSOCIATES, INC.
KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU HAWAII

EDWARD DURELL STONE, ARCHITECT
7 EAST 47TH STREET NEW YORK 21, NEW YORK
370 WAVERLEY STREET PALO ALTO, CALIFORNIA

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS
PROJECT: HA 128-08

TITLE: EXTERIOR ELEVATIONS COURT C & COURT D

REV. NO. | REVISION | DATE | CHECKED BY | DRAWN | SHEET NO.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION

Edward Durell Stone

REGISTERED PROFESSIONAL ARCHITECT NO. 1313 STATE OF HAWAII

KEY PLAN

DEPT. OF ACCOUNTING & GENERAL SERVICES
DIVISION OF PUBLIC WORKS
STATE OF HAWAII

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS

BUILDING SECTION A-A

DESIGNED BY: | APPROVED BY: JOHN HUMPHREY

DATE 1/8/2007	SCALE 1/8"	
DRAWN BY:	DATE	
FOR	1/8"=1'-0"	A-25

ERNEST H. HARA & ASSOCIATES, INC.
KENNETH F. BROWN
ASSOCIATE ARCHITECTS
HONOLULU HAWAII

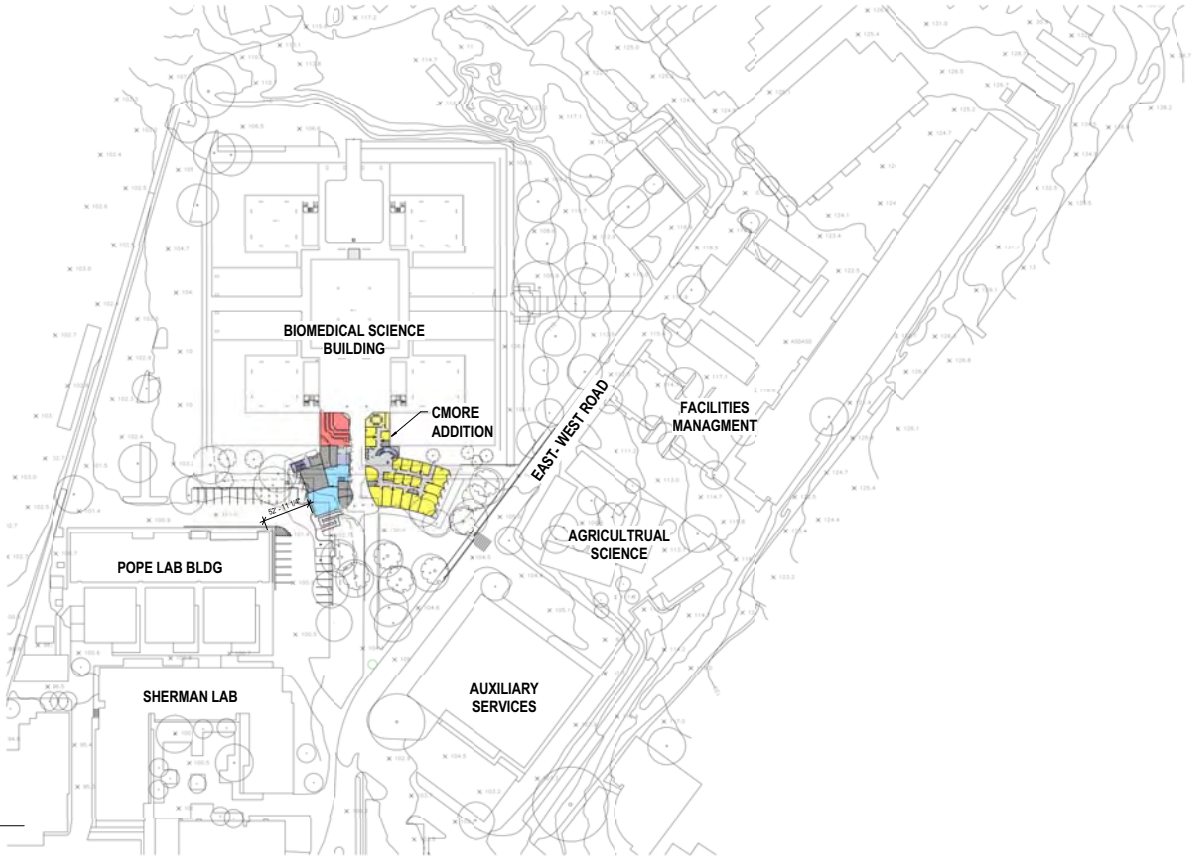
EDWARD DURELL STONE, ARCHITECT
7 EAST 47TH STREET NEW YORK 21, NEW YORK
370 WAVERLEY STREET PALO ALTO, CALIFORNIA

BIOMEDICAL SCIENCE BUILDING
UNIVERSITY OF HAWAII
MANOA CAMPUS
PROJECT: HA 128-08

TITLE: BUILDING SECTION A-A

REV. NO. | REVISION | DATE | CHECKED BY | DRAWN | SHEET NO.

Attachment C
Copy of 11 Sept 2008 Schematic Design Packet
Proposed CMORE Building



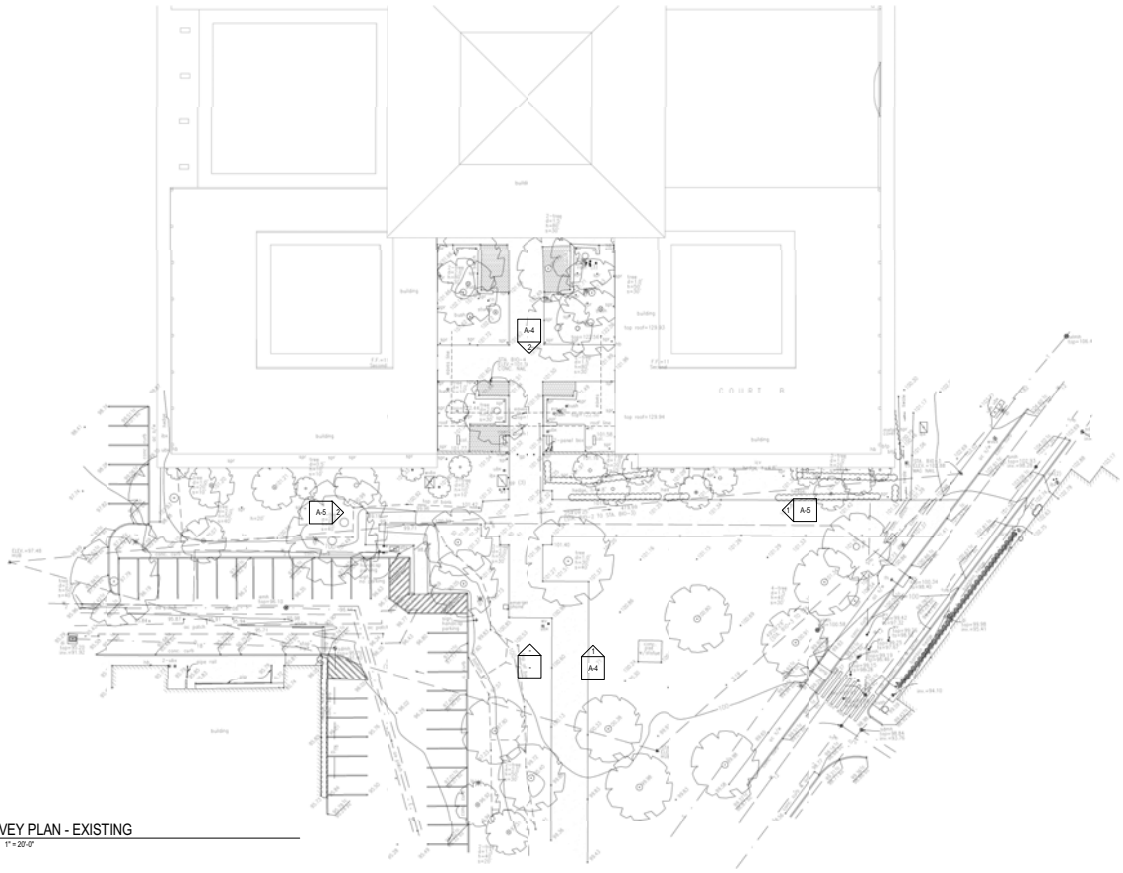
1 VICINITY PLAN
SCALE: 1" = 50'-0"

C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

VICINITY PLAN

GROUP 70
INTERNATIONAL

11 September 2008



1 SURVEY PLAN - EXISTING
SCALE: 1" = 20'-0"

C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

EXISTING SITE SURVEY

GROUP 70
INTERNATIONAL

11 September 2008

C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

SITE PLAN

GROUP 70
INTERNATIONAL

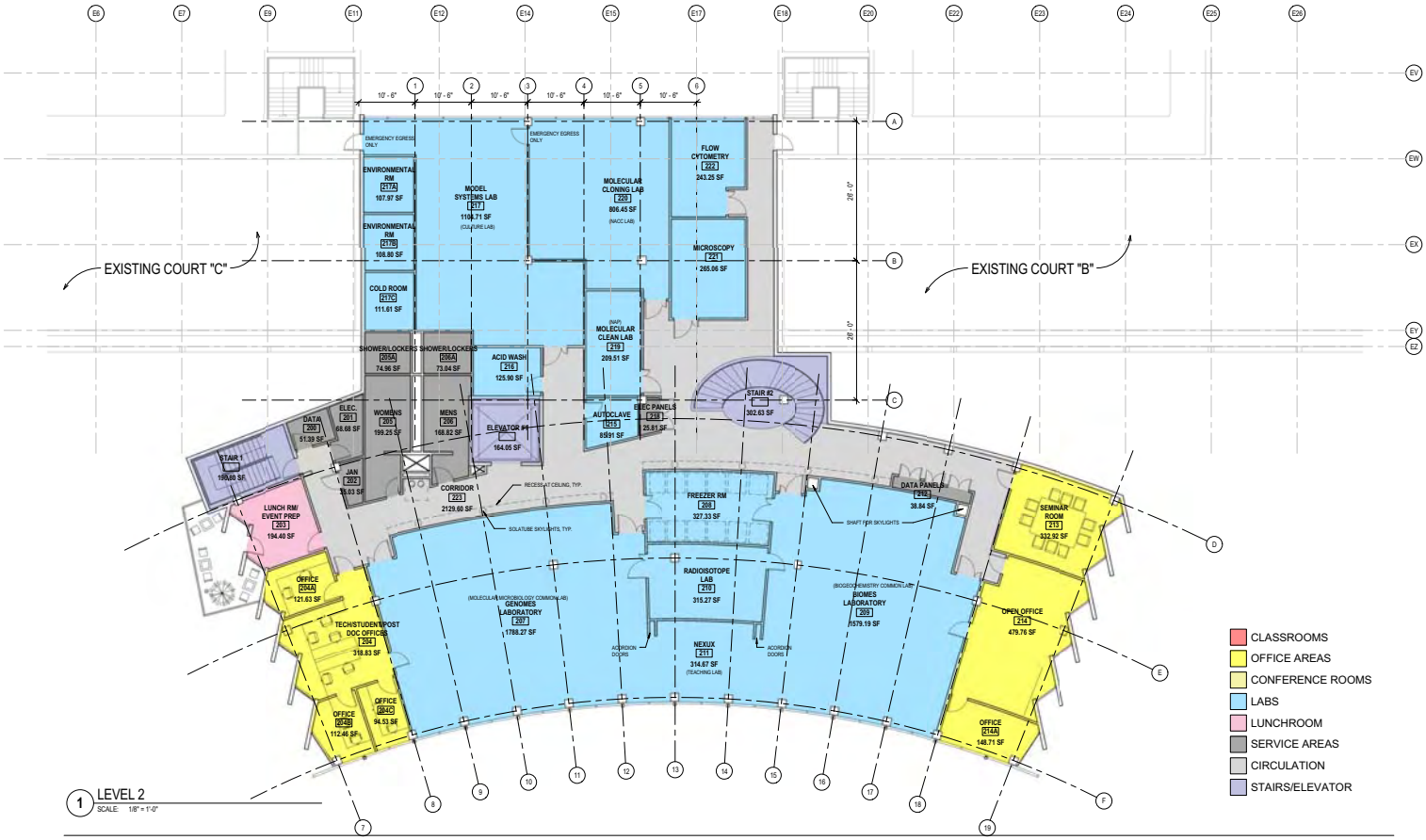
11 September 2008

C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

FIRST FLOOR

GROUP 70
INTERNATIONAL

11 September 2008

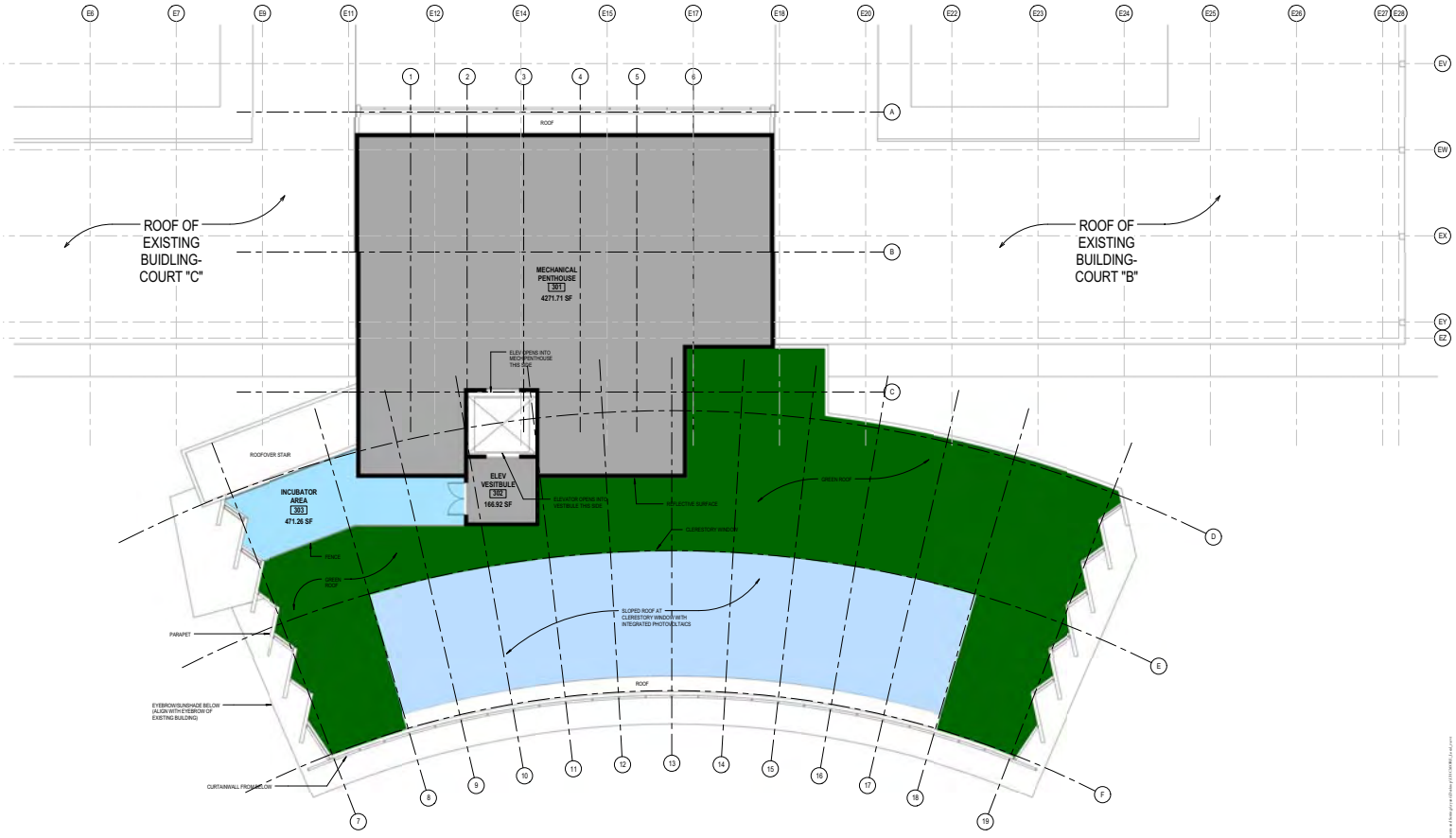


C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

SECOND FLOOR

GROUP 70
INTERNATIONAL

11 September 2008

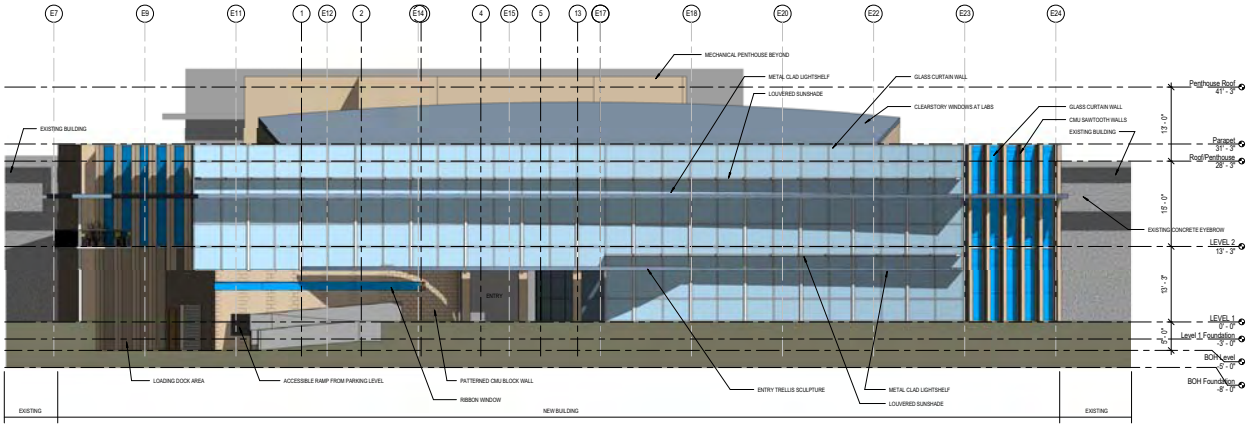


C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

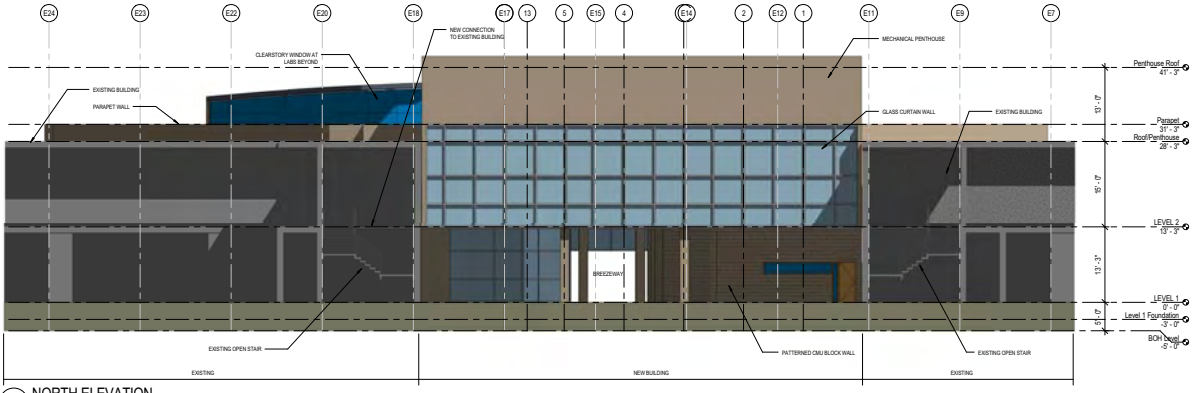
ROOF/PENTHOUSE PLAN

GROUP 70
INTERNATIONAL

11 September 2008



1 SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



2 NORTH ELEVATION
SCALE: 1/8" = 1'-0"

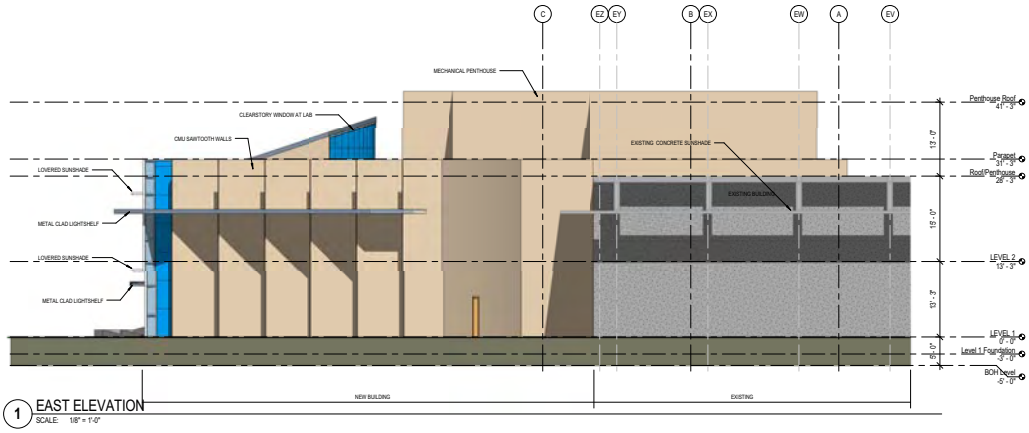
C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

NORTH & SOUTH ELEVATION

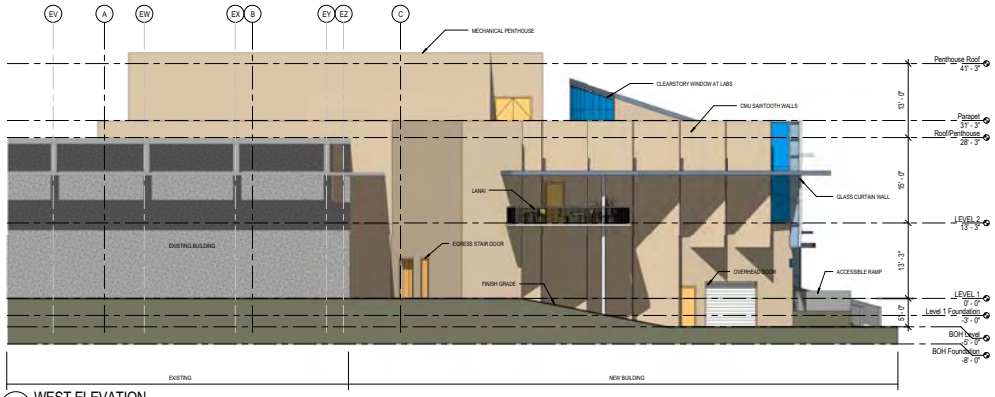
THESE IMAGES REPRESENT GENERAL MASSING AND EXTERIOR ARCHITECTURE TO A SCHEMATIC DESIGN LEVEL. COLORS AND MATERIALS ARE UNDER DEVELOPEMENT AND ARE SUBJECT TO CHANGE.

GROUP 70
INTERNATIONAL

11 September 2008



1 EAST ELEVATION
SCALE: 1/8" = 1'-0"



2 WEST ELEVATION
SCALE: 1/8" = 1'-0"

C-MORE HALE, BIOMEDICAL SCIENCES BUILDING,
RESEARCH FACILITY ADDITION

EAST & WEST ELEVATIONS

THESE IMAGES REPRESENT GENERAL MASSING AND EXTERIOR ARCHITECTURE TO A SCHEMATIC DESIGN LEVEL. COLORS AND MATERIALS ARE UNDER DEVELOPEMENT AND ARE SUBJECT TO CHANGE.

GROUP 70
INTERNATIONAL

11 September 2008

Attachment D
Visual Exposition of Existing Conditions
Biomedical Science Building

This visual exposition incorporates photos taken during three separate site visits to the Biomedical Science Building at the University of Hawai'i Mānoa Campus. Visits to the site were conducted on November 15, 2006, August 5, 2008, and October 3, 2008.

Photos containing construction fencing and materials were taken during the most recent October visit. The Biomedical Science Building has recently undergone renovations for basic maintenance of the building. The photos used for purposes of this submittal were chosen based on the ability to reflect the existing conditions of the building and its place on the Mānoa Campus. The exposition is catalogued by views from each major direction

Southern Entrance View of the Biomedical Science Building

Figure 1 – South Exterior View of Biomedical Science Building

Figure 2 – Southeast View of South Exterior of Biomedical Science Building

Figure 3 – Southeast View of South Exterior/Entry of Biomedical Science Building

Figure 4 – Southeast view of South Exterior/Entry of Biomedical Science Building

Figure 5 – Southwest View of South Exterior/Entry of Biomedical Science Building

Figure 6 – View from South Entrance of Biomedical Science Building to Adjacent Parking Lot

Figure 7 - Interior View of Biomedical Science Building Facing South Entry

Figure 8 - Interior View of Biomedical Science Building Facing South Entry – Interface of South Entrance Walls

Figure 9 – View of South Entrance Interior Walls of Biomedical Science Building

Western View of the Biomedical Science Building

Figure 10 – West Exterior View of Biomedical Science Building Looking North

Figure 11 – Interior View of Biomedical Science Building from West Entrance – Limitation for Development

Figure 12 – Basement Hatch Located in Interior Courtyard of West Entry of Biomedical Science Building - Limitation for Development

Northern View of the Biomedical Science Building

Figure 13 – North Exterior View of Biomedical Science Building – Back of House Infrastructure Limitation for Development

Figure 14 – Interior View of Biomedical Science Building from North Entrance – Limitation for Development

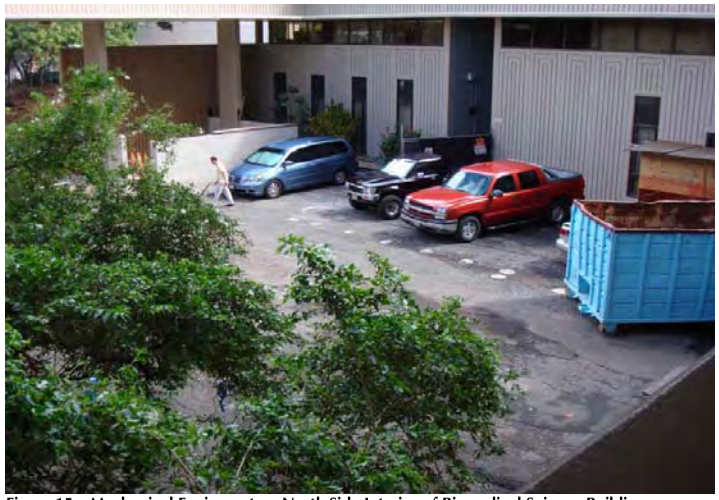


Figure 15 – Mechanical Equipment on North Side Interior of Biomedical Science Building – Limitation for Development

Eastern View of the Biomedical Science Building

Figure 16 – East Exterior View of Biomedical Science Building

Figure 17 – View of Institute for Biogenesis Research on East Side Exterior of Biomedical Science Building - Existing Alteration

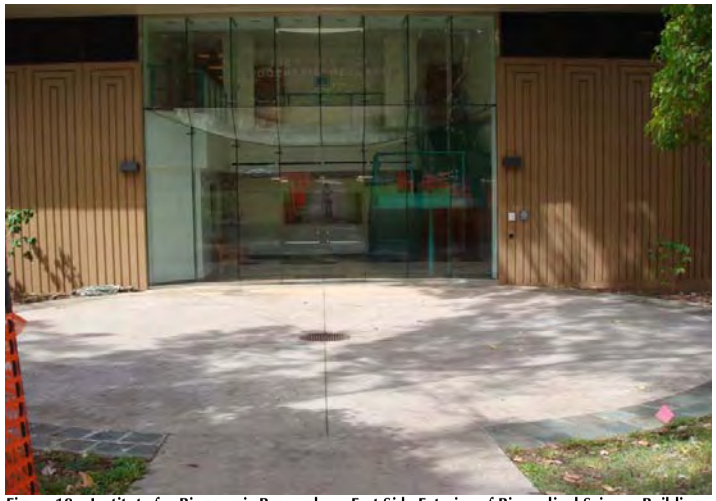


Figure 18 – Institute for Biogenesis Research on East Side Exterior of Biomedical Science Building

Figure 19 – Aerial View of Biomedical Science Building – Existing Alteration (Fill-in) of Interior Courtyards A and B (East End), Institute for Biogenesis Research

Attachment E
Copy of Waihona Database File of Land Commission Awards, Royal Patents, and Land Grants for Project Area

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DOCUMENT DELIVERY

Mahele Database Documents

Number: 00819

Claim Number:	**00819**
Claimant:	**Beckley, George**
Other claimant:	Fayerweather, A.H. attorney
Other name:	Pekele, Keoki
Island:	**Oahu**
District:	**Kona**
Ahupuaa:	**Manoa**
Ili:	

Apana:	**1**	Awarded:	**1**
Loi:		FR:	111v2
Plus:		NR:	
Mala Taro:		FT:	**349,353v2**
Kula:		NT:	
House lot:		RP:	**4546**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**

Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	**Fayerweather, attorney for Beckley heirs, See 818**

No. 819, G. Beckley heirs
[See 118 for documents]

[Award 819; R.P. 4546; Wailele Manoa Kona; 1 ap.; 36.1 Acs; no separate documents; See all documents under Award 817]

Land Grants Documents

Grant Number(LG)	**24**	Source Book:	**1**
Grantee:	**Metcalf, Theophilis**	Acreage::	**4.86** Acs
Ahupua`a	**Honolulu, Kewalo/Manoa, Kauwalaa**	Year	
District:	**Kona**	Cancelled	**False**
Island	**Oahu**	TMK	
Miscellaneous			

No. 24, Metcalf, Theophilos, Manoa Ahupuaa, District of Kona, Island of Oahu, Vol. 1, pps. 50-51
[LG Reel 1, 00068-00069]

No. 24
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Theophilos Metcalf, his faithful and loyally disposed subject for the consideration of Five Dollars, paid into the Royal Exchequer, all that certain piece of Land situated at Manoa Valley, in the Island of Oahu, and described as follows:

No. 36.
Commencing at stake at East corner of the Wailele Survey for Bishop Maigret, and running South 33° 30' West 13 Chains 19 10/12 feet along Wailele to rock marked +, South corner of kalo patch by auwai, the West corner of this land, thence
South 85° East 6 Chains 27 8/12 feet across Kauwalaa to West corner of old stone wall, little mauka of houses, thence
North 13° East 11 Chains 13 10/12 feet across Komokahi (Paki's) to stake by stone wall at East corner of this land, thence
North 62° 30' West 1 Chain 62 feet along Pamoa to place of commencement.

Containing 4 86/100 Acres, more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Theophilos Metcalf, his Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this 15th day of July 1847.

Received of T. Metcalf the sum of $5, for the above Land
Treasury Office July 17th 1847

For the Minister of Finance, William Jarrett

[Page 51]

Helu 24
Palapala Sila Nui

Ma keia palapala sila nui ke hoike nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Theophilos Metcalf i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Manoa ma ka Mokupuni o Oahu, a penei hoi ka waiho ana o na Mokuna.

Helu 36.
E hoomaka ana i ka pahu ma ke kihi Hikina o Wailele (no Makala), a e holo ana i ka Hema 33° 30' Komohana 13 Kaulahao 19 10/12 kapuai ma Wailele a hiki i ka pohaku i hoailonaia +, ke kihi Hema o ka loi kalo, a ke kihi Komohana hoi o keia aina, mailaila aku i ka
Hema 85° Hikina 6 Kaulahao 27 8/12 kapuai e moku ana i Kawalaa a hiki i ke kihi Komohana o ka pa pohaku kahiko, mauka iho o na hale, mailaila aku i ka
Akau 13° Hikina 11 Kaulahao 13 10/12 kapuai ma Komokahi (no Paki) a hiki i ka pahi kokoke i ka pa pohaku ma ke kihi Hikina o keia aina, mailaila aku i ka
Akau 62° 30' Komohana 1 Kaulahao 62 kapuai ma Pamoa a hiki i kahi e hoomaka'i ke ana ana.

A maloko o ia Apana 4 86/100 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala Elima. Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Theophilos Metcalf, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a me ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 15 o Julai, 1847.

[Land Patent Grant No. 24, Metcalf, Theophilos, Manoa Ahupuaa, District of Kona, Island of Oahu, 4.86 Acres, 1847]

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DOCUMENT DELIVERY

Royal Patents Documents

Royal Patent Number(RP)	**4546**	LCA Number:	**00819**
Patentee:	**Beckley, George, heirs of**	Book::	**18**
Island	**Oahu**	Page	**693**
District:	**Kona**	TMK	
Ahupua'a	**Manoa**	Miscellaneous	
Ili	**Wailele**		

Helu 4546, Beckley, George, heirs of, Wailele Ili, Manoa Ahupuaa, District of Kona, Island of Oahu, Volume 18, pps. 693-694 [RP Reel 10 888-889.tif] Helu 4546 Palapala Sila Nui A Ke Alii, Mamuli o Ka Olelo a Ka Poe Hoona Kuleana No ka mea, ua hooholo na Luna Hoona i ua kumu kuleana aina i ka olelo, he kuleana oiaio ko Heirs of George Beckley, Kuleana Helu 819 ma ke Ano Kuleana Nui malalo o ke Ano Alodio iloko o kahi i oleloia malalo, a no ka mea ua haawi mai lakou iloko o ka Waihona dala o Ke aupuni i na dala he Kanalinia ($50.00). Nolaila, ma keia Palapala Sila Nui, ke hoike aku nei o Kamehameha IV, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la nono iho, a no kona mau hope Alii ua haawi aku oia ma ke Ana Alodio ia Heirs of George Beckley, i kela wahi a pau loa ma Wailele, Manoa, Kona, ma ka mokupuni o Oahu, penei na mokuna. Commencing at North West corner of this land at corner of stone wall above & mauka of School House & running: South 49° West 8 chains 29 8/12 feet along stone wall (boundary between this & Luaalaea[)] to large Rock (X) on side of it by Pig pen; South 29° 30' West 4 chains 37 feet across hollow & to long rock (+) on top of stoney knowl [knoll]; South 45° East 3 chains along Kanewai to corner of stone wall; South 8° 41' West 5 chains 25 feet along Kanewai to stone on East and West wall (+) 12 feet below junction of walls; North 81° 30' East 55 3/12 feet along wall to angle; South 61° East 4 chains 59 1/2 feet to the boundary line between this and Waihii to slight angle in wall; South 54° East 4 chains 10 7/12 feet to angle in wall; South 51° East 8 chains 6 7/12 feet along Waihii to junction with side stone wall at South East corner of this; North 24.41 East 3 chains 10 feet along wide wall & Aipai to angle; North 20° West 5 chains 37 7/12 feet along Aipai to pile stones by old wall & water run; North 2° East 2 chains 23 feet along to large rock (+) by path, water run & kalo patch; North 35° East 13 chains 20 feet along Kauwalae to pile stones on kula of North East corner of this North 35° West 7 chains 18 « feet along Pamoa to long stone in stream (water run), extreme mauka point of this land; South 50° West 1 chain 50 2/12 feet along water run beside pali to large rock (+) below high rocky knowl [knoll]; South 82° 45' 3 chains 6 7/12 feet along near water run to rock (+) on side of it above water run to rocky point in pali; North 88° 30' West 7 chains 46 feet along pali to Knowl (rocky puu) and up it to commencement. Area 36.10 Acres Reserving Native Rights [page 694] Maloko o keia Apana 36.10 Eka a oi iki aku, a emi iki mai paha. Ua koe nae i ke aupuni na mine minerala a me na metela a pau. No Heirs of George Beckley ua aina la i haawiia ma ke Ano Alodio a no kona mau hoolina, a me kona waihona; ua pili nae ku auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio I kela manawa i keia manawa. A i mea o ikea`i, ua kau wau i ko'u inoa, a me ka Sila Nui o ko Hawaii Pae aina ma Honolulu i keia la 19 Sepetemaba, 1862. [Inoa] Kamehameha [Inoa] Kaahumanu [Inoa] L. Kamehameha [Royal Patent 4546, Beckley, George, heirs of, Wailele Ili, Manoa Ahupuaa, District of Kona, Island of Oahu, 36.10 Acres, 1862]

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DOCUMENT DELIVERY

Mahele Database Documents

Number: 00817

Claim Number:	**00817**
Claimant:	**Beckley,**
Other claimant:	Fayerweather,
Other name:	Pekele,
Island:	**Hawaii**
District:	**Kohala, North**
Ahupuaa:	**Kealahewa**
Ili:	

Apana:	**1**	Awarded:	**1**
Loi:		FR:	111v2
Plus:		NR:	
Mala Taro:		FT:	**350v2,353v2**
Kula:		NT:	
House lot:		RP:	**4548**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**

Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	**Fayerweather,**

Cl. 817, A. H. Fayerweather /or Heirs of George Beckley, Honolulu, Oahu, Hawaiian Islands, October 22, 1847, Claims 817 to 821
F.R. 111-113v2

To Honorable William Lee & others, &c, &c, &c.
Gentlemen: In pursuance of the public notice, I, as attorney for the heirs of the late George Beckley, beg leave to present the following claims of the said heirs.

Cl. 1. To one farm with the fishing grounds attached called Kealahewa, situated in the district of Kohala, Island of Hawaii, given to said George Beckley by King Kamehameha Ist about or in the year 1811, subject to the division made, or to be made, of such lands as are held under like circumstances.

818 - Cl. 2. Also to one farm with the fishing grounds attached called Kaliheawa, situated in Kalihi, Island of Oahu, given to the said George Beckley by Keopuolani about or in the year 1815, subject to the division made or to be made of such lands as are held under like circumstances.

Both of the above named farms with fishing grounds attached have been in the uninterrupted possession of the said George Beckley and his heirs from the time they were given; the said George Beckley to the present time.

819 - Cl. 3. Also to one farm called Kawailole, situated at the mouth of the valley of Manoa, Island of Oahu, sold to the said George Beckley by Kalaimoku (then Governor of Oahu) about or in the year 1815 and was in the uninterrupted possession of the said George Beckley and his heirs until 1827, when on 7th day of March 1827, said farm was left to Richard Charlton by Poki, Governor of Oahu, for the term of 28 years, to be returned to the heirs of the said George Beckley at the expiration of said term.

820 - Cl. 4. Also to one premises situated in Honolulu, Island of Oahu, given to the said George Beckley by the King Kamehameha I about or in the year 1819, which premises have been enclosed, built upon and occupied by the said George Beckley an his heirs ever since that time. Said premises are bounded:

On the northwest side by the public street
On southwest and southeast by premises of natives and a lot of ground at present occupied by John Voss.

821 - Cl. 5. Also to one premises situated in Honolulu, Island of Oahu, given to the heirs of said George Beckley by the authority of Honolulu, in place of a piece of ground cut off from the premises (received of King Kamehameha I in 1819) as above named, at the time said authorities altered and improved the streets of Honolulu; now in the undisputed possession of the said heirs and under them, in occupation of John Sweetman. Said premises are bounded:

On southeast side by the public street
On southwest by premises owned by Samuel Thompson
and northwest and northeast by premises of natives.

Signed, &c, A.H. Fayerweather
Attorney for the Heirs of George Beckley

F.T. 349-351v2
Cl. 817 to 821, A.H. Fayerweather for Heirs of George Beckley, 19 June.

No. 817, 818, 819. The Heirs of George Beckley, viz[?] Ahia (Widow of Beckley) William Beckley, Maria Beckley (wife of Kamakahonu), Abram (infant child of Nancy Beckley), Mary Beckley (wife of A.H. Fayerweather), George Frederick Beckley (absent from the Islands since 1834 and last heard from in 1841 at Valparaiso), Marie Beckley (wife of George W. Punchard).

A.H. Fayerweather, as attorney for the heirs, stated that the land comprised in these three claims were given by

the King (at the late division of lands) to the heirs of Beckley without any division, and that he had presented a certificate to this effect to the President of the Board which could not be found: case postponed until another can be obtained). He further stated that in the late division, the King left these lands untouched, and took three other lands on Hawaii called "Muliwai" in "Waipio." "Waaloaa," or Kihapai and Pualoalo in Kohala (See William Beckley's claim No. 976). [See other numbers 818-821 for rest of documents]

F.T. 353-354v2
Cl. 817 to 821, A.H. Fayerweather, resumed from page 350, June 21

A true copy. Richard Charlton, Waohoo March 7, 1827

Received of Mr. Richard Charlton the sum of five hundred dollars ($500) for which he is to have the full and entire use of the Estate known by the name of Wyderry free of all taxes, charges or quit rent or labor demanded of the men on said estate for the term of twenty-eight years from the date hereof.
Witness, Signed, Frand ete Paulu Marin, Signed, Boki.

Ko William Beckley a me na Hooilina o George Beckley.
Kaliawa Ili no Kalihi Kona, Oahu.
Wailele Ili no Waikiki
Kealahewa ahupuaa Kohala Hawaii
E hoona i ke kuleana.
P.S. Kalama, Kakauolelo
Hale Alii, 10 February 1848

In the name of God Amen.
I, George T. Beckley, being of weak body but of sound mind and memory, do hereby make and declare my last will and testament. First, I bequeath unto my children and to the mother of my children all my personal property and all the lands I now hold under the Government of these islands, to be equally divided among them, and it is my wish that the mother of my children may have the management of the same until my eldest son is of age and then it is my wish and will that my eldest son, William, may have the management direction of the same. Second, I wish that my son, William may be under the direction of the young King, and in case he, my son William, may wish to go to the Spanish main, it is my desire that he may go and return again to these islands.

Third. I wish My daughters to be under the direction and guardianship of Captain Alexander Adams, to do and advise (for them as he may think fit & proper) and I request my executor to have my body decently interred in the house I have commenced building as he may think most advisable.
And I hereby appoint Captain Alexander Adams to be my executor of this my last will and testament. (original without staps [stamps?]) (JHL)
Oahu, Sandwich Islands, April , 1826
(Signed) George Beckley.
Witness:
(Sd [signed]) J. Temple, (Sd) W. Hamilton, (Sd) George Fife

(Note: Lease of lands from heirs of Beckley to John Sweetman and dated 20 November 1847, returned on account of irrelevancy with the province of the Land Commissioners.)

[Award 817; R.P. 4548; Kealahewa 2 Kohala; 1 ap.; 182.8 Acs; See Oahu award for continuation of foreign testimony documents]

Attachment F
Selected Record of Edward D. Stone's Prominent Works

EDWARD STONE NOTABLE WORKS

Building	Year Construction Completed
Radio City Music Hall, New York	1932
Mandel House, Mount Kisco, New York	1934
Museum of Modern Art, NY	1939
El Panama Hotel in Panama City	1946
University of Arkansas Medical Sciences	1951
Stanford University Medical Center	1955
North Carolina State Government Legislative Building	1963
National Geographic Society Headquarters	1964
State University New York- Albany	1964
Beckman Auditorium, California Institute of Technology	1964
General Motors Building	1964
New Town Center, Hyattsville, Maryland	1964
Museum of Arts and Design NY	1965
World Trade Center of New Orleans	1965
Presidential Palace, Islamabad, Pakistan	1966
Busch Stadium St Louis	1966
Kennedy Center for Performing Arts, Washington DC	1971
Georgetown University Law Center	1971
Aon Center (formerly Standard Oil Building)	1972
W.E. Dubois Library, Univ of Massachusetts	1973

Radio City Music Hall 1932

Mandel House, Mount Kisco, New York 1934

Museum of Modern Art, NY 1939

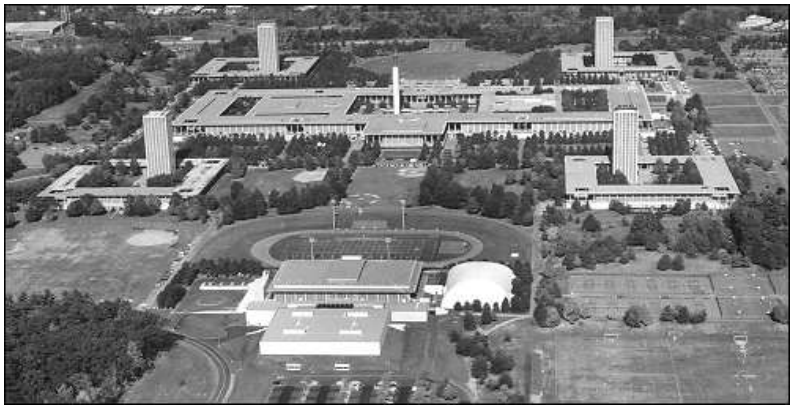
El Panama Hotel in Panama City 1946

University of Arkansas Medical Sciences 1951

Stanford University Medical Center 1955

North Carolina Legislative Building 1963

National Geographic Society Headquarters



State University New York- Albany 1964

Beckman Auditorium, California Institute of Technology 1964

General Motors Building 1964

General Motors Building 1964

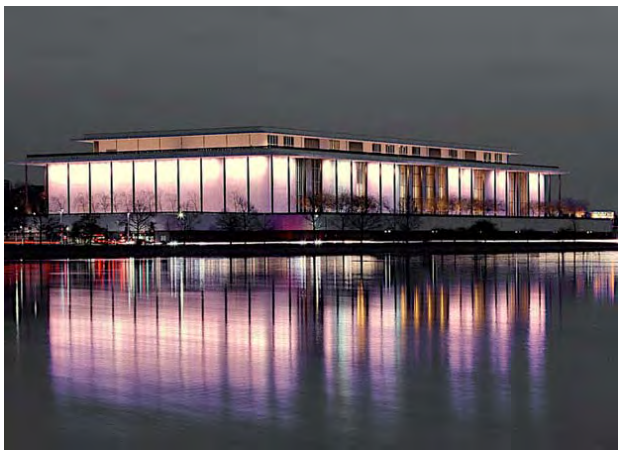
New Town Center, Hyattsville, Maryland 1964

Presidential Palace, Islamabad, Pakistan 1966

World Trade Center New Orleans 1965

Museum of Arts and Design NY 1965

Busch Stadium St Louis 1966



Kennedy Center for Performing Arts, Washington D.C. 1971

Georgetown University Law Center 1971

Aon Center 1972

W.E. Dubois Library, Univ of Massachusetts 1973

Archaeological Literature Review and Field Inspection Report for the University of Hawai‘i at Mānoa Long Range Development Plan Project Mānoa [Waikīkī] Ahupua‘a, Kona District, O‘ahu Island

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Prepared for

Group 70 International

Prepared by

David W. Shideler, M.A.

and

Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.

Kailua, Hawai‘i

(Job Code: MANOA 15)

May 2008

O‘ahu Office
P.O. Box 1114
Kailua, Hawai‘i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
16 S. Market Street, Suite 2N
Wailuku, Hawai‘i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Archaeological Literature Review and Field Inspection Report for the University of Hawai‘i at Mānoa Long Range Development Plan Project, Mānoa Ahupua‘a, Kona District, O‘ahu Island, TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004
Date	May 2008
Project Number (s)	Cultural Surveys Hawai‘i (CSH) Job Code MANOA 15
Investigation Permit Number	The field inspection was conducted under archaeological permit number 08-14 issued by the Hawai‘i State Historic Preservation Division (SHPD), Department of Land and Natural Resources (DLNR), per Hawai‘i Administrative Rules (HAR) Chapter 13-282.
Project Location	The Mānoa Campus occupies some 304 acres of land in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mō‘ili‘ili and McCully communities. Its principal physical borders are the Mānoa residential community on the *mauka* (inland) side, the Wa‘ahila Ridge on the Koko Head side, the H-1 Interstate Highway on the *makai* (seaward) side, and the lower Mānoa and McCully residential communities on the ‘Ewa (west) side. The project area is depicted on a USGS topographic map, Honolulu 1998 quadrangle (see Figure 1)
Land Jurisdiction	State of Hawai‘i
Agencies	SHPD and the University of Hawai‘i (UH)
Project Description	The 2007 Long Range Development Plan (LRDP) focuses on projects that are on the Capital Improvement Program and/or are anticipated for development within the next 5-10 years. At this time, a total of at least seventeen (17) new buildings and/or building expansions are included in the LRDP (see Figure 4).
Project Acreage	Approximately 304 acres
Area of Potential Effect (APE)	The Area of Potential Effect (APE) consists of the entire approximately 304-acre campus.
Historic Preservation Regulatory Context	This study is intended as a planning document to facilitate good stewardship of historic properties, and to streamline compliance with SHPD requirements as may attend future development.
Fieldwork Effort	CSH archaeologists Chris Monahan, Ph.D. and Jon Tulchin, B.A. conducted the fieldwork on May 14, 2008; total of 10 person hours.

Results	The following historic properties located within the boundaries of the UH campus have previously been assessed as eligible for the Hawai‘i Register of Historic Places (HRHP): 1. The historic core of the campus (State Inventory of Historic Properties [SIHP] No. 50-80-14-1352), consisting of Hawai‘i Hall, George Hall, Dean Hall, Gartley Hall, Crawford Hall, Varney Circle, Founder’s Gate, Andrew’s Outdoor Amphitheater, Wist Hall and the Pineapple Research Center. These historic structures were added to the HRHP in 1984. 2. Kānewai Cultural Garden (SIHP No. 50-80-14-4498), consisting of modern surface features (irrigation ditches feeding into taro pondfields) overlying centuries-old deposits consistent with a long history of cultivation. It is also important to state the nearby “Dole Street burials” documented by CSH (Hammatt and Shideler 1991) are reburied on the grounds of the Center for Hawaiian Studies. 3. SIHP No. 50-80-14-4191, a traditional-style presumably pre-Contact-era burial discovered during construction activities at Keller Hall (Smith and Kawachi 1991). The following historic properties located within the boundaries of the UH campus have not been previously assessed for eligibility for the HRHP: 1. Koana Cave, which has never received a site number designation, has previously yielded human skeletal remains (accessioned by the Bishop Museum in the 1960s), and probably contains as yet undiscovered historically-significant cultural materials consistent with habitation and / or gardening. 2. Hipawai Heiau, designated by McAllister (1933) as “Site 63,” reported as “torn down” earlier by Thrum; CSH archaeologists may have identified a remnant section of stone wall associated with this *heiau* located just outside the boundaries of the UH property. In addition to the aforementioned historic properties located on the UHM campus, two areas containing possible rockshelters were identified during the course of the subject field inspection. As explained in detail above, additional testing (controlled archaeological excavations) would be needed to more accurately determine whether these possible rockshelters contain any historically-significant cultural materials.

Recommendations	CSH also offers the following specific recommendations: 1. Alterations to, or near, the historic structures included in SIHP No. 50-80-14-1352 should be assessed by a qualified Architectural Historian. 2. Any major ground disturbance at Kānewai Lo‘i should be preceded by additional archaeological testing and / or should be conducted in association with monitoring by a qualified Archaeologist, in consultation with the Center for Hawaiian Studies. 3. Given the Keller Hall burial discovery (SIHP No. 50-80-14-4191), in particular, it is possible that as yet undiscovered burials may still be present at some locations on the UHM campus; however, it is fairly difficult to predict with any specific certainty where burials might occur. CSH recommends consultation with the SHPD on future excavation projects on the UHM campus. 4. Koana Cave should be formally assessed by a qualified Archaeologist and assigned a State Site number. Given reports of human skeletal remains from this cave, it should also be preserved and protected from those who might disturb or desecrate its contents. Archaeological testing (excavation) of the cave would have to be balanced against the possibility of encountering / discovering additional human skeletal remains. 5. No further work is recommended for the rock wall remnant that may be a portion of the Hipawai Heiau; however, should deep excavation or major development be planned for the adjacent Magoon Property, against which the wall remnant rests, archaeological monitoring or preliminary subsurface testing (excavation) might be warranted in order to ensure that no historically-significant cultural resources associated with the old *heiau* are damaged. Thrum’s comments in reference to Hipawai Heiau, made approximately 100 years ago (see Sterling and Summers 1978:286), are instructive: “…partly destroyed many years ago, then used as a place of burial.” 6. Finally, if the Wa‘ahila Ridge area is slated for major development, the two possible rockshelter areas should be subject to formal archaeological inventory, including subsurface testing (excavation), prior to any substantial ground disturbance.

Table of Contents

Management Summary ..... **i**

Section 1 Introduction **1**

1.1 Project Background 1
1.1.1 Project Location and Site Characteristics 1
1.1.2 Description of the Proposed Project 1
1.1.3 Overview of Need 6
1.2 Scope of Work 6
1.3 Environmental Setting 7
1.3.1 Natural Environment 7
1.3.2 Built Environment 9

Section 2 Methods **10**

2.1 Field Methods 10
2.2 Laboratory Methods 10
2.3 Document Review 10
2.4 Consultation 10

Section 3 Traditional Background **11**

3.1 Mānoa Place Names and Legendary Sites 11
3.2 Agriculture in Mānoa Valley 15
3.3 Legendary Associations 15
3.3.1 Legends Associated with Streams, Springs and Pōhaku 15
3.3.2 Legends Associated with Hills, Peaks, Ridges and Caves 16
3.3.3 Other Legandary Associations 16

Section 4 Historical Background **21**

4.1 Early Ownership and Use of Mānoa Valley 21
4.2 Mid Nineteenth Century and Land Commission Awards 23
4.3 The University of Hawai‘i at Mānoa Land Commission Awards 32
4.4 1900s to Present 39
4.5 Prominent Historic Structures 47
4.5.1 Mānoa Chapel and Cemetery of Kawaiaha‘o Church 47
4.5.2 Punahou School (Originally O‘ahu College) 47
4.5.3 Sacred Heart Church at Punahou 48
4.5.4 Wai‘oli Tea Room of the Salvation Army 48
4.5.5 Chinese Cemetery 49
4.5.6 Lyon Arboretum 50
4.6 Mō‘ili‘ili Quarry 51
4.7 Early Years of the University of Hawai‘i at Mānoa 51

Section 5 Mānoa Previous Archaeological Research **56**

5.1 Heiau of Mānoa 56
5.1.1 Kūka‘ō‘ō Heiau 56
5.1.2 Kawapōpō Heiau 60

5.1.3 Hakika Heiau 61
5.1.4 Hipawai Heiau 61
5.1.5 Mau‘oki Heiau (Kamō‘ili‘ili Heiau) 64
5.2 Early Archaeological Surveys of Mānoa Valley 65
5.3 Post 1960 Surveys of Mānoa Valley 69
5.4 Division of Mānoa Valley 75

Section 6 Results of Fieldwork **76**

6.1 Kānewai Lo‘i 76
6.2 Koana Cave 78
6.3 Wa‘ahila Ridge 82
6.4 Hipawai Heiau 84

Section 7 Summary and Interpretation **86**

7.1 Historic Properties in the Project Area 86
7.2 Recommendations 87

Section 8 References Cited **89**

List of Figures

Figure 1. USGS topographic map, Honolulu 1998 quadrangle, showing University of Hawai‘i at Mānoa campus lands....2
Figure 2. Map showing Tax Map Keys [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004....3
Figure 3. Aerial photograph of University of Hawai‘i at Mānoa campus lands....4
Figure 4. Long Range Development Plan 2007 Update....5
Figure 5. Soils map of University of Hawai‘i at Mānoa....8
Figure 6. 1929 Photograph of the Inter-Island Airway’s amphibian plane, *Hawaii*, passing over Mānoa Valley (Hawai‘i State Archives)....12
Figure 7. Early nineteenth century trails on the southwest coast of O’ahu (illustration from ‘Ī‘ī 1959:93), showing locations of some place names in Mānoa....13
Figure 8. Outline of 1882 map by E. D. Baldwin, showing topographic points and traditional land units in Mānoa Valley....14
Figure 9. Waterfalls in the back of Mānoa Valley as seen from Kanānā (photograph from Bouslog et al. 1994:4)....17
Figure 10. Kua‘io o Mānoa Pōhaku at Wailele Spring (from Bouslog et al. 1994:134)....18
Figure 11. Kapunahou Spring (photograph from Bouslog et al. 1994:132)....19
Figure 12. Possible (approximate) locations of Puka‘ōma‘oma‘o, house of Queen Ka‘ahumanu (tracing from 1882 map of Mānoa Valley, surveyed by E. D. Baldwin)....20
Figure 13. Kotzebue map of 1817 showing vicinity of project area (should be understood as somewhat schematic)....24
Figure 14. LaPlace map of 1855 showing vicinity of project area (should be understood as somewhat schematic....25
Figure 15. 1882 E. D. Baldwin map, showing Land Commission Awards and Grants in Mānoa Valley....26
Figure 16. *Makai* portion of 1882 E. D. Baldwin map with Land Commission Awards outlined in red....27
Figure 17. 1847 Hawaiian Government Survey map; surveyed by Theophilus Metcalf....28
Figure 18. 1881 Oahu Island Government Survey map....34
Figure 19. 1882 E. D. Baldwin map showing vicinity of project area....35
Figure 20. 1887 W. E. Wall map showing vicinity of project area....36
Figure 21. 1897 M.D. Monsarrat map showing vicinity of the project area....37
Figure 22. 1899 O‘ahu Island map showing vicinity of project area....38
Figure 23. Checkerboard taro fields on the floor of Mānoa Valley....40
Figure 24. 1919 Fire Control map showing vicinity of project area....41
Figure 25. 1927 US Geological Survey map showing vicinity of project area....42
Figure 26. 1938 map showing vicinity of project area....43
Figure 27. 1943 War Department map showing vicinity of project area....44
Figure 28. 1953 U. S. Geological Survey map showing vicinity of project area....45
Figure 29. 1956 map showing vicinity of project area....46
Figure 30. 1866 Photograph of Punahou School, Photograph attributed to Charles Burgess (photograph from Foster 1991:32)....49

Figure 31. Entrance to Line Yee Chung Chinese Cemetery in Mānoa (photograph from Bouslog et al. 1994)....50
Figure 32 View of the campus in 1917 from Wa‘ahila Ridge (Adapted from Kobayashi 1983:23) showing the two permanent buildings, Hawaii Hall (1912) is at center, the beginnings of the Young Engineering quad (still 4/5 intact by the present Campus Center) is at left of the relocated wooden building moved up from Young Street....53
Figure 33. 1926 aerial photograph showing seaward end of present University Avenue ending at Metcalf St. (at extreme left), the brand new George Hall (1925) inland of Gartley Hall (1922; center), with Hawaii Hall (1912) at right and the Cooke Field Track (vicinity of present Sinclair Library) in the fore. The future Bachman Hall area is still in farm plots.54
Figure 34. 1929 aerial photograph showing the western half of the present campus still in fields but University Avenue has now been extended seaward (extreme left, middle) and there has been significant clearing seaward of the Cooke Field track associated with construction of the original Gym (1928) just NW of the present Bachman Hall....54
Figure 35. 1939 aerial photograph showing the campus dominated by the old quad (lower right) of Hawaii (1912), Gartley (1922) George (1925) and Dean (1929) and the new Crawford Hall (1938). The brand new Hemenway Hall (1939) is just seaward and old Gilmore Hall (1935-1973) with its two wings anchors the east end of campus at left....55
Figure 36. In this 1949 aerial photograph the campus is dominated by the central Hemenway Hall (1938), the old Gym and the on-going construction for Bachman Hall are near University and Dole streets, the University Farms still dominate the eastern campus....55
Figure 37. Overlay of 1822 E.D. Baldwin map of Mānoa Valley on modern street map, showing possible *heiau* locations....57
Figure 38. 1908-1913 Corps of Engineers Fire Control map, showing L-shaped structure, possibly Hipawai Heiau, on land later *mauka* of the St. Francis High School Campus....63
Figure 39. 1883 S.E. Bishop map of Pa‘akea, showing location of a *heiau* near Mauoke Spring 66
Figure 40. Project area (in red) in relationship to archaeological sites identified in Sites of O‘ahu (Sterling and Summers 1978)....67
Figure 41. Circa 1900 photograph of artifacts displayed at Punahou College including the wooden idol (left foreground) possibly found in a cavern in Rocky Hill....68
Figure 42. Previous archaeological studies in the vicinity of the project area....70
Figure 43. Previously identified archaeological sites in Mānoa Ahupua‘a (project areas with no identified sites are denoted by author and year of report)....71
Figure 44. Podmore map (1916 or 1917) of the boundary between the *‘ili* of Waahila and Kanewai showing an *‘auwai* and a “cave called Koana.” The field sections in the center of the image represent the present-day Kānewai cultural garden....72
Figure 45. Upstream end of the main *‘auwai* at Kānewai (facing downstream); red arrow indicates the approximate location of the *po‘owai* (“head” of the ditch)....77
Figure 46. Stone walkway between the main *‘auwai* (left) and the Mānoa Stream (right), facing downstream, approaching the Dole Street Bridge....77
Figure 47. Overview of the central portion of the Kānewai Cultural Garden....78
Figure 48. GPS locations of major sites and features described in the results section....79
Figure 49. GPS locations of major sites and features described in the results section....80
Figure 50. Approximate location of Koana Cave indicated by red arrow, just above Dole Street81

Figure 51. Main chamber of Koana Cave 82
Figure 52. GPS tracking of pedestrian reconnaissance during the field inspection.....83
Figure 53. Possible rockshelter located west of the Faculty Housing complex at Wa‘ahila Ridge84
Figure 54. Stone wall remnant at the location of Hipawai Heiau, facing northwest 85
Figure 55. Stone wall remnant at the location of Hipawai Heiau, facing north-northwest 85

List of Tables

Table 1. Land Commission Awards for Mānoa Ahupua‘a (claims in bold were in or near UH)..29
Table 2. Previous Archaeological Investigations in Mānoa Ahupua‘a.....73

Section 1 Introduction

1.1 Project Background

At the request of Group 70 International, Inc., Cultural Surveys Hawai‘i, Inc. (CSH) prepared this Archaeological Literature Review and Field Inspection for the University of Hawai‘i at Mānoa’s Long Range Development Plan (LRDP). The project area consists of the entire approximately 304-acre campus located in Mānoa [Waikīkī] Ahupua‘a, Kona District, Hawai‘i. The project area consists entirely of State of Hawai‘i-owned land.

1.1.1 Project Location and Site Characteristics

The Mānoa Campus (hereafter “the campus”) occupies some 304 acres on land in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mō‘ili‘ili and McCully communities (Figures 1-3). Its principal physical borders are the Mānoa residential community on the *mauka* (north) side, the Wa‘ahila Ridge on the Koko Head (east) side, the H-1 Freeway *makai* (south) side and the lower Mānoa and McCully residential communities on the ‘Ewa (west) side. Vehicular access for the campus is from the H-1 Freeway, University Avenue, Dole Street and Old Wai‘alae Road. Public transportation is primarily provided by regular bus service on King Street, University Avenue, Dole Street and Metcalf Street. The bus service includes routes through the campus via East-West Road and Maile Way. The campus is also served by direct express bus service from the outlying communities. Current enrollment is approximately 20,000 students; including faculty and staff, the daytime population of the campus is about 30,000.

1.1.2 Description of the Proposed Project

The 2007 LRDP focuses on projects that are on the Capital Improvement Program and/or are anticipated for development within the next 5-10 years (Figure 4). Proposed projects include:

- Kennedy Theatre Expansion
- Parking Structure at Kennedy Theatre
- Instruction Building at Henke Hall Site
- Campus Center Expansion to Northeast
- Law School Expansion
- I.T.S. - Bilger Hall Addition, Phase II
- Research Space - Infill South Courtyard of Biomedical Building
- Klum Gym Replacement
- Instruction Building - College of Education
- Media Facilities at KHET Site
- Parking Structure IIB/Bookstore
- Faculty Housing – Wa‘ahila Ridge or Mauka Campus
- Research Buildings – North and East of Biomedical Building
- Research Buildings - Mauka Campus
- Johnson Hall - Replacement Dormitory
- Hale Noelani - Replacement Dormitory
- School of Hawaiian Knowledge

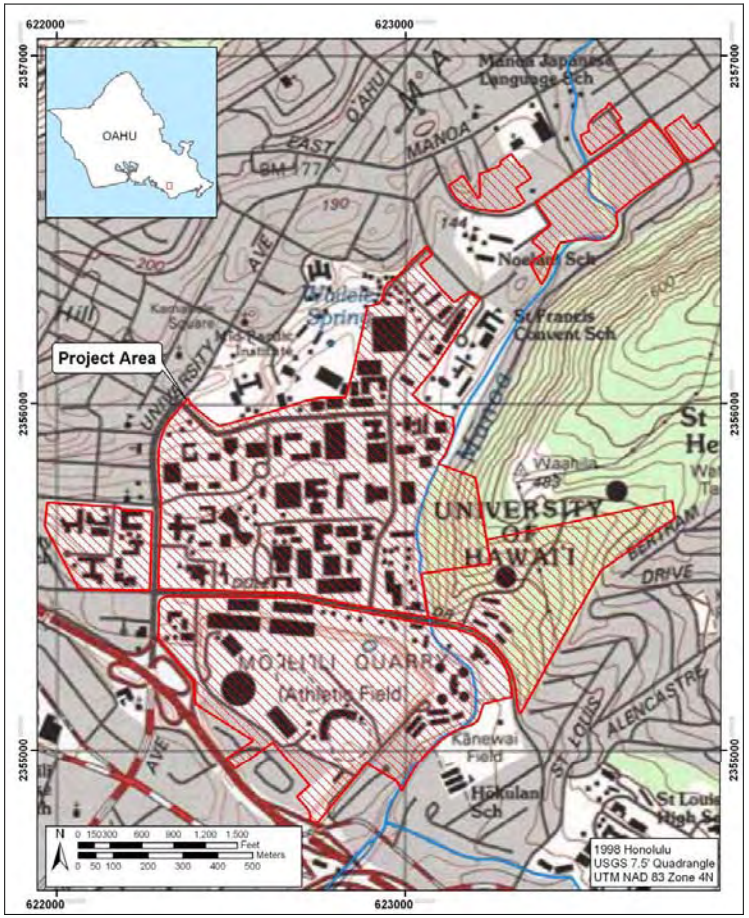


Figure 1. USGS topographic map, Honolulu 1998 quadrangle, showing University of Hawai‘i at Mānoa campus lands

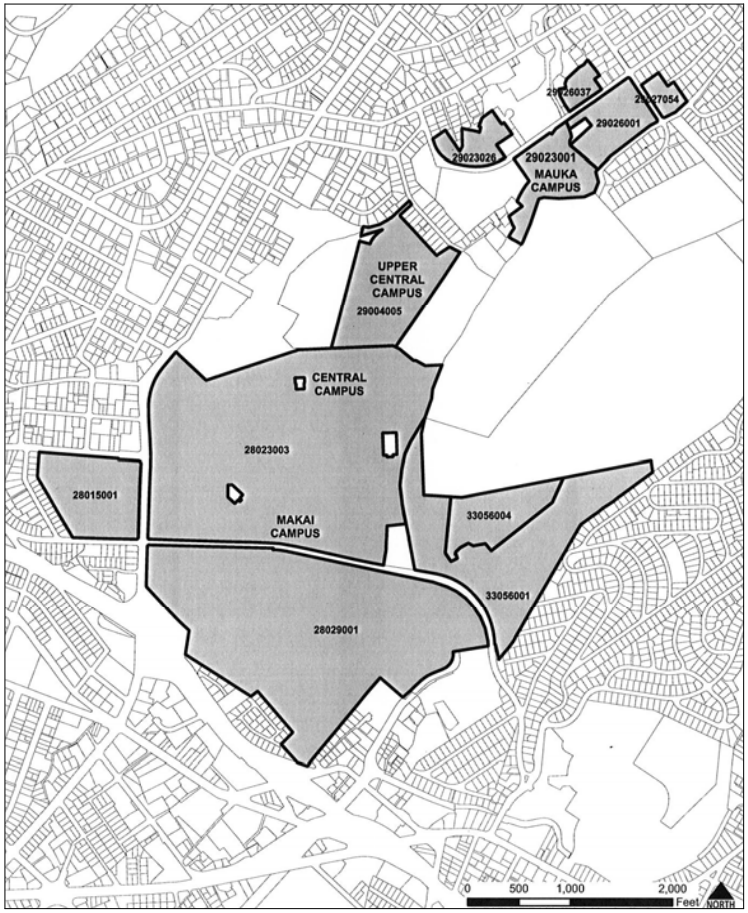


Figure 2. Map showing Tax Map Keys [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Figure 3. Aerial photograph of University of Hawai‘i at Mānoa campus lands

Figure 4. Long Range Development Plan 2007 Update

1.1.3 Overview of Need

These projects address current space and activity needs on campus. They are not based on any anticipated increase in enrollment over the next planning period. Enrollment declined from an all-time high of over 22,000 students in 1972 to a low of approximately 18,000 in 1987. Since then, enrollment has slowly increased reaching 20,644 students in the fall of 2007. Enrollment is projected to remain relatively stable through 2012, as indicated by a 2007 estimate by the University of Hawai‘i's Institutional Research Office. The anticipated opening of the new West O‘ahu Campus is also anticipated to reduce the pressure on undergraduate enrollment.

Rather than enrollment growth, campus development at the University of Hawai‘i-Mānoa (UHM) is now stimulated by current facility needs and the desire to provide a more complete campus community experience. Universities across the country have focused on enhanced environments for learning, working, and living. Campuses of the future envision uses and activities not unlike that of any vital urban center.

Graduate and research space needs will also continue to fuel growth on the Campus. In a pattern typical of other major universities, research and administrative support facilities are related to the availability of research funding rather than enrollment. Overall, extramural funding at Mānoa has increased by 50% over the past ten years. In 2003, the Top American Research Universities ranked UHM among the top 50 public universities in federal research funding. New laboratories, offices and library resources will continue to be required to support evolving graduate work and research activities.

While not all research and graduate education will be campus-bound, as evidenced by the John Burns School of Medicine in Kaka‘ako, telescopes atop Mauna Kea and research facilities on Coconut Island, the great majority of research and graduate student activities seek a direct relationship to the resources of the Campus. While distance learning and virtual teaching methods also promise changes to higher education, their immediate impact appears to be at the lower division and undergraduate level. Institutions such as UHM with large upper-division and graduate programs, successful professional schools and burgeoning research programs are anticipated to grow in-place. UHM’s challenge is to use the opportunity afforded by this growth to achieve higher levels of quality in its physical and academic environment. The 2007 Update to the LRDP will serve as guidance towards this important goal.

1.2 Scope of Work

This study was designed to address archaeological site types and locations, and allow for future work recommendations. The goal is to identify, if possible, cultural resources and historic properties and to provide recommendations related to the State of Hawai‘i’s historic review process. The agreed upon scope of work is as follows:

1. Historical research to include study of archival sources, historic maps, Land Commission Awards and previous archaeological reports to construct a history of land use and to determine if archaeological sites have been recorded on or adjacent to the subject property.

2. Limited field inspection of the project area to identify any surface archaeological features and to investigate and assess the potential for impact to such sites. This assessment will identify any sensitive areas that may require further investigation or mitigation before the project proceeds.
3. Preparation of a report to include the results of the historical research and the limited fieldwork with an assessment of archaeological potential based on that research, with recommendations for further archaeological work, if appropriate. It will also provide mitigation recommendations if there are archaeologically sensitive areas that need to be taken into consideration.

1.3 Environmental Setting

1.3.1 Natural Environment

Mānoa Valley was formed during the volcanic eruptions that formed the Ko‘olau Mountains starting about 10 million years ago. This volcanic activity and the following erosion caused amphitheater-headed, deep V-shaped valleys on the southeast coast of O‘ahu, which are separated by sharp, high ridges. The Ko‘olau volcano reactivated approximately 250,000 years ago, pouring lava into the valley. This eruption built up new cones, including Pu‘u ‘Ōhi‘a (Tantalus) in the upper valley, and lower down the smaller cones of Pu‘u Kākea (Sugar Loaf), Pu‘u ‘Ualaka‘a (Round Top) and Pu‘u o Mānoa (Rocky Hill). The erupted lava cascaded down the western ridge of Mānoa Valley. This filled in the V-shaped valley, giving it a more rounded U-shaped appearance (Bouslog et al. 1994:4-5).

According to Foote et al. (1972), soils within the campus are mostly varieties of clay loam (Figure 5). The northeast portion of the campus and most of the central campus is Makiki Stony Clay Loam (MIA) with some Tantalus Silty Clay Loam (TCC) in the northwest corner. The Wa‘ahila Ridge area north of Dole Street includes a large portion of Rock Land (rRK) as well as Kaena Very Stony Clay (KanE) and Pamoa Silty Clay (PID) soils. South of Dole Street the southeastern portion of campus includes Kawaihapai Clay Loam (KIA). The quarry area that dominates the lower campus was developed to exploit a thick dense deposit of epheline-meililite (so-called “blue stone”) basalt.

A notable feature of the dominant Makiki Stony Clay is “that there are enough stones to hinder cultivation” making up 15% of the soil by volume (Foote et al. 1972:92). Basalt outcrops are common. Several of the other soil types (rRK, KanE, PID) are described as having poor “workability” owing to the very sticky, very plastic nature of the clay. The best agricultural soil appears to be the Kawaihapai Clay Loam – which rather notably lies in a very small area where the Kānewai taro *lo‘i* (probably a traditional Hawaiian gardening complex) is located.

The Mānoa sub-basin watershed covers 6,150 acres and 12 miles of stream. ‘Aihualama, Waihī, Lua‘alaea, Nāniu‘apo, Wa‘aloa, and Waiakeakua are the tributary streams in the upper valley that merge at an elevation of 400 feet into the main Mānoa Stream. Half-way down the center of the valley, the Sugar Loaf eruption has pushed the streambed to the extreme east of the

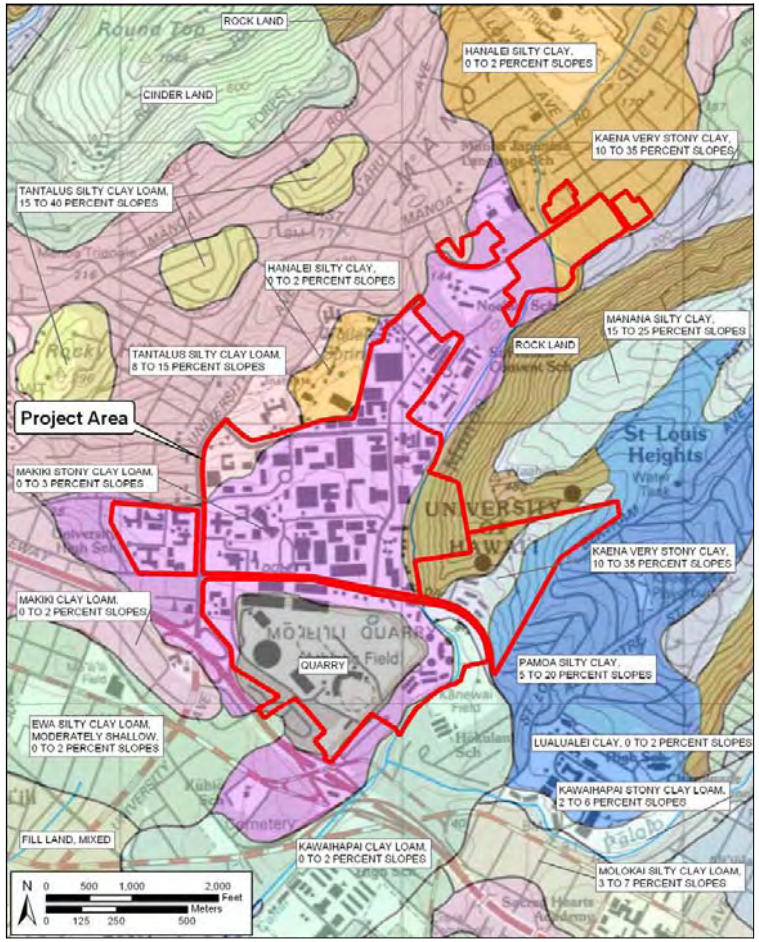


Figure 5. Soils map of University of Hawai‘i at Mānoa

valley. Before the construction of the Ala Wai Canal, the lower portion of the stream, called Kālia Stream, flowed in a westerly direction, then made a wide bend to the east where it joined the Pālolo Channel in the general vicinity of the present-day Date Street near the *mauka* side of the Ala Wai Golf Course.

Annual rainfall at the head of Mānoa Valley can reach up to 160 inches per year. At the lower boundary, rainfall is only 35 inches per year. The valley is often swept with strong winds that bring rain, including *ala‘eli*, the “cool wind of the land,” and *kākea*, a “stormy wind” (Bouslog et al. 1994:6).

Before Hawaiian settlement, the slopes of Mānoa’s ridges were probably covered with a dense forest, dominated by *‘ōhi‘a lehua* (*Metrosideros macropus*), *koa* (*Acacia koa*), and *loulu* (the native fan palm, *Pritchardia* spp.). The undergrowth would have included shrubs such as *naupaka kuahiwi* (*Scaevola* spp.), ferns such as *hāpu‘u* (*Cibotium splendens*), *‘ama‘u* (*Sadleria* spp.), and *pala‘ā* (also known as *palapala‘ā*, *Sphenomeris chinesus* syn. *chusana*), and vines such as *‘ie‘ie* (*Freycinetia arborea*) (Bouslog et al. 1994:8). Mānoa, due to its broad, well-watered valley, was probably settled early by the Hawaiians, who probably cleared much of the lower areas near streams for wetland taro cultivation.

1.3.2 Built Environment

The history of the built environment of the campus is addressed in detail in Section 4.7 (Early Years of the University of Hawai‘i at Mānoa).

Prior to the establishment of the university, and following historic-era changes in land use and ownership, the future campus was apparently a relatively dry and scruffy place: “The early Mānoa campus was covered with a tangle of *kiawe* (*Prosopis pallada*), wild lantana (*Lantana camara*) and *panini* cactus” (Kobayashi 1983:7). In 1911, “the Regents discussed what to do about seven groups of Hawaiian squatters, including one group that tilled the land, on the College’s Puahia lot” (Kobayashi 1983:7). These “squatters” homes are understood to have been rather modest. The field system (largely believed to have been fallow by the twentieth century), however, appears to have been rather developed: “The area that was to become the university farm (located on what is now the area east of Hawai‘i Hall) was made up of small fields, from one-tenth to one-fourth of an acre, each surrounded by loose rock walls” (Kobayashi 1983:7). Virtually no trace of these residences and fields is believed to be present.

Section 2 Methods

2.1 Field Methods

The field inspection was not intended to satisfy current standards for Archaeological Inventory Surveys in Hawai‘i; rather, the objective was to develop data on the nature, density, and distribution of previously undocumented or minimally documented historic properties within the allocated time of approximately 10 person hours for fieldwork. Fieldwork was conducted on May 14, 2008, by two CSH archaeologists, Chris Monahan, Ph.D. and Jon Tulchin, B.A. Field inspections were made of the following portions of the overall project area:

1. the Kānewai *lo‘i* (taro pondfields) and associated *‘auwai* system (collectively designated State Inventory of Historic Properties [SIHP] No. 50-80-14-4498);
2. Koana Cave, a possible habitation site, from which human remains were reportedly collected in the 1950s and accessioned by the Bishop Museum in the 1960s;
3. the posited location of Hipawai Heiau (designated SIHP No. 50-80-14-63) near the southern tip of TMK: (1) 2-9-023:001 (on the so-called “Mauka Campus”), and;
4. the Wa‘ahila Ridge area, located immediately east of Mānoa Stream in the lower Mānoa Valley.

Documentation included digital photography, hand-written field notes and GPS mapping. The GPS device was a hand-held Garmin GPSMap 60csx, with 3-5 m accuracy. GPS data was then projected and overlaid on topographic and aerial maps using ESRI ArcGIS v9.1 (UTM coordinate system, NAD 83 datum).

2.2 Laboratory Methods

Given the scope of work for this project, which included only limited field inspection of surface sites, no materials were collected or recovered, and no laboratory work was undertaken.

2.3 Document Review

Numerous published and unpublished accounts, surveys, maps and photographs found in public and private collections pertaining to the University of Hawai‘i at Mānoa and Mānoa Valley were investigated by CSH. Historical documents, maps and existing archaeological information pertaining to sites in the vicinity of this project were researched at the SHPD library, CSH library and the University of Hawai‘i’s Hamilton Library.

2.4 Consultation

A substantial consultation effort was undertaken for a companion Cultural Impact Assessment (CIA) of this project. No formal consultation was undertaken for the subject Archaeological Literature Review and Field Inspection; however, we were assisted in our inspection of the Kānewai *lo‘i* by its current Director, Mr. Makahiapo Cashman, who generously provided his *mana‘o* (thoughts, opinions, beliefs) and *‘ike* (wisdom, expertise).

Section 3 Traditional Background

3.1 Mānoa Place Names and Legendary Sites

The literal meaning of the word Mānoa is “wide or vast” (Figure 6). It, along with Pauoa, Nu‘uanu and Pālolo, was one of the famous “valleys of the rainbow,” as described in the legend of “The Lady of the Moon.”

> Almost all day long the valley is open to the sun, which, looking on the luxuriant verdure and clinging mist, sends its abundant blessing of penetrating light. Rainbows upon rainbows are painted on the steep precipices at the head of the valley. There are arches of exquisite beauty, smashed fragments of scattered color, broad pillars of glorious fire blazing around green branches of ghost-like trees, great bands of opal hues lying in magnificent masses on the hillside, and lunar rainbows almost circular outlined in soft prismatic shades in the time of a full moon. (Irwin 1936:18)
>
> When showers creep down the valley one by one, rainbows also chase each other in matchless symmetry of quiet, graceful motion. Sometimes the mist in the doorway of the valley has become so ethereal that splendid arches hang in the apparently clear sky without cloud support. (Westervelt 1963a:128)

O‘ahu was conquered by the Maui chief, Kahekili, in 1783 and again by Kamehameha I in 1795. It was the custom of ruling chiefs to disregard the land allocations of their defeated rivals, and thus there is little known regarding traditional (pre-1783) land tenure on O‘ahu. Mānoa is sometimes treated as a portion of the *ahupua‘a* of Waikīkī and is sometimes treated as a distinct *ahupua‘a*. Several place names within Mānoa are located on a map of early nineteenth century trails as described by John Papa ‘Ī‘ī (Figure 7).

> Our description of the trails of the royal town is finished, but we have not yet told of the trails going to lower Waikiki, Kamoiliili, and Manoa. . . . At Kawaiahao a trail passed in front of the stone house of Kaina, late father of Kikaha. The trial went above Kalanipuu’s place, along the stream running down from Poopoo to the sea, close by Kaaihee in Makiki, to Puu o Manoa, then below Puupueo, where a trail branched off to upper Kaaipu and Kahoiwai, and another to go below Kaahulue, to Kapulena [Pu‘ulena] and Kolowalu. (‘Ī‘ī 1959:92)

Figure 8 is an outline of an 1882 map of Mānoa Valley, which shows many of the place names discussed in this report section.

Figure 6. 1929 Photograph of the Inter-Island Airway’s amphibian plane, *Hawaii*, passing over Mānoa Valley (Hawai‘i State Archives)

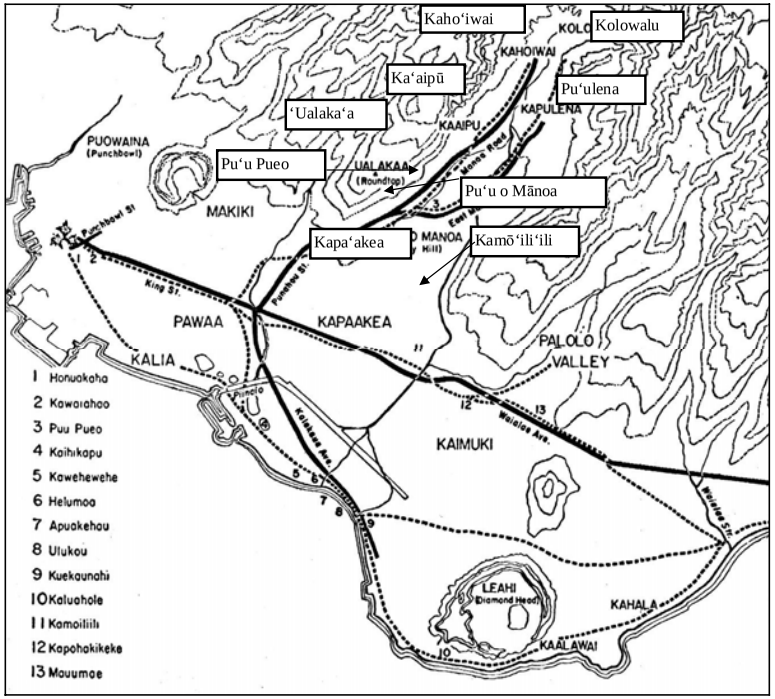


Figure 7. Early nineteenth century trails on the southwest coast of O’ahu (illustration from ‘Ī‘ī 1959:93), showing locations of some place names in Mānoa

Figure 8. Outline of 1882 map by E. D. Baldwin, showing topographic points and traditional land units in Mānoa Valley

3.2 Agriculture in Mānoa Valley

Handy’s (1940) description of Mānoa suggests it was once home to an extensive Hawaiian settlement supported by vast taro gardens:

> In upper Manoa the whole of the level land in the valley bottom was developed in broad taro flats. The terraces extended along Manoa Stream as far as there is a suitable land for irrigating…About 100 terraces are still being cultivated, but these do not constitute more than one tenth of the total area capable of being planted…Bennett…described the upper valley as “checquered with taro patches.” (Handy 1940:77)

Mānoa was home to kings and commoners as documented in legends, land records, and early maps of Honolulu. The “Indices of Awards” lists 74 Land Commission Awards in 21 named localities at Mānoa, which suggests a substantial population. Kamehameha I was attracted to Mānoa for the cultivation of food for his army. He had one house near Roundtop:

> The places Kamehameha farmed and the houses he lived in at those farms were show places. His farmhouses in Nuuanu stood several hundred fathoms away from the right side of Kapahala, a knoll on the western side of Nuuanu Street and Hanaiakamalama House. Perhaps the location was chosen to enable him to look both inland and seaward to his food patches. Some elevated houses seem to have been for that purpose. So it was with Puupueo [Roundtop, in west Mānoa Valley], directly below Ualakaa. (‘Ī‘ī 1959:69)

Thrum also stated that Kamehameha often stayed in Mānoa Valley:

> It is evident that Manoa has for several generations past, been held in high esteem by Hawaiians of rank. Kamehameha I was no stranger to the valley, and it early became the favorite resort of his immediate household and followers. (Thrum 1892:113)

3.3 Legendary Associations

Mānoa is associated with many legendary accounts, a full description of which is beyond the scope of the current document. A detailed and lengthy presentation of these *mo‘olelo* (oral histories) is contained in the companion CIA report for this project. What follows here is a brief abstract of the numerous legendary accounts.

3.3.1 Legends Associated with Streams, Springs and Pōhaku

Mānoa is watered by five streams that merge into the lower Mānoa Stream: ‘Aihualama (*lit*. eat the fruit of the *lama* tree), Waihī (*lit*. trickling water), Nāniu‘apo (*lit.* the grasped coconuts), Lua‘alaea (*lit*. pit [of] red earth), and Waiakeakua (*lit.* water provided by a god). There are seven waterfalls in the back of Mānoa Valley, named Wai‘ihī‘iki (*lit.* small trickling water), Wai‘ihī‘nui (*lit*. big trickling water), Lua‘aulaia, Nāniu‘apo, Wa‘aloa, Kahuwai‘iki (*lit*. little water tender) and Waiakeakua (*lit.* water [used] by the god) (Pukui et al. 1974). Several of these waterfalls in the back of Mānoa Valley are shown in Figure 9.

There are many *mo‘olelo* (oral histories) and legendary accounts dealing with the numerous fresh-water springs (*pūnāwai*) of Mānoa. Many of these springs are directly associated with the exploits of two primary Hawaiian gods, Kāne and Kanaloa, who were together responsible for originating many of these *pūnāwai*. These springs include Kānewai (location of the current Kānewai Cultural Garden), Hualani, Wailele (Figure 10)—located near the present day athletic field of the Mid-Pacific Institute and associated with Kūka‘ō‘ō Heiau, Punahou (a.k.a. Kapunahou, Figure 11), Ka‘aipū, Wa‘aloa and Waiakeakua.

3.3.2 Legends Associated with Hills, Peaks, Ridges and Caves

There are numerous hills, mountain peaks, and caves in Mānoa Valley which have legendary associations. On the *mauka* border in the Ko‘olau Mountain range are the peaks, Pu‘u Lepalepa, Awāwaloa (“Mount Olympus”) and Kōnāhuanui. The word *lepalepa* means “to hang in fringes or tatters” (Pukui and Elbert 1986:203). Awāwaloa means “long valley or gulch” (Pukui and Elbert 1986:35, 209). Kōnāhuanui, the home of the gods Kāne and Kanaloa, is the highest peak in the Ko‘olau Mountains. The place name means “large, fat innards” and refers to a story about a giant who threw his testicles (*kona hua nui*) at a woman who escaped from him (Pukui et al. 1974:117).

Hills, peaks and caves with associated *mo‘olelo* and legendary accounts include Wa‘ahila Ridge and its six peaks: Keanapoi, Pu‘u Pia (*lit*. arrowroot hill), Pūkele (*lit*. muddy), Paliluahine, Akāka and Kumauna (these latter two are associated with “The Princess of Mānoa” (Kahala-o-Puna), Kapaliluahine and Pali Luahine (which is associated with Kamehameha I), ‘Ulumalu, Pu‘u Pueo (“Roundtop”) and Pu‘u Mānoa.

3.3.3 Other Legandary Associations

Mānoa is associated with a variety of other *mo‘olelo* and legends, including Pikoi the Rat Killer, Maluae and the Underworld, and the Woman Who Died and Came Back to Life; and famous events and people of the early historic era, including Kamehameha I (and his famous dog Poki), Ka‘ahumanu and Boki.

Figure 9. Waterfalls in the back of Mānoa Valley as seen from Kanānā (photograph from Bouslog et al. 1994:4)

Figure 10. Kua‘io o Mānoa Pōhaku at Wailele Spring (from Bouslog et al. 1994:134)

Figure 11. Kapunahou Spring (photograph from Bouslog et al. 1994:132)

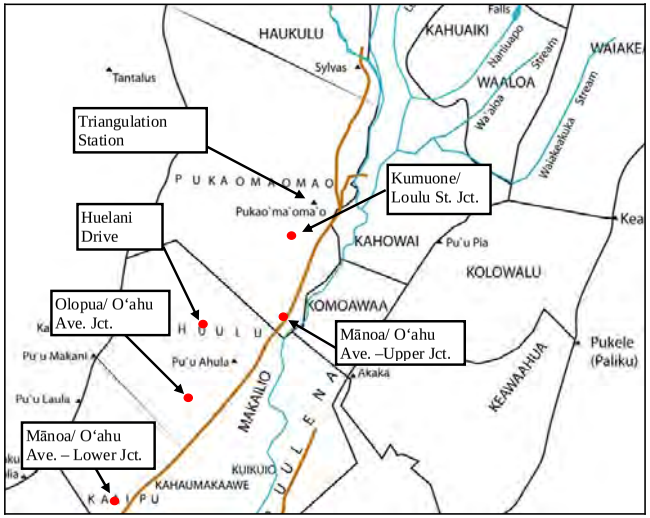


Figure 12. Possible (approximate) locations of Puka‘ōma‘oma‘o, house of Queen Ka‘ahumanu (tracing from 1882 map of Mānoa Valley, surveyed by E. D. Baldwin)

Section 4 Historical Background

In 1892, before it was urbanized, the beauty of Mānoa Valley was described:

> Manoa is both broad and low, with towering hills on both sides that join the forest clad mountain range at the head, whose summits are often hid in cloud land, gathering moisture there from to feed the springs in the various recesses that in turn supply the streams winding through the valley, or watering the vast fields of growing taro, to which industry the valley is devoted. The higher portions and foot hills also give pasturage to the stock of more than one dairy enterprise.
>
> . . .For nearly a mile the road leads by or along pasture fields with no vestige of tree or shrub other than the lantana pest and an occasional algeroba (kiawe), and passes along Round top or Ualakaa . . .
>
> At this summit of the road the whole valley opens out to view, the extensive flat area set out in taro, looking like a huge checker-board, with its symmetrical emerald squares in the middle ground, surrounded by pasture fields on the slopes at the base of the guarding hills. Here and there ‘mid sheltering trees, humble dwellings dot the scene around, while up the rugged slopes the almost endless shades of green with black worn seams of rock oft times lightened by ‘silvery thread of torrent’, forms the background to one of the most charming pictures, either in the clear sunlight, heightened as it often is by cloud shadows chasing rifts of sunshine down the mountain sides; or, as frequently, may be, to watch the drifting mist or rain sweep down one side of the valley, while the other basked in the sun, throwing over its weeping neighbor a “bow of promise” so radiant and bright that its-double, or even triple, reflection is no rarity. (Thrum 1892:110-111)

Mānoa Valley was a favored spot of the *ali‘i*, including Kamehameha I, Chief Boki (Governor of O‘ahu), Ka‘ahumanu, Ha‘alilio (an advisor to King Kamehameha III), Princess Victoria, Kana‘ina (father of King Lunalilo), Lunalilo, Ke‘elikōlani (half sister of Kamehameha IV), and later Queen Lili‘uokalani.

> The site of the various houses that once sheltered Haalilio and his retinue is pointed out just above the old Ehu homestead, known later as the ‘Charley Long’ premises and, till very recently, part and parcel of Montana’s Kaipu Diary. Rev. H. Bingham, of early Hawaiian Mission fame, is also referred to by old timers as having had a residence adjoining the Haalilio premises, though his history makes no mention thereof. (Thrum 1892:114)

4.1 Early Ownership and Use of Mānoa Valley

Mānoa was given to the Maui chief Kame‘eiamoku by Kamehameha I after his conquest of O‘ahu. After Kame‘eiamoku death, the land was inherited by his son Ulumāheihie (or Hoapili), who became the governor of Maui during the reigns of Kamehameha II and Kamehameha III. Liliha, the daughter of Hoapili, inherited the lands in 1811 and brought them with her to her marriage with the high chief Boki, governor of O‘ahu. They had a residence at Punahou in

Mānoa Valley which they often used (Bouslog et al. 1994:14-15). As noted previously, the entire floor of Mānoa Valley was a “checkerboard of taro patches.”

Boki traveled with Kamehameha II on his ill-fated trip to England. While there, Boki met John Wilkerson, a British agriculturalist who had once been a planter in the West Indies. Boki and Wilkerson traveled back to Hawai‘i on the English ship *Blonde*. In 1825, Wilkerson planted seven acres atop Punahou Hill (Pu‘u Pueo) with sugar cane, the first sugar plantation in the Hawaiian Islands.

> *I ka makahiki 1826, ua hoomaka ia ke kanu koana ma Manoa, he haole Bertiania ka mea nana i hana. O Boti a me Kekuanaoa kekahi mau alii kokua nui i ka mahi ko, a o ia paha ka hoomaka mua ana o ka wili ko ma Hawaii nei. A i ka haalele ana o ka haole, ua lilo ka wili ko ia Boti, a o Kinepu ke kanaka nana e hooponopono. Ua kukulu ia ka hale puhi ko ma loko o ke kulanakauhale o Honoluu, ma ka pa kokoke i kahi o Keolaloa Summuner ma e noho nei. He mau hana maikai keia a Boti.* (Kamakau, *Ka Nūpepa Kū‘oko‘a*, May 23, 1868)
>
> Translation:
>
> In 1826 the cultivation of sugar was begun in Manoa valley by an Englishman. Boki and Ke-ku anao‘a were interested in this project and it was perhaps the first cane cultivated to any extent in Hawaii. When the foreigner gave it up Boki bought the field and placed Kinepu in charge. A mill was set up in Honolulu in a lot near where Sumner (Keolaloa) was living. For this action Boki is to be commended. (Kamakau 1976:278)

Wilkinson died in 1826, the mill for the sugar was moved to Honolulu, and Boki lost interest in the endeavor. In 1828, he sold the sugar plantation and sugar mill (or took as partners) to four Honolulu businessmen: William French, Stephen Reynolds, John C. Jones, and John Ebbets (Kuykendall 1938:172). French encouraged Boki to turn the sugar mill into a distillery. When Ka‘ahumanu heard of this, she was outraged and took the Punahou lands away from Boki and gave them to Hiram Bingham and his wife as a base for mission work.

John Wilkerson was also the first to try to grow coffee in the islands.

> At the foothills just above Kaipu, is the reputed location of the first Coffee nursery of the islands, also the work of John Wilkinson, with plants brought by him in the Blonde, from Rio de Janeiro. All the shady recesses and glens at the head of the valley show evidences, to-day, of this early agricultural effort, but to no pecuniary or commercial advantage, for it is all neglected and overgrown. (Thrum 1892:114)

Captain John Kidwell brought a variety of pineapple to the islands called Smooth Cayenne in 1885. He conducted experiments with 31 varieties of pineapples on his farm, in the vicinity of current campus. Smooth Cayenne worked best, and this variety became the standard for the pineapple industry. The sugar cane plantation was destroyed, but some of the coffee plants were used to start coffee cultivation on the islands of Kaua‘i and Hawai‘i (Bouslog et al. 1994:15). The only remaining structures associated with this endeavor noted by Thrum in 1892 were a few filled-in cisterns and wells, and stones marking the western side of the sugar house foundation.

Prince Tute of Tahiti, who became the tutor of Kamehameha III, was also given a piece of land by Boki, in a lot adjacent to the sugar plantation. During the Māhele, he enclosed his lot with a stone wall. Tute died in 1859, but his descendants (the Sumners) continued to live in the area, which later became part of the Montano ranch, and then part of the fruit farms owned by Carlos Long (Bouslog et al. 1994:16). On the 1882 Baldwin map (see Figure 15), Ha‘alilio and Tute are shown owning two pieces of adjoining land in Kalehua and Pu‘upueo. Queen Lili‘uokalani later owned land on the old Brenig premises bordering the land of John Stevenson.

Ka‘ahumanu had a great estate in the upper valley, which included the lands of Pu‘ulena. After the deaths of Boki, Liliha, and finally Ka‘ahumanu in 1832, many of these royal lands were given to Charles Kana‘ina, the father of King William Lunalilo. Kamehameha II was also said to have maintained a summer house in Wai‘oli and Ka‘aipū. Lunalilo gave some of these lands to Kapōkini, who gave them to Ha‘alilio. When Ha‘alilio went on a diplomatic mission to England, he returned the lands to Kamehameha III (Bouslog et al. 1994:16).

An 1817 map by Otto Kotzebue (Figure 13) and an 1855 map by La Passe (Figure 14) show a dense concentration of population in Mānoa Valley. In 1836, French missionaries visited Mānoa, counting 50 houses. If each house contained five people, this would put the population at 250 Hawaiians. The general population of Honolulu and the coastal plain was about 6-7,000 people (Coulter and Serrao 1932:109), which probably represented only a small percentage of the total population of the area that existed before the Hawaiian people were decimated with war, exotic diseases, and the disruption caused by the influx of Westerners and Asians, and their influence on the economy and culture of Hawai‘i. An 1847 record lists 34 eligible landowners; only two were non-Hawaiian. An 1849 tax list includes 195 Hawaiian names, meaning the population of Mānoa was probably about 1,000.

4.2 Mid Nineteenth Century and Land Commission Awards

A total of 68 commoners were granted *kuleana* (Land Commission) awards in Mānoa *makai* of King Street, totaling 332.26 acres (Figures 15, 16 and 17; Table 1). Twenty-seven awards were less than an acre; 31 awards were less than five acres, four awards were less than 10 acres; and one award was for more than 10 acres (to Akahi, a *wahine* [female] cousin of Bernice Pauahi Bishop, in Kaipua *‘ili*, LCA 5368:1, RP 1262, 10.25 acres); five awards were for more than 30 acres (J. Stevenson [Ka‘aipū, 34.96 acres, and Nāniu‘apo, 30.17 acres], Kalaiheana, 66.59 acres, Kaunuohua, 35.40 acres, and Beckley, G. for heirs, 36.10 acres). Victoria Kamāmalu received most of Kānewai ‘Ili. C. Kana‘ina (father of King W.C. Lunalilo) received the *‘ili ‘āina* of Kolowalu and Pāmoa, and all of Kukuio and Kalehua. The largest grant went to the American Board of Commissioners for Foreign Missions who received a total of 301.68 acres; this became the campus for Punahou School (Bath and Kawachi 1990:3-5). Chief Boki gave Hiram Bingham this piece of land in 1829 (DeLeon 1978:3).

The Land Commission documents suggest that most of the agriculture and habitation at Mānoa was in the east-central part of the valley (along Mānoa Stream) between the present-day Mid Pacific Institute and the Chinese cemetery. There were a few claims and awards in the far northern part of the valley, at Punahou, and a few in the Kānewai/Kalaepōhaku area.

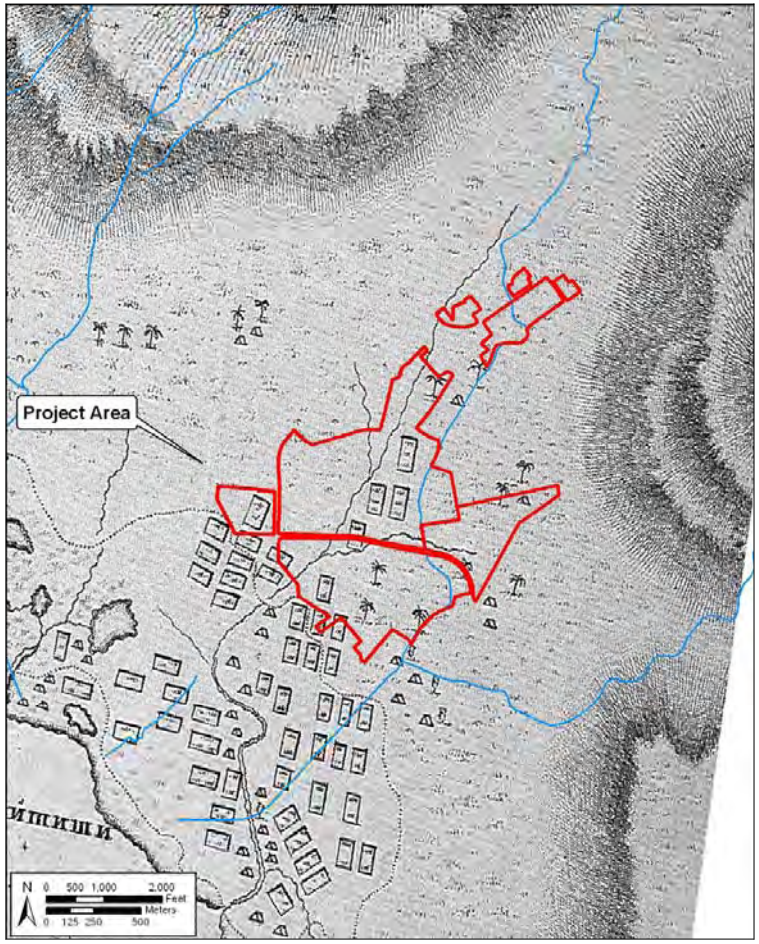


Figure 13. Kotzebue map of 1817 showing vicinity of project area (should be understood as somewhat schematic)

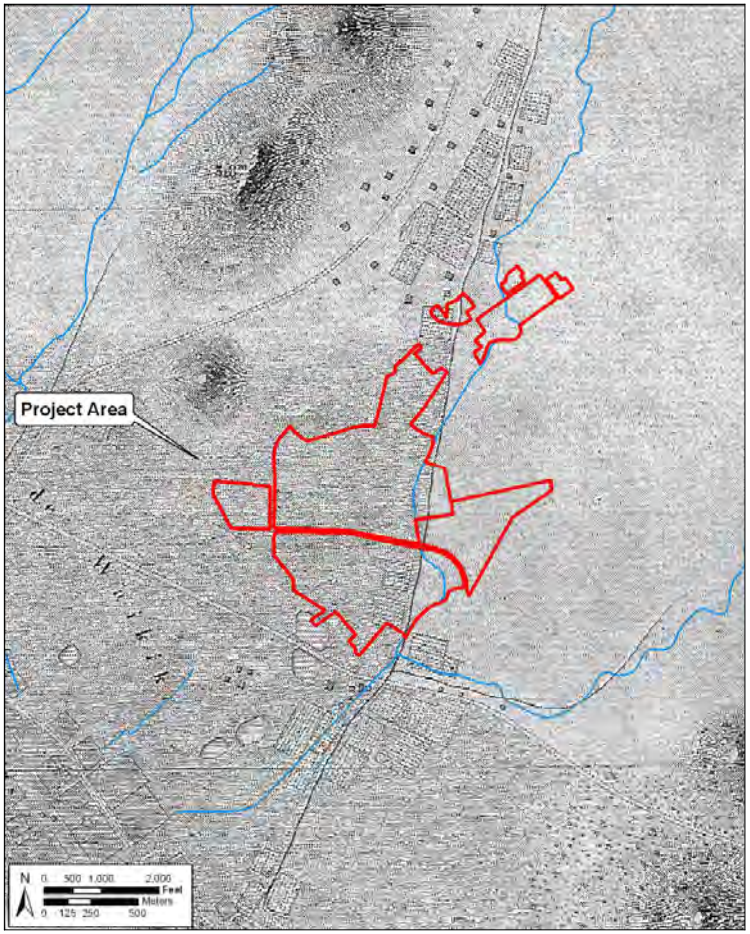


Figure 14. LaPlace map of 1855 showing vicinity of project area (should be understood as somewhat schematic

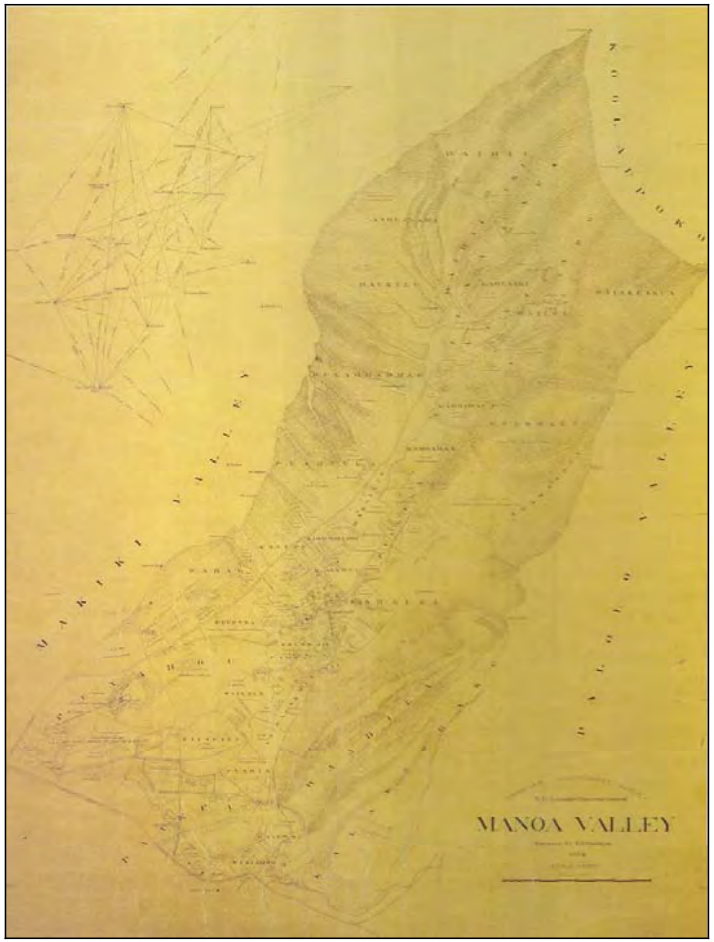


Figure 15. 1882 E. D. Baldwin map, showing Land Commission Awards and Grants in Mānoa Valley

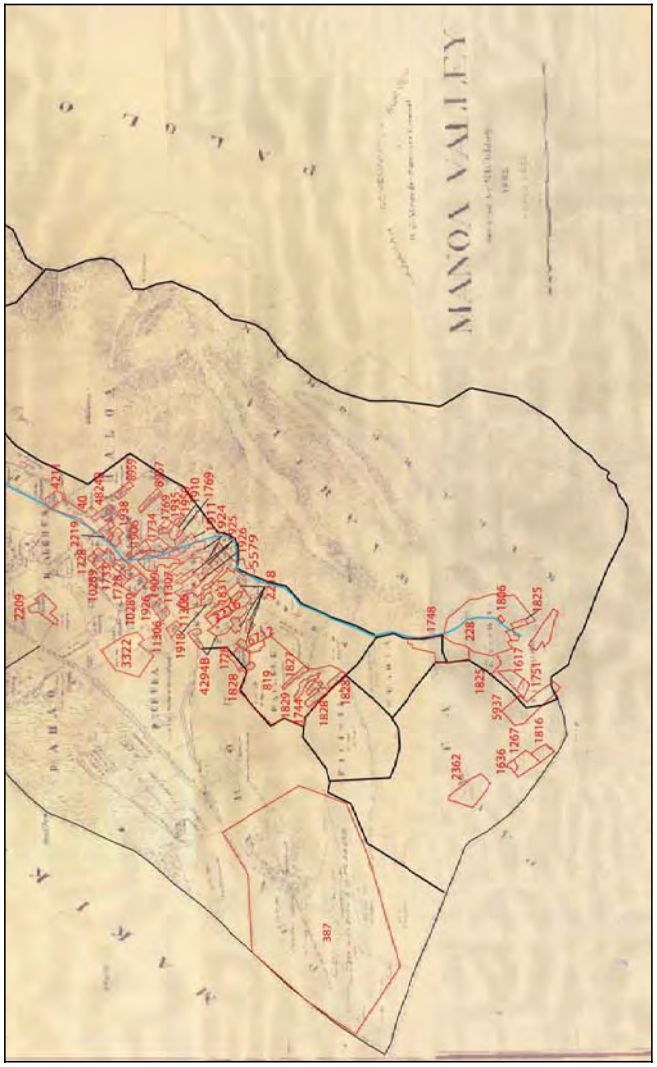


Figure 16. *Makai* portion of 1882 E. D. Baldwin map with Land Commission Awards outlined in red

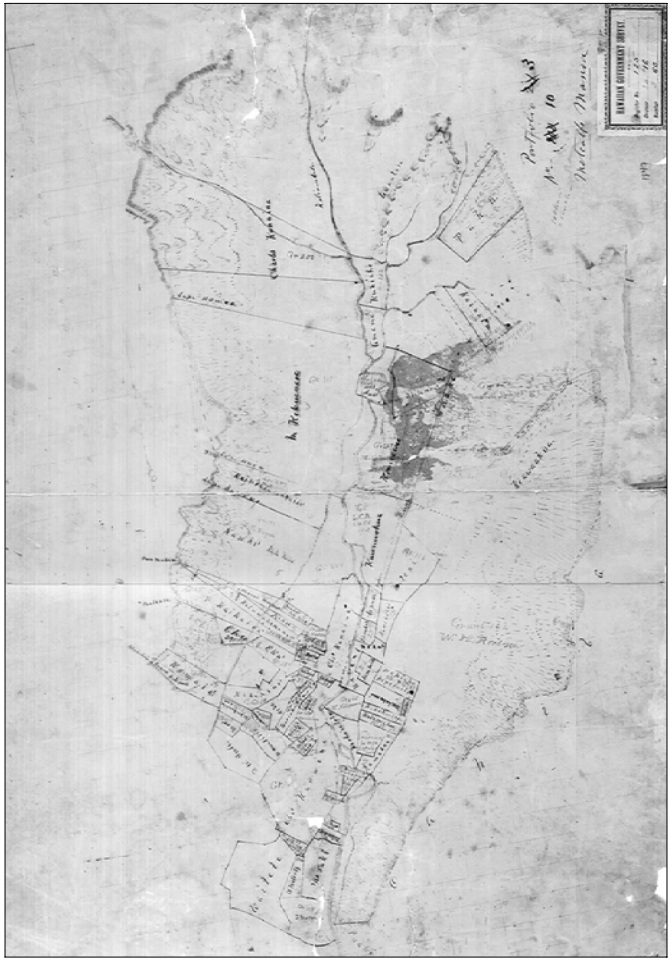


Figure 17. 1847 Hawaiian Government Survey map; surveyed by Theophilus Metcalf

Table 1. Land Commission Awards for Mānoa Ahupua‘a (claims in bold were in or near UH)

Claim	Claimant	Location	Notes
17	Jones, Eli	Beretania St.	House
40	Kai, D.	Ka‘ahaloa	*Māhele* Award
42	Maigret, Louis	Wailele	
228	Kaleiheana	Kānewai	Kānewai Pool
387	ABCFM (mission)	Punahou	Received from chief Boki: spring, house
707	Kaiaina		Received land from Kamehameha
819	Beckley, George	Wailele	Farm called “Kawailele”
1130			House, 2 patches, pasture
1267	Kawela	Pa‘akea	3 *‘āpana*: taro *lo‘i;* taro *lo‘i*; house
1273	Spear	King St.	
1274	Hulilau	Piliamo‘o	Dry taro, 12 taro *lo‘i*, *hala* trees
1356	Namaka	Piliamo‘o	2 taro *lo‘i*
1525	Kuaana	Piliamo‘o	2 taro, house, pasture
1617	Kenao	Piliamo‘o	4 taro, 1 ditch, 2 houses
1627	Keonea	Kānewai	
1636	Haole	Pa‘akea	2 *‘āpana:* house, fence; house, fence
1728	Kuikuikahi	Halelena, Wailele	3 ‘āpana: pahale; lo‘i ma hale lena; taro lo‘i, pasture
1733	Kaheenalu	Halelena	4 lo‘i
1734	Kauhi	Hamamakahwaha, Hipawai	2 *‘āpana*; house enclosed; 6 taro *lo‘i*
1744	Hakuole	Wailele	5 taro *lo‘i*
1748	Ono	Kānewai	Houselot
1751	Aea	Piliamo‘o	3 *‘āpana*: house; taro *lo‘i;* taro *lo‘i*
1755	Kaluaapana, Peter	Hamamakowaha	
1769	Malaihi	Hamamakawaha, Kahamama	Taro *lo‘i*
1806	Hinai	Kānewai	3 taro *lo‘i*
1813	Keaka, I.	Piliamo‘o	2 taro *lo‘i*
1816	Kaaha	Pa‘akea	2 *‘āpana*: 6 taro, pasture; taro *lo‘i*
1825	Kuewa	Kānewai	*‘Āpana* 3-4 - Pasture with 2 houses; *‘āpana* 5 - taro
1827	Wahahee	Wailele	6 taro *lo‘i*
1828	Ewaloa	Wailele	3 *‘āpana*: taro *lo‘i;* taro *lo‘i*, house
1829	Hoohoku	Wailele	8 taro *lo‘i*
1831	Mamala	Pāmoa	3 *‘āpana*, 8 taro *lo‘i*, *‘auwai*, house; taro *lo‘i*; house
1906	Kaumakaokea	Hamamakowaha	House at Kolowalu
1908	Kalaau	Kamo‘olepo	4 lo‘i
1909	Kaianui	Kolowalu	*‘Auwai*, 6 taro *lo‘i*, houselot
1910	Apiki	Hamamakawaha, Kolowalu	*‘Auwai*, pili, taro for konohiki
1911	Naihe	Hamamakowaha	Taro, house

Claim	Claimant	Location	Notes
1918	Kamahiai	Kolowalu	2 ‘āpana: pahale; 6 lo‘i
1920	Paaluhi	Pu‘ulena	3 taro *lo‘i*, pasture, house
1921	Moku	Kahawai	9 taro *lo‘i*, *kula*, house
1922	Nawaanui	Kali‘i	13 *lo‘i*, sweet potato
1923	Kekua	Kaho‘iwai	6-8 *lo‘i*, *‘auwai*, house
1924	Kealohapauole	Kauala‘a	3 *‘āpana*,: 7 taro *lo‘i*; taro *lo‘i*, house on south side; pasture
1925	Paniani	Koloalu, Koloaluiki	*‘Auwai*, *pili*, pasture, 2 houses
1925	Koi	Kolowalu	*Pili*, taro, land sinking in
1926	Nanauki	Kolowalu	1 *‘āpana*: pasture, house; taro
1927	Nawaakakele	Pāmoa	12 *lo‘i*, *kula*, house
1928	Aiia	Pu‘ulena	4 taro, pasture with house
1929	Kaanaana	Pu‘ulena	*Lo‘i* for *konohiki*, *‘auwai*, pasture
1930	Kaaea	Pu‘ulena	2 *‘āpana*: taro *lo‘i*, pasture, houselot; *lo‘i* for *konohiki*
1931	Kaiwi	Pu‘ulena	9 taro, pasture, house
1935	Puuwaewae	Kamamakoaha, Hamamo	7-8 taro *lo‘i*
1937	Kahalepohaku	Pu‘ulena	6 taro *lo‘i*, pasture, house
1938	Lupe	Kamo‘olepo	2-4 taro *lo‘i*
1940	Upepe	Pu‘ulena	Taro *lo‘i*, pasture
1944	Maemae	Komoawaa	14 taro lo‘i, *kula*
1945	Kamaikaaloa	Komoawaa	6 taro *lo‘i*
1946	Makalii		16 taro *lo‘i*, *kula*, houselot
1947	Puuki	Komoawaa	6 taro *lo‘i*, *kula*, houselot
1948	Ma	Komoawaa	7 taro *lo‘i*, *kula*, houselot
1949	Kipi	Hipawai	13 taro *lo’i*, *kula*
1950	Kalua	Hipawai	3-4 taro *lo‘i*
1951	Nui	Kaho‘iwai	Taro *lo‘i*, house
1980	Haole	Piliamo‘o	
2209	Keaulana	Kaaipuluna	*Kalo* taro & *kula*; pasture named
2216	Kaohe	Pāmoa	2 *‘āpana*: 16 taro, watercourse; house site near taro
2218	Kaawahua	Pāmoa	4 *‘āpana*: taro *lo‘i* and pasture in each
2219	Keawe	Kamo‘olepo	2 taro *lo‘i*
2209	Keaulana		*Kalo* taro & *kula*; pasture named
2362	Kaaimoa	Pa‘akea	2 taro *lo‘i*, pandanus, house
2530	Kaahu	Piliamo‘o	
3028	Kauhi	Punahou	
3322	Tute, T.	Haliimaile	Garden farm with stone wall
3906	Neki, K.	Kolowalu	Heiau of Kūka‘ō‘ō, fence; house in
4211	Kaululaau	Kaahaloa iki, Manuahi	10 taro patches & pasture in one
4294B	Kalaweaumoku	Pāmoa, Ka‘ahaloa	2 *‘āpana*

Claim	Claimant	Location	Notes
4605	Hakau, wahine	Kaho‘iwai, Kaluohau, Hokeulu, Pi‘inaio	6 *‘āpana*: 5 taro *lo‘i*; 3 taro *lo‘i*; pasture; 1 ditch; 1 ditch; 1 fish pond
5368	Akahi	Ka‘aipū	8 taro *lo‘i*
5579	Kahapapa	Hipawai	5 taro *lo‘i*, Kahawai Stream
5937	Paukuwahie	Piliamo‘o	
6450	Kaunuohua	Pu‘ulena	Loko Kūwili
6616	Nuuanu	Kānewai	
6712	Paikau	Kalena, Wailele, Pu‘ulena	3 *‘āpana*: 2 *lo‘i*, *kula* house; mountain land; 28 *lo‘i*, *kula*, house
7713	Kamamalu, Victoria	Kānewai	
8555	Kaina, M.	Maka‘īlio	4 *lo‘i*, *‘auwai*, pasture
8559	Kanaina, C.	Kukuhio, Pāmopa	2 *‘āpana*: taro; *‘ili* of Kalowalu
8957	Kuhaumea	Ka‘ahaloa	5 taro *lo‘i*, house 2 *hala* trees
8958	Kahele	Ka‘ahaloa	1 taro *lo‘i*, *kula*, house
8959	Kuamoo	Ka‘ahaloa	8 taro *lo‘i*, sweet potatoes
10289	Namokae	Halelepa (Halelena)	2 *‘āpana*: 6 taro patches, pasture
11029	Stevenson, John	Ka‘aipū, Kapo, Kukona, Kamakela	3 *‘āpana*: *pali*, pasture (22 acres); pasture, *kalo*, stream (9 acres); *kalo* (2 acres)
11306	Kalama	Halelena, Kolowalu	2 *‘āpana*
11307	Kea	Kolowalu	9 *lo‘i*, house site

4.3 The University of Hawai‘i at Mānoa Land Commission Awards

Charles S. Bouslog (in Kobayashi 1983:183) gives the following summary account of the history of Hawaiian tenure of the University of Hawai‘i at Mānoa lands:

> The grantees of land at the mahele (mostly 1848-50) have their names recorded forever in all subsequent deeds and title search leads back to the first owner. All but one of these names for campus land were Hawaiian. Names seen are Ewaloa, Kapehana, Kaumakapili, Mooiki, Ono, Poonui, Puoa, Hakuole. Charles Kanaina (the father of King Lunalilo) at mid-century was the owner of much of the Mauka Campus and of the large areas now in the Lyon Arboretum. For most of these men, it is a one-time legal enshrinement; few of the names are seen again, except in deed.
>
> I have attempted to trace the ownership changes of some of the original grants: 718, 882, 1744, 1748, 1828 (see the 1882 map).
>
> In the “Native Register” (p. 270) Ewaloa signed with his mark. There is a reference to his widow in 1876, and to an heir in 1881, when the land passed into the hands of Emma Davison. No more Ewaloa.
>
> Hakuole has modern descendants but the land is no longer theirs. For Land Grant 1744, he made his mark in the “Native Register” and testified: “I got this land in 1830…for taro land for cultivating sweet potato at Kawailele in the land of Lui Palani (Louise French), the konohiki.” This was on December 3, 1847. An heir sold to Ilikealani in 1864. The family continued in the valley. One man is listed as a Manoa taro planter in the city directory of 1888. In 1894-95 one is listed as living in Manoa. The last kuleana seems to have been sold to a Magoon in 1896.

The largest parcel in Mānoa (LCA 228, 66.59 acres) for a private individual was awarded to Kalaiheana at Kānewai. John Papa ‘Ī‘ī (Native Register; August 14, 1846) relates the following

> Kalaiheana’s land, called Kanewai, is at Waikiki. It has some leles in Mānoa . . . that was the land of Keeaumoku at Waikiki, adjoining the north side of Kalaepohaku. This land became his upon the victory of Kamehameha I at the Battle of Nuuanu, also Waialua, as was the custom of granting land to chiefs at that time.

When the *peleleu* (fleet of large canoes) came, the land passed from Ke‘eaumoku to Papa and Kalaiheana and all the *leles* were also conveyed. In Foreign Testimony, ‘Ī‘ī relates the following:

> Kanewai is its name. It borders on the sea which enters part of it. On S. and E. is land of Kalaepohoku on NE & N is land of Waihi. From NW & W round is Piliamo. On W. Keokapu has land. This land belonged to Kiaumoku father of Kaahumanu. . . . When Kiaumoku obtained it was in 1804. Claimant is his descendant.

This later account is particularly interesting because of the reference to Kānewai bordering “on the sea which enters part of it.” This corroborates the account in the *Star Bulletin* (Williams 1935) of a subterranean passage linking Kānewai and the sea, and suggests that the famous Kānewai pool lay in Kaleiheana’s LCA. The reference to LCA 228 being bordered on the northeast and north by the land of Waihī is uncertain, but may refer to springs or seeps on the nose of Wa‘ahila ridge (Waihī – “trickling water”).

Testimony relating to Keliipo’s land claim (LCA 1635, 0.43 acres) is of particular interest in that it provides the clearest picture of land use in Kānewai. The Native Register offers the following account:

> ‘Ili of Kanewai, Ahupua‘a of Waikiki. I have two lo‘i. My lo‘i on the west is bounded on the north by the lo‘i of Kalama, on the east by the Kula of Maalahia, on the south by the lo‘i of Kalama, on the west by the lo‘i of Kanemakini, one small house.

The Foreign Testimony offers the following accounts:

> This land is Kanewai, Waipio, Waititi. Kalo land only. No house or fence. Mauka is a stream dividing it from upland Waialae, Kalama [is] Konohiki; Makai Stream and wasteland; Honolulu, Kalama. Claimant had this from Kalama about 8 years ago on account of friendship and work.
>
> One taro patch and the boundaries are Mauka is the ditch; Waialae, [lands of] Kalama; the Konohiki, Makai a stream; Honolulu, Kalama the Konohiki. Acquired in 1841, he has done Friday work for the Konohiki.

The testimony for Keliipio’s land claim suggests there were a number of small *lo‘i* (irrigated plots) in the area north of Mānoa Stream and south of the *‘auwai* (irrigation ditch), which were cultivated by different people with a number of *lo‘i* belonging to the *konohiki* (overseer) named Kalama.

The land claim of Nu‘uanu (LCA 6616:1, 0.96 acres) lists three *lo‘i*, four coconut trees, a small sweet potato *kula* (dryland plot), and a house lot. While it is not clear whether these are all in *‘āpana* (lot) 1, it seems a virtual certainty that he claimed a *lo‘i* there.

The testimony associated with Keonea’s land application (LCA 1627) relates that “Kaleiheana gave claimant these lots” and the presence of *lo‘i* and a house lot on the property.

Figures 18 through 22 illustrate some aspects of land use changes from the 1880s to the end of the nineteenth century in and around the project area.

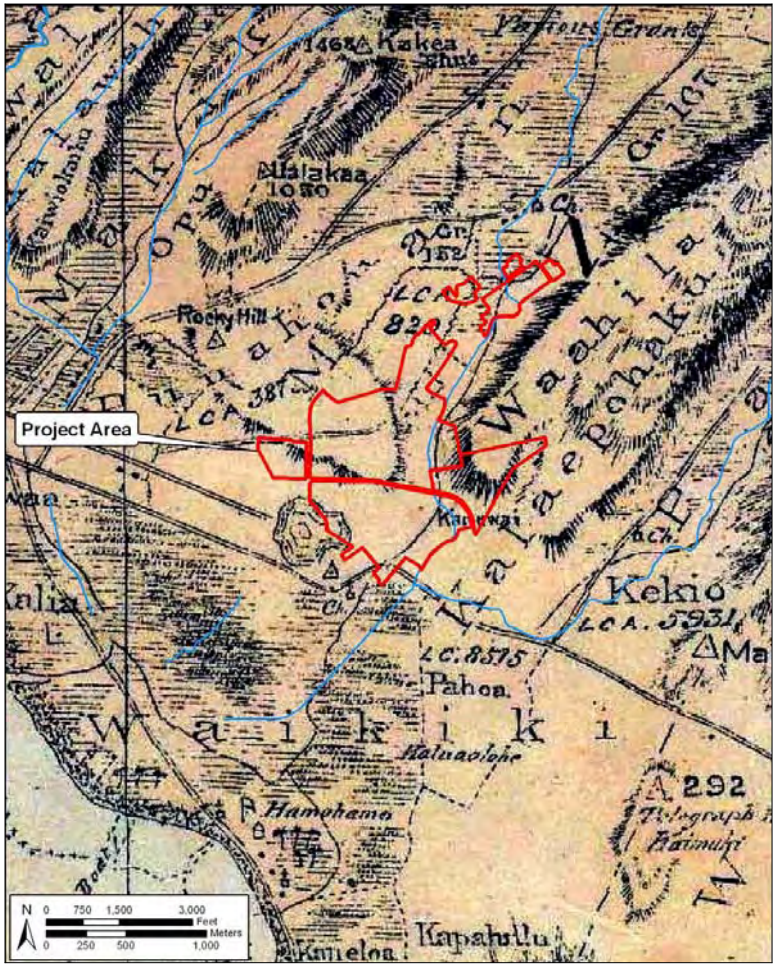


Figure 18. 1881 Oahu Island Government Survey map

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

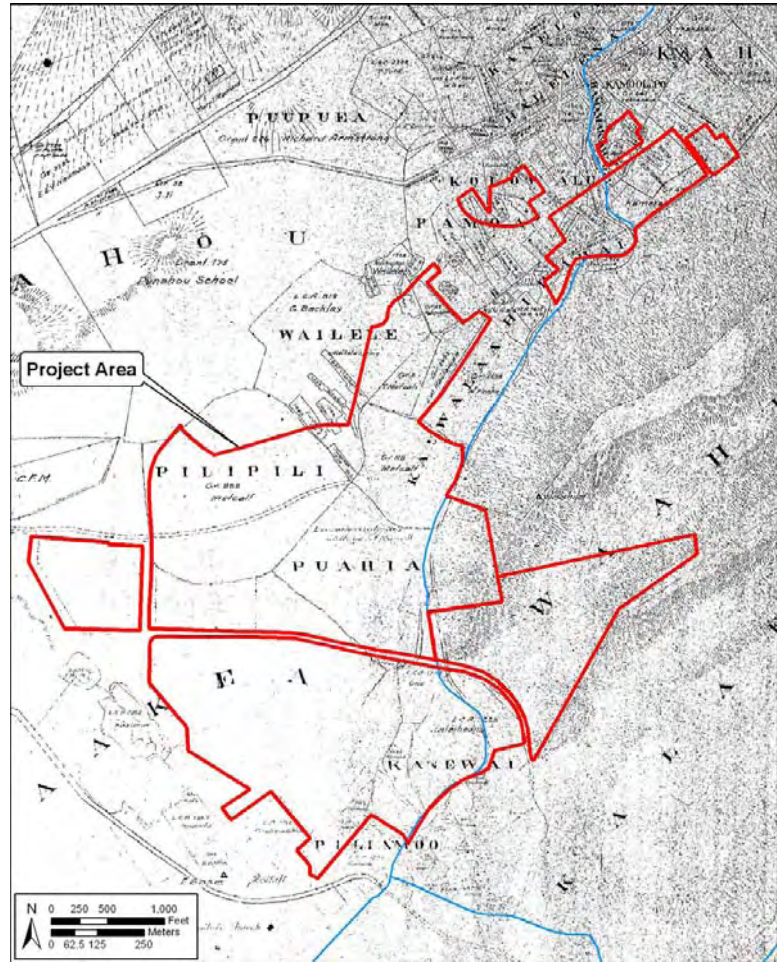


Figure 19. 1882 E. D. Baldwin map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

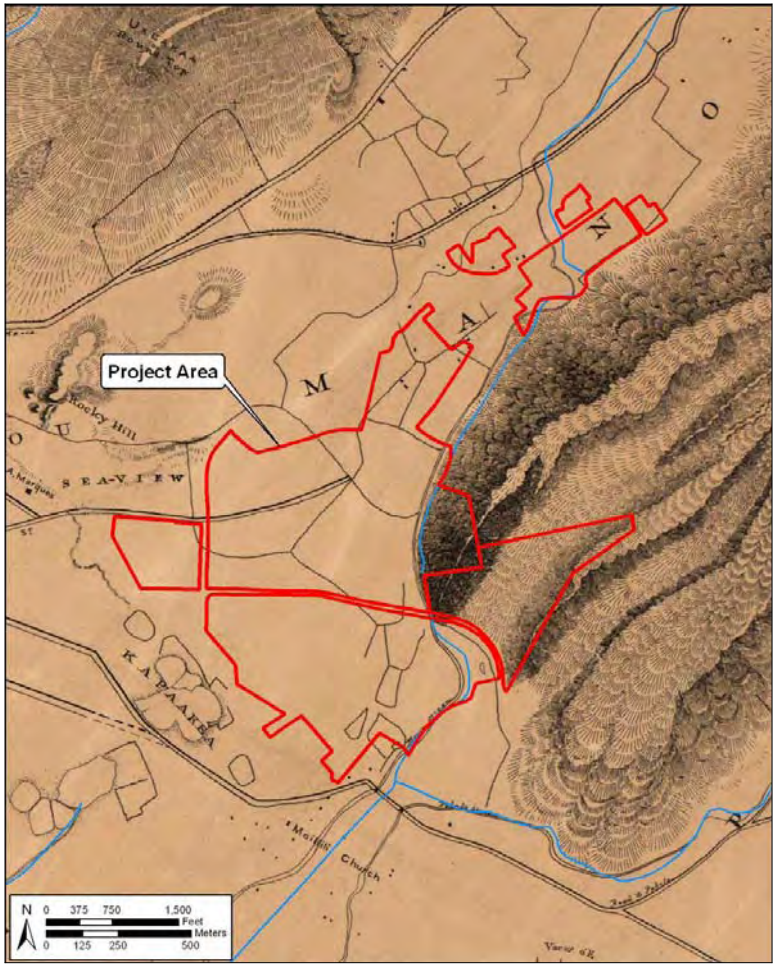


Figure 20. 1887 W. E. Wall map showing vicinity of project area

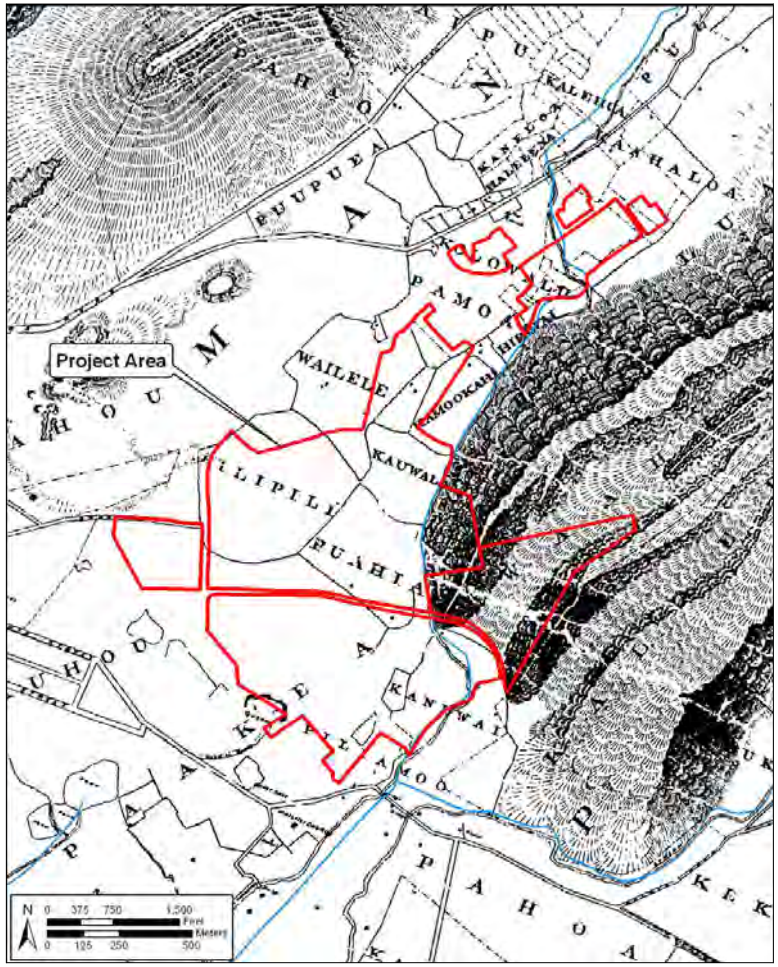


Figure 21. 1897 M.D. Monsarrat map showing vicinity of the project area

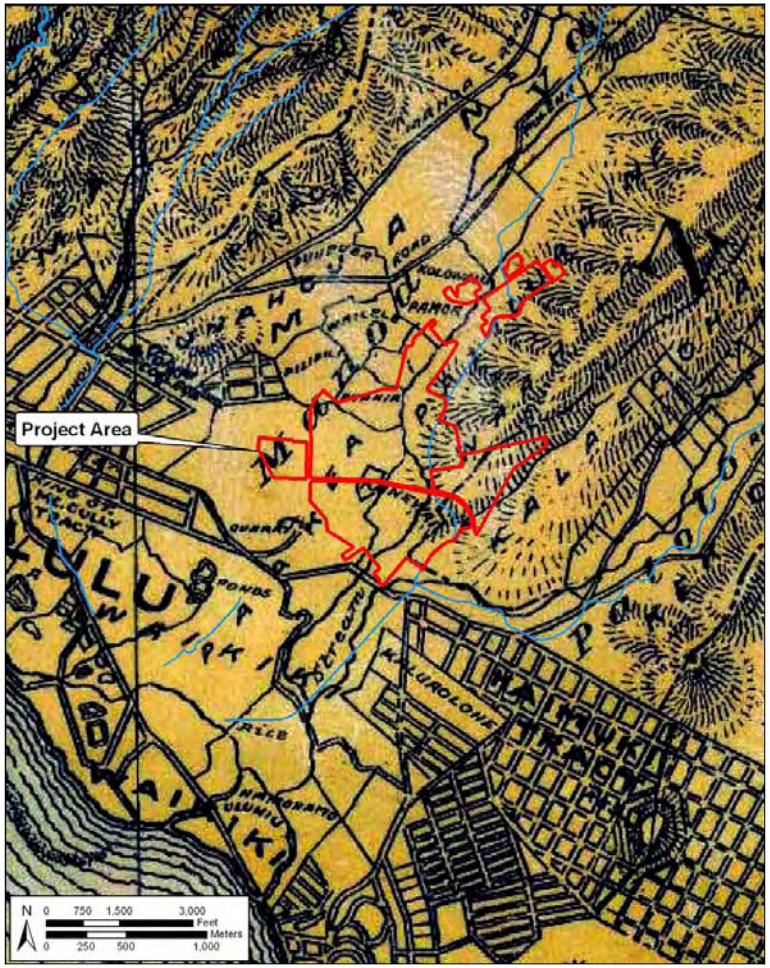


Figure 22. 1899 O‘ahu Island map showing vicinity of project area

4.4 1900s to Present

Hawaiians and Chinese continued to grow taro on the floor of Mānoa Valley in the late nineteenth century (Figure 23). However, disease, out-migration to the centers of population, the loss of traditional culture, and other factors led to a decimation of the resident Hawaiian population. By the end of the century, half of the taro lands in Mānoa Valley were cultivated by Chinese. They also raised other vegetables and bananas. For a time pineapples were raised on the lower slope between Pu‘u Pia and Wa‘ahila Ridge (the eastern boundary of the *ahupua‘a*) (Emery 1956:57).

The well watered, fertile and relatively level lands of Mānoa Valley supported extensive wet taro cultivation well into the twentieth century. Handy and Handy (1972:480) estimated that in 1931 “there were still about 100 terraces in which wet taro was planted, although these represented less than a tenth of the area that was once planted by Hawaiians.”

In the early past of the nineteenth century, the Japanese began to move in to the upper valley to start truck farms, growing strawberries, vegetables, such as Japanese dry-field taro, Japanese burdock, radishes, sweet potatoes, lettuce, carrots, and soy beans, and flowers to sell to the Honolulu markets. Bananas were grown on the northeastern slopes of the valley. Several dairies were also opened in the area, including the first opened by William Harrison Rice in 1844. The result of the presence of these dairies was that many previously forested slopes were denuded by the grazing cattle (Emery 1956:57, 62).

Rice cultivation was attempted in Mānoa Valley by 1882, but the project was unsuccessful.

> Though the valley is under almost complete cultivation of taro, largely by Chinese companies, an effort was made by them in 1882 to divert it to the growth of rice, but after two years struggle with high winds, cold rains and myriads of rice birds it was abandoned. In the spring of 1884 a north wind, with the local appellation of Kakea, visited the valley, which blasted all the taro, withered all the growing rice, moved a number of houses bodily and demolished several entirely. This is said to have terminated the rice industry of Manoa, since which time its fields have been devoted to taro, as it had been for many preceding generations. Sweet potatoes and bananas are also cultivated in a limited measure, and some attention is being given to fruit culture . . . (Thrum 1892:116)

In the 1903-04 Honolulu City Directory, 148 names are listed, 107 haole (Caucasian), 11 Chinese, 9 Japanese, and 21 Hawaiians. In 1932, the valley had 1,000 homes (with an estimated population of 5,000), about 300 Caucasian, 173 Japanese, ten Chinese, ten Portuguese, six Hawaiian , five Puerto Rican, two Filipino and one Spanish (Coulter and Serrao 1932:109). By 1944, the population of Mānoa was 15,000. By the year 2000, Mānoa had a population of 21,112 (City and Co. of Honolulu 2000). Figures 24 through 29 show the growth of roads and residential areas during in Mānoa from the early to middle twentieth century.

Figure 23. Checkerboard taro fields on the floor of Mānoa Valley

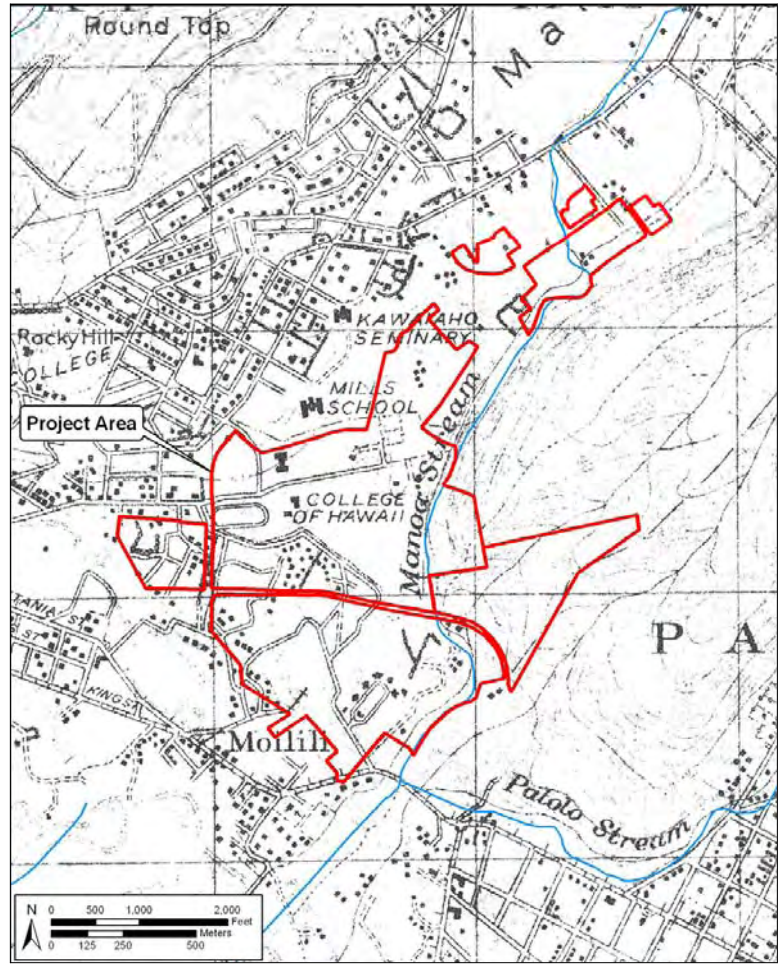


Figure 24. 1919 Fire Control map showing vicinity of project area

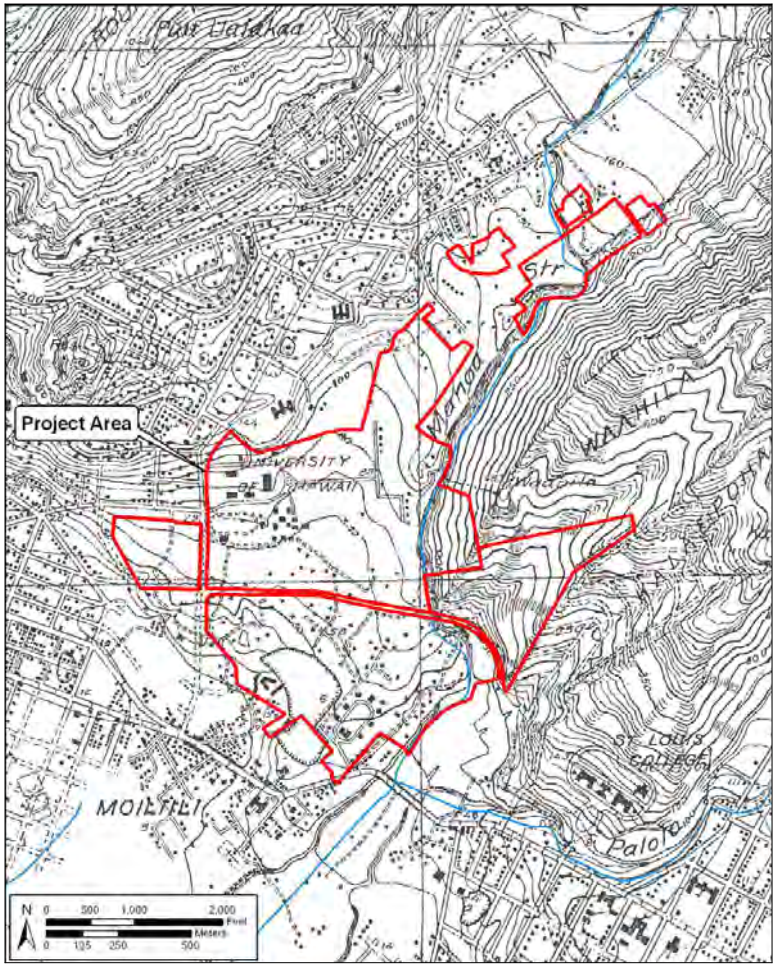


Figure 25. 1927 US Geological Survey map showing vicinity of project area

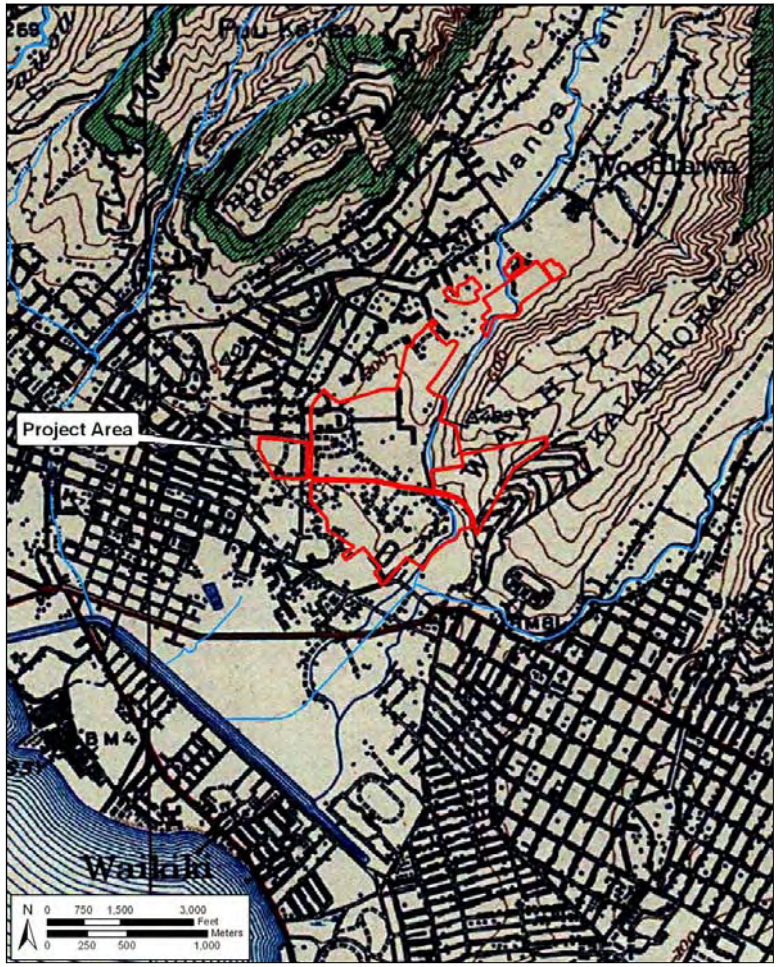


Figure 26. 1938 map showing vicinity of project area

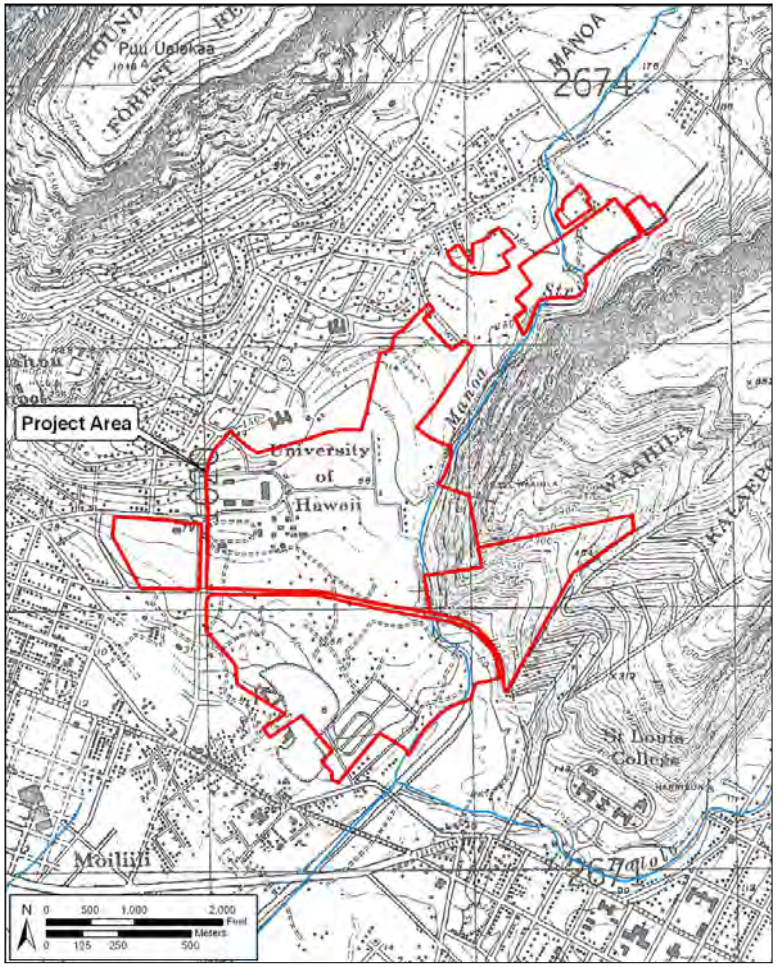


Figure 27. 1943 War Department map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

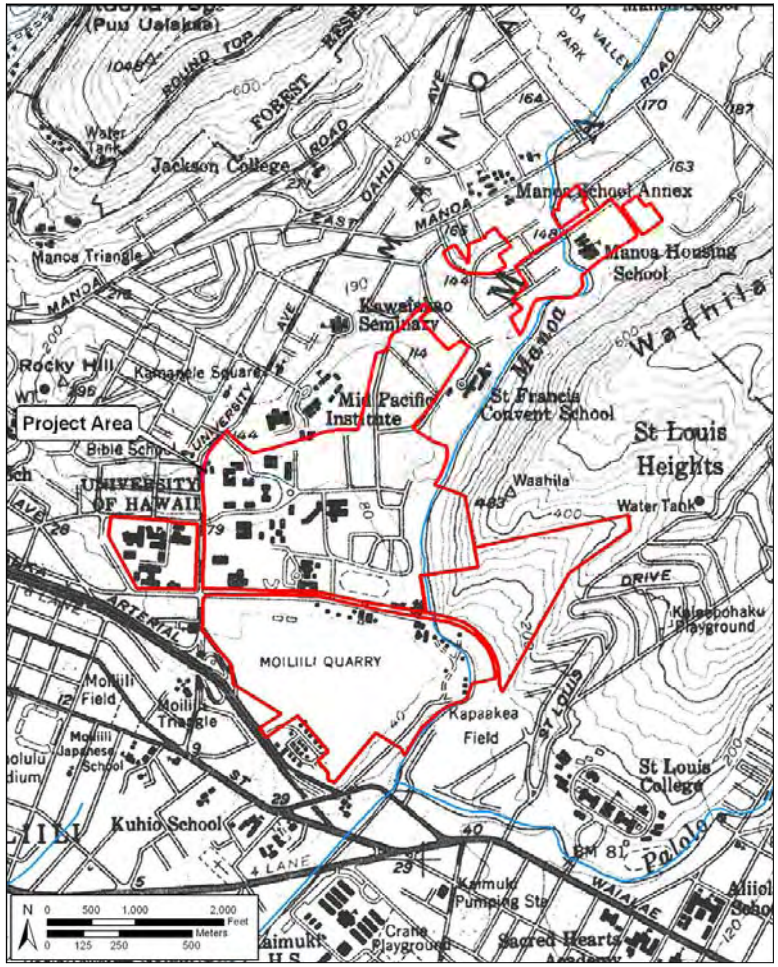


Figure 28. 1953 U. S. Geological Survey map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

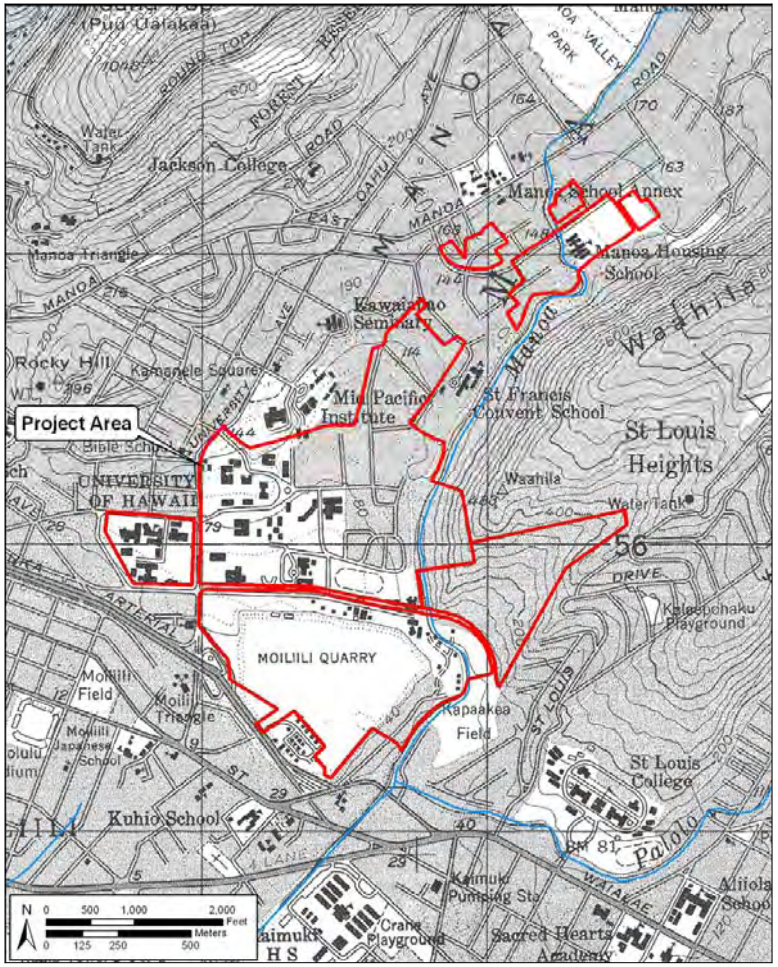


Figure 29. 1956 map showing vicinity of project area

4.5 Prominent Historic Structures

4.5.1 Mānoa Chapel and Cemetery of Kawaiaha‘o Church

In 1832, the missionaries Hiram Bingham, Abraham Blatchely, Levi Chamberlain, and Elisha Loomis hiked into Mānoa Valley to look at two parcels of agricultural land that had been appropriated for the use of the Mission by Kalanimōkū, the Prime Minister of the Hawaiian Kingdom. One plot was on the western side of ‘Ualaka‘a in West Mānoa; the other was an acre and a half of low taro ground with thirty to forty taro patches in East Mānoa; this land was probably at the site that later became the Mānoa Chapel and the Mānoa Hawaiian Cemetery. At Ka‘ahumanu’s residence in Puka‘ōma‘oma‘o, there was a “kind of village of forty of fifty huts, the houses of the chiefs, a schoolhouse and a chapel” (Diary of Elisha Loomis, cited in Bouslog et al. 1994:153). The cemetery, which may have predated the chapel, is said to have been established by Ka‘ahumanu for a Christian cemetery.

In 1846, Reverend Richard Armstrong wrote: “In the beautiful valley of Mānoa, there is an encouraging state of things . . . . A substantial stone meeting house has been erected under the direction of Bro. William Harrison Rice, intended also for a school house.” This stone church may have been built on land once owned by John ‘Ī‘ī, who had early bought fee simple land near the present junction of the upper ends of Mānoa and East Mānoa Roads. In a letter from Armstrong to the Honolulu Mission in May of 1848:

> Brother Rice has had charge of the meeting in Manoa Valley and I hope he will present an account of his labors there to the Mission. A substantial stone meeting house has been erected there under the direction of Brother Rice, intended also as a school house, and an adobe building for the same purpose at Waikiki. . . . While erecting the houses we feared they would prove too large, but during the present year they have been filled with attentive worshippers on Sabbath afternoons and, frequently, during the week. (Gulick and Hinckley 1918:235)

This building was destroyed in 1876 by a severe storm, but a wooden structure with some stone work was quickly rebuilt to replace the chapel. In 1914, the lot was granted to Kawaiaha‘o Church, which managed it as an ‘*āpana*, or branch church. In the 1930s, a third church was built to replace the termite-eaten second church. This church, called Luakini Hou O Mānoa (The New Church of Mānoa) was dedicated in 1935. This building was a wooden structure over a lava rock foundation. The stones for this foundation may have come from Hipawai Heiau, which may have been destroyed around 1819 when Queen Ka‘ahumanu broke the old *kapu*. As membership began to fail, the remaining congregation began to meet at a center on Mānoa Road instead. The old chapel was used as a baby clinic, a community center, and then as a theater. The theater proved popular, so the old building was razed and the Mānoa Valley Theater was completed in 1987. The church also has a small cemetery; the earliest grave can be dated to 1903 (Williams 1980:1).

4.5.2 Punahou School (Originally O‘ahu College)

As previously noted, the Punahou lands once belonged to the High Chief Boki and his wife Liliha. They were given to Hiram Bingham in 1849 until Chief Boki’s return. When Boki did not

return, Bingham retained possession. He built a small adobe and thatch house on the property as early as 1831, where he worked on a Hawaiian translation of the Bible. It was near this time that many walls were built on the property, to keep out roaming cattle, and two large stones were placed along what is now known as Punahou Street. One of these stones is still at the main gate of the school. In 1837, the idea of a school to educate the children of the missionaries was proposed in a letter (Foster 1991:17-21). The original building for the school was built in 1841 (Figure 30), and the first fifteen students began to study in the structure in 1842.

4.5.3 Sacred Heart Church at Punahou

In 1823, Kamehameha II, his wife, and entourage sailed to London. With this party was a Frenchman, named Jean Rives, a close friend of the king, and his servant, a young Hawaiian boy named Kanui. After the king and queen died in London, Rives left the party and traveled to France where he visited the Sacred Hearts Fathers in Paris. Rives left Kanui at the church and urged the fathers to send missionaries to Hawai‘i to convert the natives to Catholicism. The fathers sent three brothers in 1827, and Kanui, now known as Father Maigret, returned home in 1837.

There is some evidence that Kanui may have had a grass-thatched chapel somewhere in Mānoa Valley, but most of the converts probably traveled to the Catholic Mission on Fort Street in downtown Honolulu. Kanui died in 1842, and many of his converts may have reverted to the dominant Congregational Church. The American missionary Richard Armstrong visited the area in 1846 and noted:

> . . . in the beautiful valley of Manoa, there is an encouraging state of things. Meetings are full and interesting and some 18 papists have returned to the “old paths.” (Armstrong 1846)

In 1883, Father Clement Evrand decided to establish a permanent church in Mānoa, a wooden structure built on Wilder Avenue. In 1910, a new Gothic-styled stone church was planned on land on Wilder Avenue across from the Punahou campus. The Sacred Heart Church was completed on 1914, with stained glass windows shipped from France. In 1923, a parish hall was completed, on 1927 a parochial school was built, and in 1953 a new high school was built on Punahou School (Bouslog et al. 1994:32-33).

4.5.4 Wai‘oli Tea Room of the Salvation Army

In 1909, the Salvation Army purchased 28 acres in Mānoa on lands in Ka‘aipū once owned by Kamehameha III. On this land the Salvation Army built a home to shelter and educate needy children. In 1922, they built the Wai‘oli (meaning “happy water”) Tea Room and a bakery, so that the girls could learn “cooking, baking, and the arts of gracious living.” “High Tea” was served at Wai‘oli and later luncheons. The tea room rapidly became a focal point of the community. In 1929, a grass hut once occupied by the famed writer Robert Louis Stevenson during his visits to the islands (in 1889 and 1893) was moved from its original location at ‘Āinahau, the Waikīkī home of Princess Kai‘ulani and her parents, to the Wai‘oli Tea Room property (Bouslog et al. 1994:32).

Figure 30. 1866 Photograph of Punahou School, Photograph attributed to Charles Burgess (photograph from Foster 1991:32)

4.5.5 Chinese Cemetery

The society called Lin Yee Chung was organized in 1851. The purpose was to buy burial land, to conduct Chinese funeral rites, and to arrange for the return bodies to China for final burial, if requested. In 1852, a group purchased the first lot of land in Mānoa from a Hawaiian called Moehonua. In 1854, they bought Land Grant #101, but disputes with the lot boundary delayed construction of the cemetery until 1896 (Figure 31).

In 1852, a man name Lum Ching, a practioner of the astronomy/geology study called “kum yee hok”, or geomancy (the art of divination by means of lines and figures), visited Mānoa Valley. When he climbed Akāka Peak, his instruments (including an astronomy-based compass and a light-reflecting mirror), told him he was at an:

> . . . extraordinary spot. It is the pulse of the watchful dragon of the valley. People from all directions will come from across the seas and gather here to pay homage. Birds, too, will come to sing and roost. It is a haven suitable for the living as well as the dead. The Chinese people must buy this area and keep it as sacred ground. (Thom 1985:5)

Figure 31. Entrance to Line Yee Chung Chinese Cemetery in Mānoa (photograph from Bouslog et al. 1994)

4.5.6 Lyon Arboretum

In 1919, the Hawaiian Sugar Planters' Association (HSPA) purchased the 124-acre Haukulu ‘Ili, which had once been owned by Charles Kana‘ina, father of King William Lunalilo. It was later owned by Fred Harrison, who built a country home and stable. Dr. Harold L. Lyon was the plant pathologist for the HSPA and head of the Department of Botany and Forestation for the Territory of Hawai‘i. He leased 325 adjoining acres of land from the Territory and the Bishop Estate to use as a reforestation area and as an experimental station for the growing of sugar cane varieties. The HSPA gave the 124-acre arboretum to the University of Hawai‘i in 1953 for the purpose of research, education, and public service (Bouslog et al. 1994:200-201).

Near the Lyon Arboretum, above ‘Aihualama Stream, is a cul-de-sac known as "The Pen," which became famous during the overthrow of the Queen Lili‘uokalani and the Hawaiian monarchy. In 1893, a Provisional Government was declared by several businessmen; and in 1894, they established the Republic of Hawai‘i. Revolutionists who wished to restore the monarchy soon began to stockpile weapons. One of these was Robert W. Wilcox, a former member of the government. He and his associates planned to form an army large enough to attack Honolulu, capture ‘Iolani Palace, and restore Lili‘uokalani to her throne.

The new government found out that the Royalists had a cache of weapons at the house of H.F. Bertelmann at Waikīkī Beach, and they sent a squad of government police to secure the weapons and arrest the rebels. Some of the Royalists escaped to Diamond Head where they held out for several days, but finally running low on ammunition and food they retreated into Pālolo Valley, and then finally climbed through a pass into Mānoa Valley, ending at "The Pen." Many of the rebels surrendered, and others scattered towards Pauoa Valley and on to Honolulu. Eventually all of the rebels surrendered or were rounded up.

4.6 Mō‘ili‘ili Quarry

A major feature of the lower campus is the quarry that was operated by the Honolulu Construction and Draying Company, Ltd. (HC & D; now Ameron HC & D). A quarry was established there as early as 1889 (Kobayashi 1983:169) to exploit the thick dense deposit of epheline-meililite "blue rock" basalt. HC & D leased the Bishop Estate land from W. C. Cummings starting on June 1, 1910 and enlarged operations by buying out the neighboring Mō‘ili‘ili Quarry in 1914. Although Portuguese masons worked the rock into building blocks, curbing material and tombstones, most was used for road construction base course and general aggregate. Mō‘ili‘ili residents kept track of the time by the regularity of the blasting schedule. Quarry operations ended on November 15, 1949, but the crusher continued to process rock from a Pālolo Valley quarry until 1951, when Ameron HC & D moved operations to Kapa‘a in Kailua. After extensive negotitation over price, a final order of condemnation for the approximately 95 acres of Bishop Estate land was finalized in 1953 and the University took over the area.

4.7 Early Years of the University of Hawai‘i at Mānoa

The University of Hawaii at Mānoa developed out of the 1862 U.S. Federal Morrill Act funding for "land grant" colleges. In 1907, "an act to establish the College of Agriculture and Mechanic Arts of the Territory of Hawai‘i" was passed by the Hawai‘i's Territorial Legislature and was signed into law by governor George Carter on March 25th. The regents chose the present campus loxcation in lower Mānoa on June 19, 1907. Regular classes began in September 1908 with ten students and thirteen faculty members at a temporary Young Street facility near Thomas Square. In 1911, the name of the school was changed to the "College of Hawaii" and in the following year the college moved to the present Mānoa location.

The future campus was a relatively dry and scruffy place: "The early Mānoa campus was covered with a tangle of *kiawe* trees (algarroba), wild lantana and *panini* cactus" (Kobayashi 1983:7). It appears the first structures built were a poultry shed and a dairy barn. The indications are clear that there were many stone walls and almost certainly other archaeological sites in the core area of the future campus:

> The area that was to become the university farm (located on what is now the area east of Hawaii Hall) was made up of small fields, from one-tenth to one-forth of an acre, each surrounded by loose rock walls. Each area had been farmed by individual Chinese and Hawaiian tenants. All of the rock had to be removed. There was also much rock both on the ground and buried in the soil. It took ten years to clear 22 acres. The late Dr. Frederick Krauss estimated that 5,000 cubic

> yards of stone were removed from the stone walls alone…The rock was piled in an area just east of Hawaii Hall and covered almost an acre, with rock piled five feet high. The rock was sold to builders and contractors for ten cents a wagon load. (Kobayashi 1983:7)

The reference to “5,000 cubic yards” sounds like a lot of archaeological sites! The accounts cited above indicate fairly intensive agricultural use of the area just east of (the present) Hawaii Hall. Residential use is suggested in an account that: “ On May 15, 1911, the Regents discussed what to do about seven groups of Hawaiian squatters, including one group that tilled the land, on the College’s Puahia lot” (Kobayashi 1983:7). It appears that all seven groups were resident in the immediate vicinity of the campus but that only one group was involved in farming on campus. They were evidently evicted the same year.

An eye witness account from Arthur L. Dean documenting conditions after June 1914 noted:

> Immediately in front of [the present] Hawaii Hall was a strip of lawn perhaps 75 feet wide. The wooden building moved up from Young Street, stained a dull brown, was the only other building on what is now the Campus. Dirt roads, which were impassable in wet weather, straggled through the grounds and disappeared among the trees and bushes in the direction of the farm. A neighboring dairyman paid a small monthly rate for the privilege of running his cows through the lands and they wandered about at all hours and places. (Kobayashi 1983:7)

Development of the campus was restricted by a lack of funding in the early years. An early donation of $1,500 for Alexander and Baldwin in 1915 allowed the college:

> To clear and grade a large area of wild campus land approximately bounded by what is now University Avenue, Campus Road [running east-west on the seaward side ofn Hawaii Hall], the Campus Center Building, and the parking lots behind Sinclair Library, converting it into the first Cooke Field…(Kobayashi 1983:7)

That the grading of this relatively small area cost $1500 1915 dollars suggests that, like the first portion of the campus to be cleared to the northeast, this area also included “much rock.” While the first conceptions of a campus plan in 1909 were for major campus buildings to define an elongated east-west esplanade extending east from Hawaii Hall, by 1915 the campus had started to take on a more ad-hoc style with the H-shaped Young Engineering Quadrangle starting to be developed to the southeast (four of the five structures remain, the southwestern one having been torn down for the building of the present Campus Center) (Figure 32).

The College of Hawai‘i was started with a clear focus on studies in agriculture and engineering to address local needs. In 1920, with the formal establishment of the University of Hawai‘i, the vision changed to a much broader curriculum reaching out to countries of Asia and the Pacific.

In 1922, the construction of the third permanent building on campus, Gartley Hall, began the “old quad” that was subsequently expanded by construction of George Hall in 1925 and Dean Hall in 1929. The old gymnasium was built in 1928/29 (just northwest of the present Bachman Hall) and remained until 1959 when it was razed following the construction of Klum Gym. The depression years significantly slowed development. In 1930, the Normal School (today’s “Wist

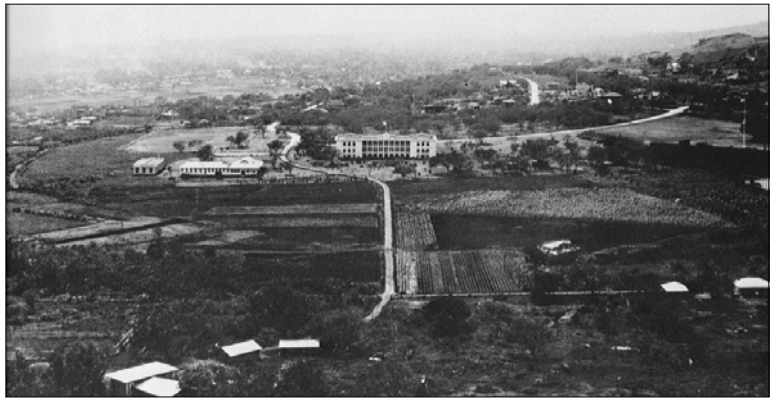


Figure 32 View of the campus in 1917 from Wa‘ahila Ridge (Adapted from Kobayashi 1983:23) showing the two permanent buildings, Hawaii Hall (1912) is at center, the beginnings of the Young Engineering quad (still 4/5 intact by the present Campus Center) is at left of the relocated wooden building moved up from Young Street

Hall”) was opened on the west side of present University Avenue. In 1931, with the merging of the Normal School with the Universty’s School of Education (forming what was then Teachers College and what is now the College of Education), this western land became part of the University campus. The 1930s were also the time of the construction of many of the campus’ most iconic structures, including Founders Gate (1933), Varney Circle Fountain (1934), Andrews Outdoor Theater (1935), George Hall (1936), Crawford Hall and Hemenway Hall (both 1938), and Miller Hall (1939) (Figures 33 through 36).

WWII brought such impacts to campus life as Hawai‘i Hall becoming the U.S. Armed Forces Institute and the construction of fourteen wooden barracks up near the present Spaulding Hall. The army took over the gym, soldiers ate at the Hemingway Hall cafeteria, and bomb shelters were built. A portion of the campus was designated as a temporary military cemetery but fortunately no graves were ever dug (Kobayashi 1983:80).

The Bachman Hall administration building, designed by Honolulu architect Vladimir Ossipoff, and built in 1949, was the first permanent post-war building. A construction boom has been on-going more or less continuously ever since. The core area of the campus was expanded in 1968, when approximately 30 acres were obtained near the Mānoa Library and Mānoa Marketplace; this land was developed in 1975 for the present Astronomy Institute at 2680 Woodlawn Drive.

Figure 33. 1926 aerial photograph showing seaward end of present University Avenue ending at Metcalf St. (at extreme left), the brand new George Hall (1925) inland of Gartley Hall (1922; center), with Hawaii Hall (1912) at right and the Cooke Field Track (vicinity of present Sinclair Library) in the fore. The future Bachman Hall area is still in farm plots.

Figure 34. 1929 aerial photograph showing the western half of the present campus still in fields but University Avenue has now been extended seaward (extreme left, middle) and there has been significant clearing seaward of the Cooke Field track associated with construction of the original Gym (1928) just NW of the present Bachman Hall.

Figure 35. 1939 aerial photograph showing the campus dominated by the old quad (lower right) of Hawaii (1912), Gartley (1922) George (1925) and Dean (1929) and the new Crawford Hall (1938). The brand new Hemenway Hall (1939) is just seaward and old Gilmore Hall (1935-1973) with its two wings anchors the east end of campus at left

Figure 36. In this 1949 aerial photograph the campus is dominated by the central Hemenway Hall (1938), the old Gym and the on-going construction for Bachman Hall are near University and Dole streets, the University Farms still dominate the eastern campus

Section 5 Mānoa Previous Archaeological Research

The first recording of information regarding archaeological sites of Mānoa was by Thomas G. Thrum in his informal study of Hawaiian *heiau*. It was presented in a number of short articles in his *Hawaiian Annual* between 1892 and 1909. Thrum (1907a, b) briefly described five *heiau* in Mānoa. In the early 1930s, McAllister (1933) reprinted this information in his *Archaeology of O‘ahu*. McAllister could relocate only one of these *heiau*, Kūka‘ō‘ō Heiau, which he mapped and described in more detail.

Emma Nakuina (1907:24) also describes a *heiau*, named Kaualaa, and a sub-*heiau*, named Kauwalomalie, on the site of the Mid-Pacific Institute near Wailele Spring (possibly in the *‘ili* of Kauwala‘a). These *heiau* were not listed by Thrum in his report on O‘ahu *heiau*, but may be mentioned in a different article by Thrum (1892:112), which lists forts built by the high *ali‘i* Kūali‘i, who built “a system of heiaus, extending from Mauoki, Puahia-luna and lalo, Kumuohia, Kaualaa, Wailele, and one or two other points between Kaualaa and Kukao‘o.”

The possible locations of these six *heiau*, and place names associated with them mentioned in their descriptions, are shown in Figure 37. This figure is a modern O‘ahu street map, with an overlay of the outline of the 1822 E.D. Baldwin map of Manoa Valley (see Figure 8). The overlay was created by lining up several major peaks (Round Top, Makani, and Wa‘ahila) plotted on both maps; however, since this is a comparison of one map created in the nineteenth century and a more exact map created in the twentieth century, the correlation between the two maps may not be exact.

5.1 Heiau of Mānoa

5.1.1 Kūka‘ō‘ō Heiau

According to legend, six *heiau* on the island of O‘ahu were built by the *menehune*, but only one, Kūka‘ō‘ō Heiau, was built for their own use (Luomala 1951:20). The *menehune* were said to have built a fort and a temple at Kūka‘ō‘ō, a place above (inland of) the hill called Pu‘u Pueo (Westervelt 1963a:131). They were driven away from their fort by the high chief Kūali‘i during his reign (sometime in the 1700s). Kūali‘i rebuilt it after his seizure of the fort.

In 1892, Thrum described this still-standing *heiau* of Kūka‘ō‘ō on the hill called ‘Ulumalu:

> A few hundred feet from the house, on a vast rock pile, still stands a walled enclosure known as the heiau of Kukaoo, now overgrown with lantana and night blooming cereus. This old heathen temple dates back many hundred years. Its erection is credited to the Menehune’s—or class of pigmies—but was rebuilt during the reign of Kualii [circa A.D. 1700s], who wrested it from them after a hard fought battle. The Menehune‘s fort was on the rock hill, Ulumalu, on the opposite side of the road, just above Kukaoo. Previous to the battle, they had control of all upper Manoa. (Thrum 1892:112)

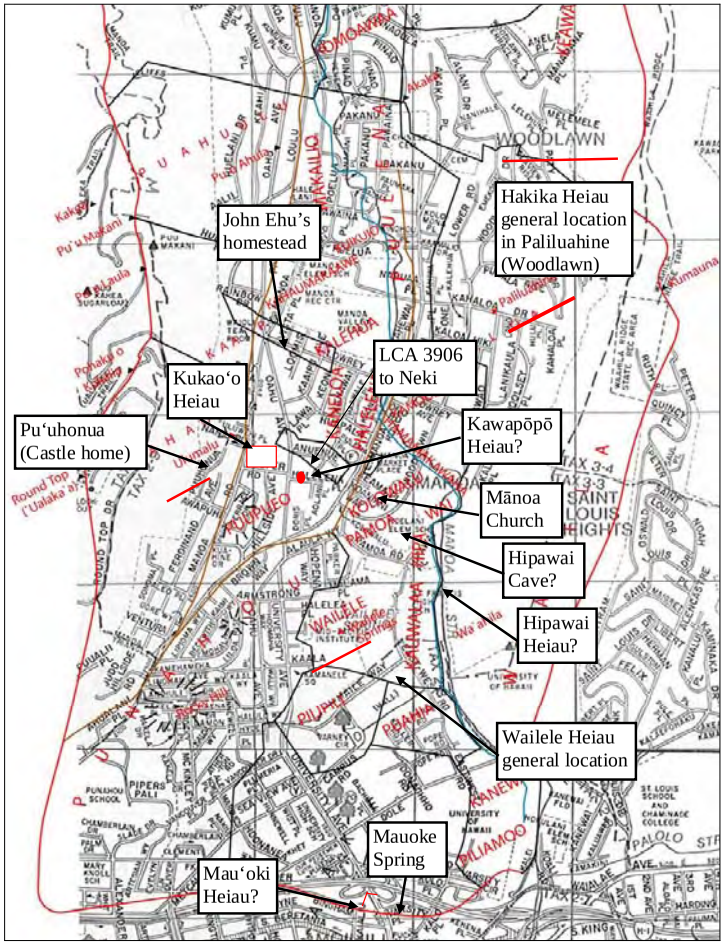


Figure 37. Overlay of 1822 E.D. Baldwin map of Mānoa Valley on modern street map, showing possible *heiau* locations

McAllister located Kūka‘ō‘ō Heiau during his inventory of O‘ahu in the early 1930s. He described it as a “small heiau 50 by 40 feet,” built on a natural elevation about 30 feet high. “There remain[s] a small inclosure and two terraces to the west” (McAllister 1933:79). He located the *heiau* on the premises of the residence of C. M. Cooke, Jr.

This *heiau*, which is still standing and located at 2859 Mānoa Road, has been recorded during several subsequent archaeological surveys (Kennedy 1991; Cleghorn and Anderson 1992; Tomonari-Tuggle 1998a). Various portions of the *heiau* have been recorded in TMK 1-2-019: 035, 036, and 043, in a large area between Mānoa and O‘ahu Roads and *mauka* of Cooper Road. In addition, a burial has also been recorded from 2859 Mānoa Road (Jourdane 1994).

Although there is no confusion over the present-day location of the *heiau*, there is some disagreement regarding the number of structures, the name of the surrounding area, and the name of the hill on which the *heiau* and/or fort was built. In Thrum’s 1892 account of Mānoa Valley, he described Mānoa Road as if he was traveling from the *makai* boundary to the upper valley. He states that Kūka‘ō‘ō Heiau was built on a rock pile, and the *menehune* fort was built “on the opposite side of the road on the rock hill, Ulumalu, just above Kukaoo.” This suggests there were actually two structures on ‘Ulumalu hill: a *heiau* on the east side of Mānoa Road and a *menehune* fort on the west side of Mānoa Road.

In the legend of Pueo Ali‘i, the king of the owls, Westervelt states that Pueo Ali‘i “was thought to be a chief leading his army along the hillside below Pu‘uhonua Temple.” In a footnote on the same page of his book, he states “This place is now the site of the Castle home” (Westervelt 1963a:131). William and George Castle built a large mansion in Mānoa in 1898 for their ailing mother Mary Tenney Castle, the widow of Samuel Northup Castle, one of the group of the eighth missionary party to Hawai‘i. They called the house Pu‘uhonua, which means “place of refuge.” It was built in a land area called Kaulumalu (Ka ‘Ulumalu) on a hill called ‘Ulumalu, at the place that would later be the end of Ferdinand Street. George Castle remembered that near the house was a “sacrificial stone and some ruins of the *heiau* to Kū‘ula and above on the hillside the Pōhaku Kū‘ula, a rock on which the watchman stood to command a view of the entire valley from mountain to sea” (Bouslog et al. 1994:88).

A hill labeled “Ulumalu” was plotted on the 1882 Baldwin map of Mānoa Valley on the west side of Mānoa Road. This map also shows that the hill was part of Grant 4166 to Mrs. Mary Castle. A *pōhaku* called Pōhaku o Kūkalia is also plotted on the 1882 Baldwin map of Mānoa Valley (see Figure 8) just *mauka* (northwest) of the hill labeled ‘Ulumalu. This may be the “sacrificial stone” that George Castle called Pōhaku Kū‘ula. The question remains if there was a fort also on ‘Ulumalu hill, or if the *heiau* ruins Castle is referring to is actually Kūka‘ō‘ō Heiau, on the east side of Mānoa Road. As mentioned previously, Westervelt refers to a structure called Pu‘uhonua Temple at the Castle residence. However, the presence of such a “temple” at the Castle residence would be inconsistent with George Castle’s reminiscences, since he refers to a sacrificial *heiau* dedicated to the war god Kū, not a *heiau* dedicated to “refuge.”

Joseph Kennedy (1991) concluded that there was only one structure, that acted as both a *heiau* and fort, and that it was located on the east side of Mānoa Road (location of Kūka‘ō‘ō Heiau). He believed that the surrounding area was called Kūka‘ō‘ō and the hill that the *heiau* was built on was called ‘Ulumalu (east side of Mānoa Road). The resolution to at least some of this

confusion may have been addressed in a 1982 article on the Castle home. In this article, the author states that the location for the house was chosen in 1898 on the western side of the valley.

> This is the *alii* (or noble’s) side of Manoa, rich in legend and folklore, known to Hawaiians as Kaulumalu (Breadfruit shade). . . . One of the Castle sons, George (1851-1932) recalled “there being a beautiful grove of breadfruit and ohia trees where native birds congregated in great numbers.” The man who planted the grove was very old and I was a boy. Sand [volcanic cinders] came down . . . and choked the trees. . . .
>
> Another son, William (1849-1935), gave the name Puuhonua to the property. *Pu‘u*—hill or protuberance, and *honua*—of earth, but also meaning a place set apart for refuge and safety. . . .
>
> The 8.16 acres had been purchased at auction on May 12, 1898, for $6,250. A government survey station on the site had already been given a name from the past, *Ulumalu*. (Robb and Vicars 1982:173-174)

These passages suggest that the specific association of the place name ‘Ulumalu with the hill on which the Castle home (west of Mānoa Road) was built may only date from the late nineteenth century; therefore, a hill on the east side of Mānoa road may well be the original (older) Pu‘u ‘Ulumalu. It seems to have been a mistake for Westervelt to call the Castle home “Pu‘uhonua Temple” or to associate it with Kūka‘ō‘ō Heiau, which was a sacrificial *heiau* dedicated to the war god Kū, and not a “place of refuge.” The name Pu‘uhonua was probably given to the house to represent that the place was a refuge for the Castle family (Stokes 1941:2). McAllister (1933:79) also showed some skepticism to the Westervelt reference for Pu‘uhonua Temple stating, “I doubt that this was a heiau.”

The *heiau* is also mentioned in Land Commission records as “LCA 3906 to K. Neki, *Heiau* of Kukao‘o, fence; house in” (see Table 1). On the 1882 Baldwin map, there is a property labeled “Gr. 638 Haalilio, see LCA 3906 W Neki.” Land Commission documents reveal the following information regarding this award:

> No. 3906, Neki, Honolulu, January 17, 1848
>
> N.R. 187-188v4
>
> To the Land Commissioners, Greetings and thanks: I, Neki hereby state my claims /at/ the land fence, mauka in Manoa, at the heiau of Kukaoo on the side below the heiau.
>
> These two fences of which I tell you were from my makuas - they expended a great deal of revenue in making these fences, and I also did, and they are mine at this time - no one else has a right to them. That is my explanation to you.
>
> I am, with thanks.
>
> NEKI

To the Land Commissioners - House lot, also. Greetings to you and thanks: I, Neki, hereby state my claim for a house lot which is mauka in Manoa in the Land of Kaloiiki. I have two house lots at this time. That is my explanation to you.

Aloha,

NEKI

N.T. 378v10

No. 3906, Neki (from page 306), 1 September 1854

Maki, sworn, I have seen his claim in Kaloiiki in Manoa of two lots with enclosures and in one piece.

Mauka, Mahune’s land
Waialae, Kaahaloa, Kalanikahua’s land
Makai, T. Tute’s land
Ewa, Mr. Marshall’s land.

This land was given to Neki by J. Haalilio when Kaahumanu was yet alive before 1832. No objections.

Kahanaumaikai, sworn, I have seen this place since 1842 to the present time. I have done farming under Neki and that place is for Neki. Mahi's statements above are true.

Kana, sworn, I have known in the same way as they have stated since 1845 to the present time.

[Award 3906; R.P. 6502; Kolowalu Manoa Kona; 1 ap.; 7.25 Acs]

On the overlay map (see Figure 37), this LCA seems to be in the general location over Anuenue Street rather than between Mānoa and O‘ahu Roads (where Kūka‘ō‘ō Heiau is standing). From the description, Neki says that his lot is “on the side below the heiau,” so it is possible that the *heiau* was not in this actual lot; rather the lot was *makai* of the *heiau*.

5.1.2 Kawapōpō Heiau

Upper Manoa, on premises formerly of Haalilio; a small *heiau* said to have been torn down prior to 1850 (Thrum 1907a:45].

McAllister (1933:80) could not relocate this *heiau*.

In 1975, Margaret Luscomb (1975) conducted an inspection of the Maretzki property on 2626 Anuenue Street. This property was a portion of Grant 638 to Hana Haalilio and K. Neki (LCA 3906), Royal Patent 6502, signed by Lunalilo. The Native Testimony for this award was presented above in the discussion of Kūka‘ō‘ō Heiau. Luscomb recorded a raised platform, 7 by 6.5 m on the property. Since this structure was on Ha‘alilio’s land, Luscomb concluded that this platform might be Kawapōpō Heiau. In the description of his land, Neki says it was below Kūka‘ō‘ō Heiau; there is no mention of the name Kawapōpō or of a second *heiau*.

One problem with assigning this structure as Kawapōpō Heiau is that Ha‘alilio was granted other lands in Mānoa, before the *Māhele*, and the location given by Thrum may refer to these other lands. Thrum described the location of some of these lands as *mauka* of John Ehu’s homestead:

> The site of the various houses that once sheltered Haalilio and his retinue is pointed out just above the old Ehu homestead, known later as the ‘Charley Long’ premises and, till very recently, part and parcel of Montana’s Kaipu Diary. Rev. H. Bingham, of early Hawaiian Mission fame, is also referred to by old timers as having had a residence adjoining the Haalilio premises, though his history makes no mention thereof. (Thrum 1892:114)

On the 1882 Baldwin map, two properties (Grants 15 and 54) are shown in the ‘*ili* of Ka‘aipu awarded to John Ehu (see Figure 37). If Thrum is referring to land owned by Ha‘alilio that is above John Ehu’s homestead, Kawapōpō Heiau may have been located much farther *mauka* of the structure recorded by Luscomb in LCA 3906 to Neki. This would suggest that the structure recorded by Luscomb may be part of Kūka‘ō‘ō Heiau instead. Because of Thrum’s imprecise location and the fact that McAllister could not relocate Kawapōpō Heiau, it is impossible at this time to determine whether Luscomb correctly identified the structure on the Metzinger property as Kawapōpō Heiau.

5.1.3 Hakika Heiau

> Paliluahine, east side of valley.-A round heiau of not large size. Foundations now barely traceable. (Thrum 1907a:45)

McAllister (1933:80) could not relocate this *heiau*, but according to Thrum’s description, it was on the east side of the valley, in the area called Paliluahine (near the modern-day suburb of Woodlawn). On the 1882 Baldwin map (see Figure 37), there is a peak labeled Paliluahine; therefore, the *heiau* was probably in this general location, but the specific location is not known.

5.1.4 Hipawai Heiau

Thrum described Hipawai Heiau as:

> Makai of Church, Manoa.-Of large size and pookanaka class, partly destroyed many years ago, then used as a place of burial. Remaining walls subsequently torn down. (Thrum 1907a:45)

This *heiau* was possibly described in 1823 by Levi Chamberlain, when he and other missionaries came to inspect a lot of three acres given to them by the Hawaiian government. The official report of the Sandwich Island Mission described the structure as:

> On one side of this secluded valley they visited an old *heiau* or place of worship of Kamehameha‘s time, consisting now simply of a stone wall enclosing a small area about 20 feet square. (cited in Bouslog et al. 1994:12)

In his own journal for June 6th, 1823, Levi Chamberlain described in more detail “the ruins of a moreai [heiau]” as:

> It was a regular wall built of loose stones about twenty four feet square from three to four feet high on the inside & from two and an [sic] half to three feet in thickness. On the north the outer side of the wall was much higher owing to a declivity at the foot of which were a few *kou* trees. The tall grass within and around was an evidence that it is a long time since it had been frequented for the purpose of superstitious ceremonies. It is probably fifty years since it was erected. (cited in Bouslog et al. 1994:11-12)

The Mānoa Church was built in 1846 as an *‘āpana* (branch) of the Kawaihao‘o Church. A newspaper article says that Hipawai Heiau was torn down in 1819 and some of the stones were used to build the rock foundation of the Mānoa Congregational Church, a building which replaced the Mānoa Church in 1935. Some stones may also have been used in the Mānoa Hawaiian Cemetery. A new church was built in 1968 on nearby Huapala Street, and the old building, on 2833 E. Mānoa Road, was used to house the Mānoa Valley Theater (Williams 1980:1).

Hipawai is also the name of a cave.

> There is a large underground cavern with much of the water of Manoa passing through it under the area of Woodlawn Drive where the new (1975) astronomy building of the University is. People went down into the cavern in former times. (Mary Pukui, cited in Sterling and Summers 1978:287)

The former location of the 1846 Mānoa Church is plotted on the 1882 Baldwin map (see Figure 37). The present day location of the astronomy building of the University of Hawai‘i, and thus the possible location of Hipawai Cave, is shown on the base map of the same figure.

Hipawai Heiau was reported as *makai* of Mānoa Church. In 1968, Francis Ching recorded a rock mound, two to three feet high, 30-40 feet long, and 18 feet wide, with some remaining facing on the *makai* side. A platform was also present on the *makai* side. This *heiau* was located on the Magoon property on land donated to the University of Hawai‘i. Ching identified this structure as a possible *heiau*, but did not suggest a name for the structure. Ching also stated “I was also told that there was another site similar to the one discovered a little further makai” (Ching 1968:1).

In 1988, a field check was conducted at the St. Francis High School campus (TMK 1-2-9-04:01), which is *makai* and adjacent to the northeastern corner of the campus (Kawachi 1988a). Carol Kawachi recorded several walls and terraces in this area, but the place was heavily vegetated. An inventory of the features was not made, and no map was drawn. Kawachi also reported on a 1908-1909 military map that showed a *heiau* in the general area. She then suggested that this *heiau* could be the same as the one recorded by Ching on the Magoon property, but since Ching did not give the TMK of the parcel he investigated, it was difficult to determine the exact location of this structure. According to a Land Court Map of 1926, Magoon once owned property in several locations, including upstream of the St. Francis campus.

The exact 1908-1909 military map referred to by Kawachi could not be determined, but a 1908-1913 Corps of Engineers map (Figure 38) does show an L-shaped structure *mauka* and upstream of the St. Francis campus. This map was made before the construction of the high

school, which was founded in 1924 by the Franciscan Sisters of the Third Order. Although this structure is not labeled as a *heiau*, it may be the structure recorded by Ching, and may be Hipawai Heiau. A further confirmation of this attribution can be found on the 1822 Baldwin map (see Figure 37); the area where this L-shaped structure would be on this map (*mauka* of St. Francis High School) is in the *‘ili* named Hipawai (*lit.* water foolishness). In fact, the street just *mauka* of the high school is called Hipawai Place, which was “named for an O‘ahu land section” (Budnick 1989:43).

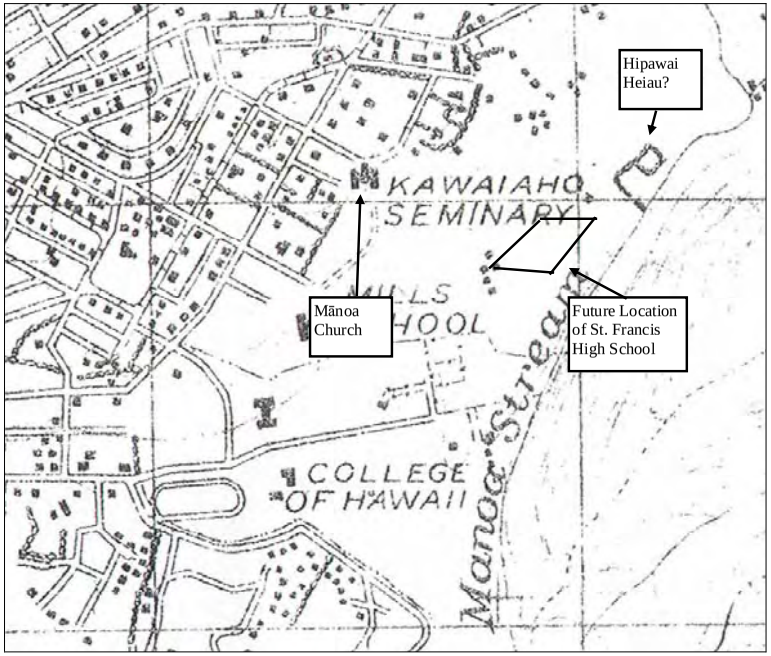


Figure 38. 1908-1913 Corps of Engineers Fire Control map, showing L-shaped structure, possibly Hipawai Heiau, on land later *mauka* of the St. Francis High School Campus

5.1.5 Mau‘oki Heiau (Kamō‘ili‘ili Heiau)

Mau‘oki was a *heiau* of the *po‘okanaka* type (large *heiau* for the paramount chief of the district or island), as discussed by Samuel Kamakau:

> There were many heiaus and *luakini* heiaus in Honolulu in the ancient days. . . . Of *heiau po‘okanaka* there were Pakaka and Kaheiki in Honolulu, and Mau‘oki, Kupalaha and Le‘ahi [Papa‘ena‘ena] at Waikiki. Mau‘oki was a *luakini heiau* built by the Menehune, a numerous race of men often spoken of in the traditions of *ka po‘e kahiko*. Kahanoniualewa [Kahano-a-Newa] is said to have brought them here; his arms were the bridge. Mau‘oki was made of stone from Kawiwi in Wai‘anae, and there were so many Menehene that each brought one stone, and Mau‘oki was completed. *Ka po‘e kahiko* called these people Menehene; it is said the came from the east. (Kamakau, *Ka Nūpepa Kū‘oko‘a* March 3, 1870; translation in Kamakau 1991c:144)

The association of the *heiau* with the high chiefs in O‘ahu is illustrated in the story of the birth of Kiha-a Pi‘ilani. Lā‘ie-lohehoe was an *ali‘i* born at Helumoa and raised at Kaluaokau in Waikīkī. She was betrothed to Pi‘ilani, the son of the *mō‘ī* (island-wide chief) of Maui and moved to his Pi‘ilani’s father’s residence at Lāhainā in Maui for her wedding. They had four children; for the birth of her fourth child, a son, she returned to O‘ahu. Samuel Kamakau reported that Kiha-a-Pi‘ilani, the son of Lā‘ie-lohehoe and Pi‘ilani of Maui, was taken to Mau‘oki Heiau after his birth at ‘Āpuakēhau in Waikīkī.

> No Kihapiilani. Ua laweia oai e ke kahuna e hanai i ka moku. O Mauoki hoi ka heiau i ku i ka moku ma ka olelo a ke kahuna. Ua hanai ia oia a nui, a ua ao ia i ke koa me na oihana, kakaolelo, me ke akamai hoi i ka oihana hana. (Kamakau, Ka Nūpepa Kū‘oko‘a, August 26, 1865)

> Kiha-a-Pi‘ilani was taken by the *kahuna* and raised at the *heiau* of Mau‘oki at Kamō‘ili‘ili [Mō‘ili‘ili]. He was raised there until he was grown and taught to be a warrior and an orator; he was skilled in those professions. (Kamakau 1991c:50)

The *heiau* was described by Thrum (1907a:44) as:

> It is said to have been of traditional Menehune construction with stones brought one by one from Kawiwi, Waianae. It was a heiau of good size, walled on three sides and open to the west that stood at the foot of the slope dividing the Manoa and Palolo valleys, Kamoiliili.

Thrum also referred to this *heiau* as the Kamō‘ili‘ili Heiau.

> Kamoiliili. Heiau and luakini [sacrificial heiau]; erected according to tradition by Menehunes with stones from Kawiwi Waianae. Torn down about 1883 by the Minister of Interior for street work. (Thrum 1907a:44)

According to Thrum, the *heiau* was in Mō‘ili‘ili, at the border of the *ahupua’a* of Mānoa and Pālolo. According to C. S. Stewart (Sterling and Summers 1978:279), Mau‘oki Heiau was located possibly at the junction of Wai‘alae Avenue and Third Street, which would place the

heiau just south of Chaminade University in the *ahupua‘a* of Pālolo. McAllister also located the *heiau* (Site 62) in Pālolo Ahupua‘a, just *mauka* of Site 61, the Mō‘ili‘ili petroglyphs.

Dr. Richard Bordner, who was familiar with the Chaminade University area, said he believed a large agricultural *heiau* was once just north of an area of petroglyphs along Pālolo Stream. This *heiau* was on a relatively flat area on the west edge of Pālolo Stream near where there is presently a 22-caliber rifle range. Dr. Bordner’s account of the relationship of these petroglyphs and a *heiau* are consistent with McAllister’s (1933:57) description of Mau‘oki Heiau (McAllister’s Site 62), which was just *mauka* or north of the Mō‘ili‘ili petroglyphs (McAllister’s Site 61). According to Dr. Bordner, until relatively recently, there were still some large boulders in the immediate vicinity that may be remnants of this *heiau* (Hammatt et al. 2002:23). A search for this *heiau* was made during the recent Ala Wai Watershed survey, but no *heiau* or cluster of boulders was found. In a recent conversation with Dr. Bordner, he stated that he believed that the remains of the *heiau*, and the petroglyphs, have been destroyed.

All of these reports have placed Mau‘oki Heiau within the current boundaries of Pālolo Ahupua‘a, near Chaminade University. McAllister (1933) located the *heiau* just north of the petroglyphs, which seem to be definitely near Pālolo Stream; however, McAllister never personally saw the *heiau*, since it had been destroyed in 1883.

On an 1883 survey map (Figure 39) by S. E. Bishop (traced by E. Kealoha in 1958), a structure labeled “heiau” is shown near a feature labeled “Mauoke Spring,” both of which are *mauka* of “Moiliili Road” and King Street (along the present day alignment of Wai‘alae Avenue) in the *‘ili* of Pa‘akea. In a comparison of this map with the 1882 S.E. Bishop map of Mānoa Valley (see Figure 8), this location is south of the *‘ili* of Pilipili and west of the *‘ili* of Kānewai (the present day athletic field for the University of Hawai‘i at Mānoa). If the pictured *heiau* is Mau‘oki Heiau (as suggested by its proximity to “Mauoke Spring”), then Mau‘oki Heiau was actually once located much farther west than Chaminade University, near the *makai* border of Mānoa Ahupua‘a (south of the University of Hawai‘i) rather than near the *makai* border of Pālolo Ahupua‘a (south of Chaminade University).

This location seems to be near the Mō‘ili‘ili Quarry, but the correlation of the 1882 map and the modern map is probably not exact. This also means that the agricultural *heiau* noted by Dr. Bordner near the Mō‘ili‘ili petroglyphs may be a different *heiau* than the *luakini* (sacrificial) *heiau* of Mau‘oki. It is also possible that Mauoke spring was another name for Kumulae Spring, an ancient legendary pool that is associated with the extensive karst caves of Mō‘ili‘ili.

5.2 Early Archaeological Surveys of Mānoa Valley

In J. Gilbert McAllister’s island wide archaeological survey (1933), he recorded five sites in the vicinity of Mānoa including Site 61 petroglyphs, Mō‘ili‘ili, Site 62 Mau‘oki Heiau, Site 63 Hipawai Heiau, Site 64 Kūka‘ō‘ō Heiau, and Site 65, which seems to refer to the whole valley (Figure 40).

Under McAllister’s Site 65, “Mānoa Valley,” he discusses “Pu‘uhonua Heiau,” the sweet potato fields of Pu‘u Ualaka‘a, Thrum’s sacred stone, a cave on the east side of Mānoa Valley, which Westervelt (1904:2) associates with Kamehameha the Great, and the Kawapōpō and Hakika Heiau. Little new information is presented regarding the other sites.

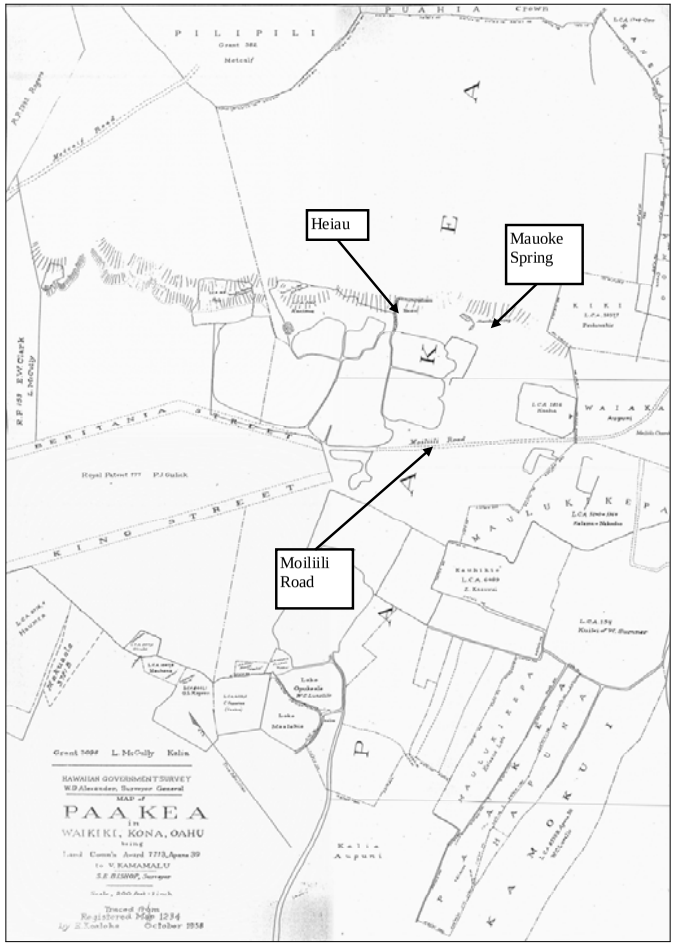


Figure 39. 1883 S.E. Bishop map of Pa‘akea, showing location of a *heiau* near Mauoke Spring

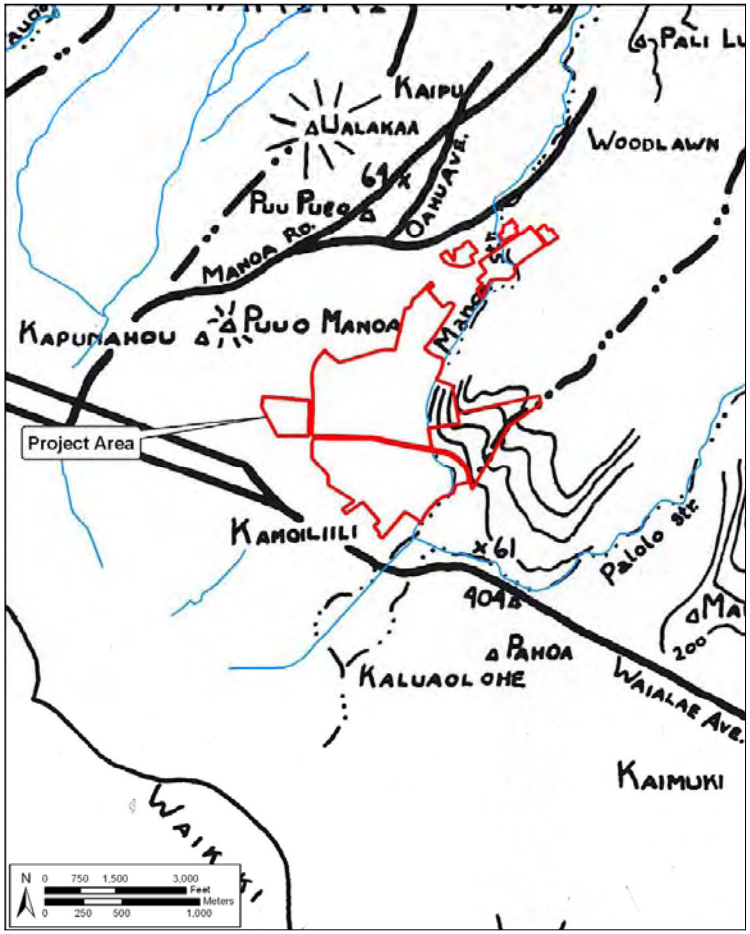


Figure 40. Project area (in red) in relationship to archaeological sites identified in Sites of O‘ahu (Sterling and Summers 1978)

Until 1900, Punahou School had a small collection of Hawaiian artifacts in a glass cabinet in the Old School Hall. Some of these artifacts are shown in a circa 1900 photograph (Figure 41). In the foreground of the photograph is a carved wooden figure that may be the wooden figure found by Punahou students on Rocky Hill. Foster says this was found “on Rocky Hill” (Foster 1991:35) in one section and “in a cave on Rocky Hill, a vestige of the *heiau* that once stood in that area” (Foster 1991:128).

> Samuel Armstrong mentions exploring its caves for wooden idols and ghosts, and Thomas Gulick tells in detail how the boys, climbing the slope, once came upon a cavern between the cliffs and, by excavating, penetrated to a point where they required torches to see their way. There they discovered a little idol. It must have come from the small *heiau* that once stood on Rocky Hill. Probably it and a large wooden idol brought to Punahou from a taro patch at Waialua had both been hidden at the time the edict had gone forth to destroy all the idols. (Alexander and Dodge 1941:122)

Other early site designations in Mānoa included the Bishop Museum’s designation of the former home of Queen Ka‘ahumanu, “Pukaomaomao,” in upper Mānoa as Site 405 and the designation of a complex of agricultural terraces in extreme northern Mānoa Valley (State Site #50-80-14-3953).

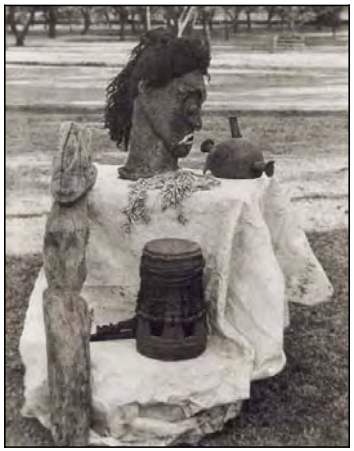


Figure 41. Circa 1900 photograph of artifacts displayed at Punahou College including the wooden idol (left foreground) possibly found in a cavern in Rocky Hill

5.3 Post 1960 Surveys of Mānoa Valley

Between 1963 and 1990 there were at least thirteen other archaeological studies in the Mānoa area, which are summarized in Table 2 and plotted in Figures 42 and 43. Of particular interest is the recovery of a total of 25 presumed prehistoric burials from six other areas (Sites 3743, 4038, 4134, 4191, 4266 and the Koana Cave Site). The oldest report of burials in the Mānoa area of which we are aware concerns the discovery of human bones in a cave site located approximately 50 m *mauka* of the Dole Street burial site (4266). This cave is almost certainly the “cave called Koana” on a 1916 Podmore map (Figure 44). A neighboring resident informed us that she had taken human skeletal remains discovered in the cave to the B.P. Bishop Museum (she thought it was in 1953), and that subsequently archaeologists from the Museum had visited the cave and indicated that they felt the site had little potential. The Bishop Museum has no record of such a visit; however, they have an accession of an adult female crania (osteological catalogue #2863) dated 7/10/1964 from St. Louis Heights, O‘ahu giving a person with the same last name (different first initial) as the source. Typically a Museum archaeologist would have investigated such a discovery. A habitation or burial function of the cave is suggested by one possible translation of *ko‘ana* – “to stay or settle in one place, as people” (Pukui and Elbert 1986:157).

The five burial sites (3743, 4038, 4134, 4191 and 4266) were all interpreted as “prehistoric or early historic” (Bath and Smith 1988; Bath and Kawachi 1989; Bath and Kawachi 1990; Hammatt and Shidleler 1991; Smith and Kawachi 1989). With one exception (the Dole Street burials), there were no associated cultural materials with any of these remains, nor was there any chronological dating. The Dole Street burials were associated with three formal artifacts of traditional design and with cultural layers dated to the fifteenth century A.D. (Hammatt and Shideler 1991).

Three of the archaeological studies bear upon *heiau* at Mānoa. Luscomb (1975) may have correctly dentified the remains of Kawapōpō Heiau. Ching (1968) and Kawachi (1988a) both discuss possible identifications of a *heiau* on what appears to be two different properties located on the west side of Mānoa Stream just north of University of Hawai‘i at Mānoa. It seems highly probable that Hipawai Heiau, where human sacrifices were offered, was in the immediate vicinity of these two study areas, but whether either report indeed describes remains of this temple is not altogether clear. There appears to have been no discussion of the other two known Mānoa Heiau: Kūka‘ō‘ō Heiau (2859 Mānoa Rd.) and Hakika Heiau (near Paliluahine-Chinese Cemetery hill) since McAllister (1933). Other archaeological reports discuss minor agricultural sites or report no sites at all.

Archaeological data recovery was conducted at the Kāpapa Lo‘i ‘o Kānewai (a.k.a. Kānewai Cultural Garden) in association with construction of the University of Hawai‘i Center for Hawaiian Studies building (Liston and Burtchard 1996). The project area was located adjacent to the east bank of Mānoa Stream, immediately *makai* of the Dole St. bridge. The Kāpapa Lo‘i ‘o Kānewai, designated Site 50-80-14-4498, consisted of a 1.7-acre parcel including active cultivation of taro *lo‘i* and native Hawaiian plants. The area had been restored in the early 1980s by a group including community members, University students, and alumni. It was also noted by the Hawaiian Botanical Society that the garden was home to 69 varieties of taro, including 60

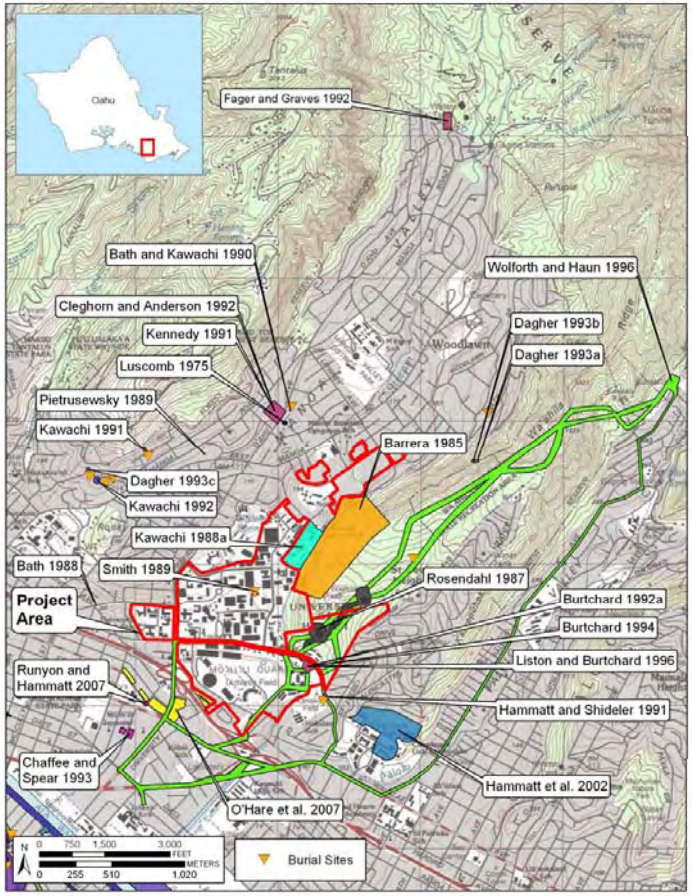


Figure 42. Previous archaeological studies in the vicinity of the project area

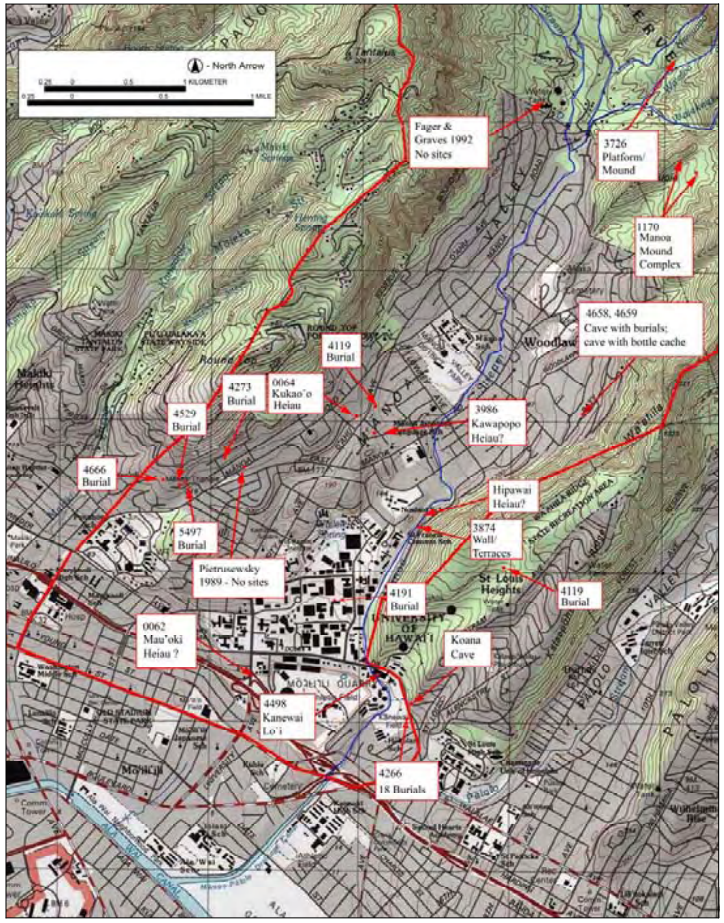


Figure 43. Previously identified archaeological sites in Mānoa Ahupua‘a (project areas with no identified sites are denoted by author and year of report)

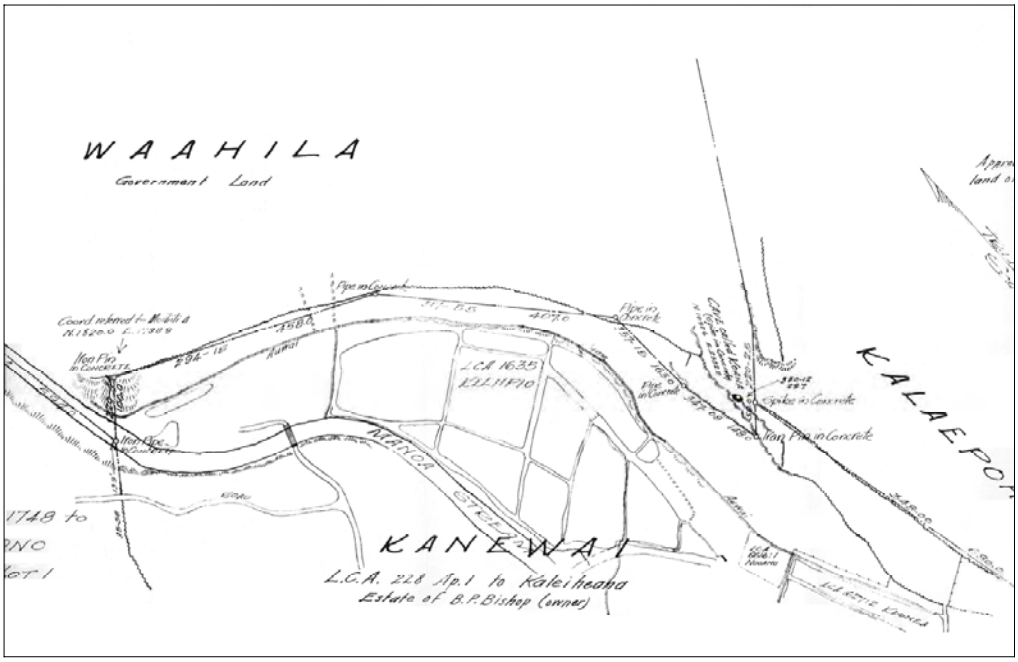


Figure 44. Podmore map (1916 or 1917) of the boundary between the *‘ili* of Waahila and Kanewai showing an *‘auwai* and a “cave called Koana.” The field sections in the center of the image represent the present-day Kānewai cultural garden

Table 2. Previous Archaeological Investigations in Mānoa Ahupua‘a

Reference	Type of Investigation	Site 50-80-14-	Findings
Thrum 1907a, b McAllister 1933	Heiau Study Island-wide Study	0063	Briefly describes Hipawai Heiau, reportedly destroyed at the time Reprints Thrum’s description
Thrum 1907a,b McAllister 1933 Kennedy 1991 Cleghorn & Anderson 1992 Jourdane 1994 Tomonari-Tuggle 1998a	Heiau Study Island-wide Survey Arch. Investigation Inventory Survey Burial Report Historical Research	0064	Thrum briefly describes Kūka‘ō‘ō Heiau (rebuilt around 1700) McAllister repeats Thrum’s description and adds new information Investigation of Kūka‘ō‘ō Heiau Inventory Survey of Kūka‘ō‘ō Heiau and Preservation Plan Inadvertent discovery of human skeletal remains at 2859 Mānoa Rd Historical background pertaining to Kūka‘ō‘ō Heiau
McAllister 1933	Island-wide Survey	0065	Designates Mānoa Valley as Site 65.
Smith 1988a	Site Description	1170	Description of previously identified Mānoa mound complex site
Smith 1988b	Site Description, Reconnaissance	3726	Inspection of Pu‘u Pia trail alignment. Description of a new site with a platform and mound.
Bath & Smith 1988	Burial Removal	3743	Burial removal from 2034 Round Top Drive
Ching 1968 Kawachi 1988b	Reconnaissance Survey Field Check	3874	Survey of sites on the Magoon Property given to the Univ. of Hawai‘i. Site (3874) probably located near St. Francis High School grounds; possibly a pre-contact agricultural *heiau*. Field check of walls and terrace facings; St. Francis High School grounds may be location of a *heiau* shown on 1909/10 military map
Soehren 1963	Field Notes	3953	Notes in B.P.B.M. files on agricultural terraces
Thrum 1907a, b Luscomb 1975	Heiau Study Inspection Report	3986	Kawapōpō Heiau Examination of site at 2626 ‘Ānuenue St., probably Kawapōpō Heiau
Bath 1988	Burial Removal	4038	Burial removal from 2030 Wilder Ave. at Circle K convenience store.
Bath & Kawachi 1990	Burial Report	4119	Inadvertent discovery of human skeletal remains on O‘ahu Avenue
Bath et al. 1988	Burial Removal	4134	Burial removal from 2030 A Makiki St. (site 50-80-14-4134)
Smith & Kawachi 1989 Douglas 1990	Burial Report	4191	Burial Removal Near Keller Hall on the campus
Hammatt and Shideler 1991	Burial Report	4266	18 human skeletal remains found on Dole Street, C14 dating, perhaps a village cemetery; includes osteological analysis.
Kawachi & Douglas	Burial Report	4273	Burial found at Lower Mānoa, 2414 Sonoma St; includes osteological analysis.

native Hawaiian cultivars (Fenstemacher 1989). Controversy arose when construction plans would have allowed encroachment into the garden area. Final plans limited disturbance to the recently restored southeastern portion of the garden area. The data recovery work was later conducted in a portion of the *lo'i* area that would be impacted by construction. Backhoe testing revealed evidence of a prehistoric irrigation system and pondfield agriculture. Radiocarbon dating of recovered samples indicated a period of prehistoric usage (A.D. 1443-1681), abandonment, and later reconstruction in the early historic period (Liston and Burtchard 1996).

5.4 Division of Mānoa Valley

Mānoa Valley was once divided into two sections, one for the *ali'i* and their retainers and one for the commoners. The *ali'i* lived on the high, cooler western slopes; the commoners lived on the warmer eastern slopes and on the valley floor where they tended their irrigated taro fields (Bouslog et al. 1994 12). Mary Kawena Pukui (in Sterling and Summer 1978:283) has stated:

> In Mānoa valley a low hill at the head of the valley and Rocky hill above Punahou are said by a kinswoman of mine to have marked the division between the chiefs and the commoners in that valley. The chiefs lived on the west half, the commoners on the east. The chief's excrement was buried secretly in the commoners' ground by the keepers…The imaginary line from Puu-o Mānoa to Ka-pali luahine marks the division of Mānoa; on the left called Mānoa-alii, and on the right, Mānoa-Kanaka.

Pu'u Mānoa is best known as Rocky Hill on the Punahou Campus. It seems that Kapaliluahine - the *mauka* reference point - is the small green hill in back of the Chinese cemetery (as illustrated by Sterling and Summers 1978).

Such a cognitive division of the valley suggests that the commoners - the vast majority of the populace - would have been buried on the east side of the valley. It also seems probable that the remains of the aristocracy would be buried on the east side as well, in as much as both corpses and excrement would have shared certain cultural values of dangerousness and defilement. It may well be that the division of the valley into Mānoa – Ali'i and Mānoa-Kanaka was drawn because the west side of the valley was generally higher and less swampy than the east side. It may have been drawn with regards to the experience of sunlight. The Mānoa Ali'i of the valley would have the experience of the rising morning sun which was associated with values of ascendancy, tumescence, vigor and fertility, while the decline of the sun which illuminates the Mānoa-Kanaka side would have been associated with values of decay, senescence, and death.

The four known sites of prehistoric burials in Mānoa proper (Bath and Smith 1988; Smith and Kawachi 1989; the Koana Cave site; and the Dole Street site) all fall in Mānoa-Kanaka, as defined by Pukui.

Perhaps significantly two prehistoric burials have been reported just to the west of Mānoa Valley (Bath and Smith 1988, Bath 1989), standing in relation to Makiki Valley much as the Kānewai burials relate to Mānoa Valley. This suggests a possible pattern of prehistoric burial practices that may have been widespread - interring the dead near the east border of south facing valley mouths.

Reference	Type of Investigation	Site 50-80-14-	Findings
1991			
Burtchard 1992a Burtchard 1992b	Data Recovery Testing	4498	Letter to Tom Dye regarding test trenches at Kapapa *lo'i* Kānewai. Letter report on trenching conducted to mitigate adverse effects of Hawaiian Studies Institute construction at Kapapa *lo'i* Kānewai
Burtchard 1994 Liston & Burtchard 1996 Tomonari-Tuggle 1998b	Data Recovery Site Description, Historic Literature Historical Research, Arch. Assessment		Paleoenvironmental samples, stratigraphic profiles at Mānoa stream. Prehistoric irrigation system that supported agriculture between A.D.1443-1681 at Kapapa *lo'i*, Kānewai Recommends subsurface testing or archaeological monitoring at Kānewai for the National Marine Fisheries Service Laboratory
Pietrusewsky 1992 Kawachi 1992	Burial Report Burial Report	4529	Inadvertent discovery of human remains at 1908 Judd Hillside Road
Dagher 1993a	Burial Report	4658	Inadvertent discovery of cave containing multiple burials in Mānoa Valley.
Dagher 1993b	Site description	4659	Historic bottle cache found in Mānoa Valley Cave
Dagher 1993c	Burial Report	4666	Discovery of human skeletal remains at 2048B Ualaka'a Street
Jourdane 1997	Burial Report	5497	Inadvertent discovery of skeletal remains at Wo/Sullivan House construction, 1908 Judd-Hillside Road. Skeletal remains are of undetermined age and ethnicity
Bishop Museum (Bowen?) 1964	Field notes		Visited Koana cave in response to discovery of human remains. No report.
Barrera 1985	Survey and Testing		No sites reported in project area within the Mānoa Hillside Subdivision.
Rosendahl 1987	Reconnaissance Survey		No sites found at the Wa'ahila Reservoir Project Area.
Pietrusewsky 1989	Burial Report		Cremated dog and cat remains found at 2462 Mānoa Rd, no site number assigned to burial.
Fager & Graves 1992	Inventory Survey		No sites found at prospective well site project area
Jones et al. 1994	Archaeological Monitoring		Archaeological monitoring at the site of the UH School of Architecture. No sites.
Grune 1992	Archaeological Synthesis		Synthesis of sites in Mānoa Valley
Dixon 1993	Reconnaissance Report		Absence of cultural remains at proposed Board of Water Supply well within Mānoa Valley Park, recommended an archeological monitor be present during construction.
Chaffee & Spear 1993	Archaeological Assessment		No sites located at 2 Vancouver Drive lots; Vacant lots, some evidence of 1900s house foundations and walkways on surface.
Hammatt & Chiogioji 1998	Archaeological Assessment		No sites found on a 2.4 Long portion of the H-1 Highway from the Punahou Street Overpass to Vineyard Blvd. Off-Ramp
McIntosh & Cleghorn 2007	Archaeological Monitoring		Archaeological monitoring near the site of the UH School of Architecture. No sites.

Section 6 Results of Fieldwork

Fieldwork was conducted on May 14, 2008, by two CSH archaeologists, Chris Monahan, Ph.D. and Jon Tulchin, B.A., working under the overall guidance of Hallett H. Hammatt Ph.D. Specific methods and documentation details have been described in Section 2 (Methods). The scope of work called for a limited field inspection of the project area to identify any surface archaeological features; to investigate and assess the potential for impact to such sites; and to identify any sensitive areas that may require further investigation or mitigation prior to proposed development projects.

Field inspections were made of the following portions of the overall project area:

1. the Kānewai *lo‘i* (taro pondfields) and associated *‘auwai* system (collectively designated State Inventory of Historic Properties [SIHP] No. 50-80-14-4498);
2. Koana Cave, a possible habitation site, from which human remains were reportedly collected in the 1950s and accessioned by the Bishop Museum in the 1960s;
3. the posited location of Hipawai Heiau (designated SIHP No. 50-80-14-63) near the southern tip of TMK: (1) 2-9-023:001 (on the so-called “Mauka Campus”), and;
4. the Wa‘ahila Ridge area, located immediately east of Mānoa Stream in the lower Mānoa Valley.

6.1 Kānewai Lo‘i

CSH archaeologists and cultural specialists (working on the companion CIA for the subject project) visited the site with current Director of the Ka Papa Lo‘i o Kānewai, Mr. Makahiapo Cashman. We walked the entire site area, from above the *po‘owai* (the “head,” or *po‘o*, upstream end of the irrigation ditch that feeds the taro) to the *ho‘iwai* (the “return,” or *ho‘i*, downstream end of the main ditch) (Figures 45 through 47).

There appears to be some confusion regarding the historic significance of the Kānewai *lo‘i* (SIHP No. 50-80-14-4498), and its eligibility for the Hawai‘i Register of Historic Places (HRHP). Some sources suggest the site area is not historically significant, and therefore is not eligible for the HRHP, because the totality of the surface remains—including the *‘auwai* (irrigation ditch) system—have all been built or largely rebuilt since about 1980. Field inspection of the entire site area confirms these observations, and evidence of modern construction materials can be observed throughout all of the main components of the irrigation and pondfield complex.

However, prior subsurface testing (archaeological excavation), radiocarbon dating and pollen analysis by International Archaeological Research Institute, Inc. (cf. Liston and Burtchard 1996) demonstrate use of the area as a taro *lo‘i* from the middle 1400s, and perhaps earlier. Thus, as echoed by subsequent studies of this area from a historic preservation perspective (cf. Tomonari-Tuggle 1998), any proposed subsurface disturbances or major excavation at the Kānewai *lo‘i* should be preceded by additional archaeological testing (controlled excavation), or should be

Figure 45. Upstream end of the main *‘auwai* at Kānewai (facing downstream); red arrow indicates the approximate location of the *po‘owai* (“head” of the ditch)

Figure 46. Stone walkway between the main *‘auwai* (left) and the Mānoa Stream (right), facing downstream, approaching the Dole Street Bridge

Figure 47. Overview of the central portion of the Kānewai Cultural Garden

monitored by a qualified archaeologist to mitigate against any potentially adverse impacts to pre-Contact and / or early historic deposits that may still be present (see Section 7 below).

Clearly, given its proximity to the well-known (now in-filled) Kānewai Pūnāwai (Spring) and the probable pre-Contact cemetery area known as the “Dole Street burials” (SIHP No. 50-80-14-4266), and given its physiographic location at the important transitional zone between the upland valley / ridge system and the Waikīkī plain, the Kānewai Lo‘i is a highly significant historic property, regardless of its loss of surface-feature integrity (Figures 48 and 49).

6.2 Koana Cave

As described in detail in Section 5.3 (above), human skeletal remains were reportedly collected from Koana Cave by a resident of St. Louis Heights in the 1950s, and turned over to the Bishop Museum, which accessioned these in the middle 1960s. No additional records of the Bishop’s work at this cave have been located, although it appears that a site visit was conducted in the 1960s, at which time the cave was deemed to have relatively little excavation potential.

CSH archaeologists and cultural specialists visited Koana Cave, which is located in the extreme southeast corner of the UH property, a short distance upslope from Dole Street, immediately adjacent to residences of St. Louis Heights (Figures 50; see also Figures 48 and 49).

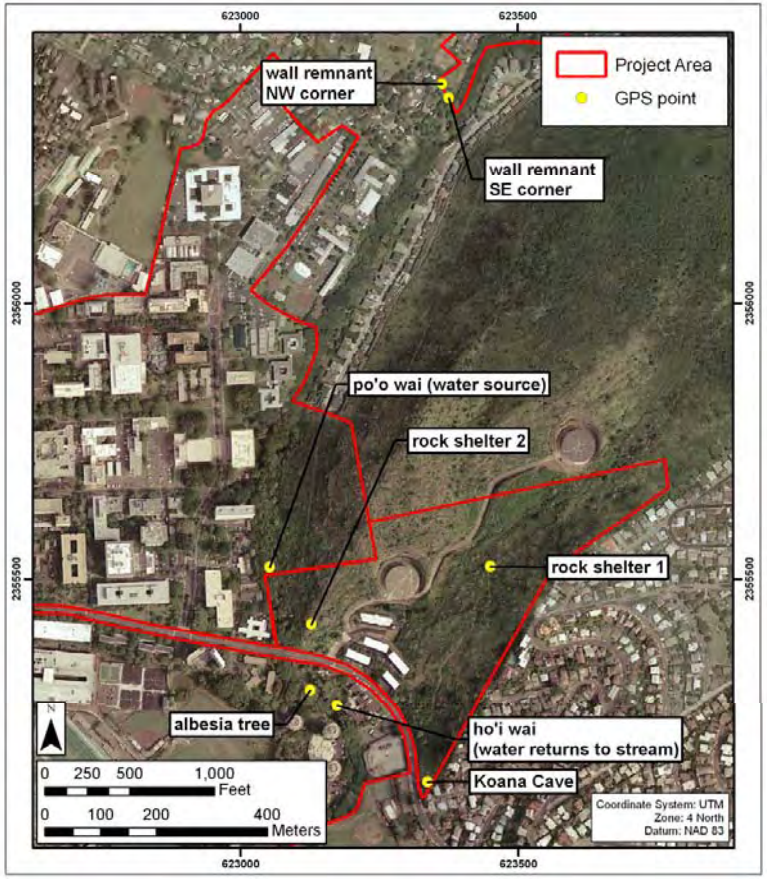


Figure 48. GPS locations of major sites and features described in the results section

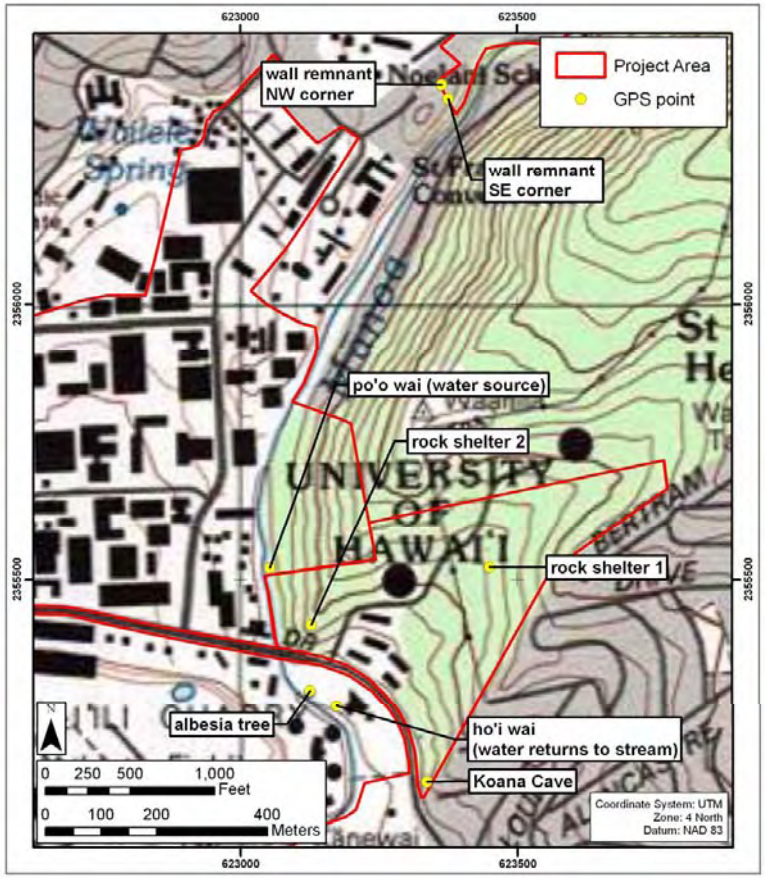


Figure 49. GPS locations of major sites and features described in the results section

Figure 50. Approximate location of Koana Cave indicated by red arrow, just above Dole Street

CSH staff carefully inspected the entire ground surface of the cave, which consists of one, relatively small main chamber; its maximum dimensions are approximately 5-6 feet in height at the south-facing opening (and diminishing considerably towards the back of the main chamber), approximately 12-15 feet across the main opening; and approximately 10-15 feet in depth from the opening to the back of the main chamber (Figure 51). No human skeletal remains were observed, nor were any minimally-identifiable or non-identifiable bones that might be deteriorated human skeletal remains observed. One cow (rib) bone and several *kukui* (candlenut, *Aleurites moluccana*) shells (some burned) were observed on the ground surface within the main chamber. No other historically-significant cultural materials were observed in the cave.

A relatively small terraced area is located outside of the main chamber, immediately south of the opening, and beyond the dripline of the overhang; this area of level soil, which measures approximately 12-15 feet in length (i.e., parallel with the slope contour lines) by 6-8 feet in width (i.e., perpendicular to the slope contour lines), has recently been used as a gardening site, with modern plastic drip-line tubing. It is likely that this area was at least partially modified (i.e., artificially enlarged and filled with soil) at some point in the past to take advantage of the natural rocky terrace. There is a relatively high probability of encountering historically-significant cultural deposits below the ground surface in this terrace area, especially nearer the dripline and just under the opening of the main chamber. Several small bones, including bird and fish, were observed on the ground surface in the terraced area. No other historically-significant cultural materials were observed on the terrace area.

Figure 51. Main chamber of Koana Cave

6.3 Wa‘ahila Ridge

CSH archaeologists and cultural specialists conducted a pedestrian reconnaissance of the approximately 50-acre Wa‘ahila Ridge portion of the project area (Figure 52). Two specific areas with prominent rock exposures and overhangs, possibly representing rockshelters used in the past, were identified (see Figures 48 and 49). Both of these areas contain several possible rockshelters that might yield historically-significant cultural materials in subsurface deposits. Both areas also contain evidence of ongoing or recently-abandoned “homeless” shelters, tarps and tents that precluded more thorough inspection. For this reason, the two possible rockshelter areas should be considered representative and approximate descriptions of the available evidence on the ground. The area immediately west of the current Faculty Housing complex (Figure 53), for example, may extend some distance around the Wa‘ahila Ridge to the northwest; however, we were prevented from following it around due to the presence of people living in the area.

Other portions of the Wa‘ahila Ridge area include additional rock exposures and natural formations that may contain more possible rockshelters and / or petroglyphs, although high quality rock surfaces (typically required for petroglyphs) are rarely rare in the portions of the project area we visited.

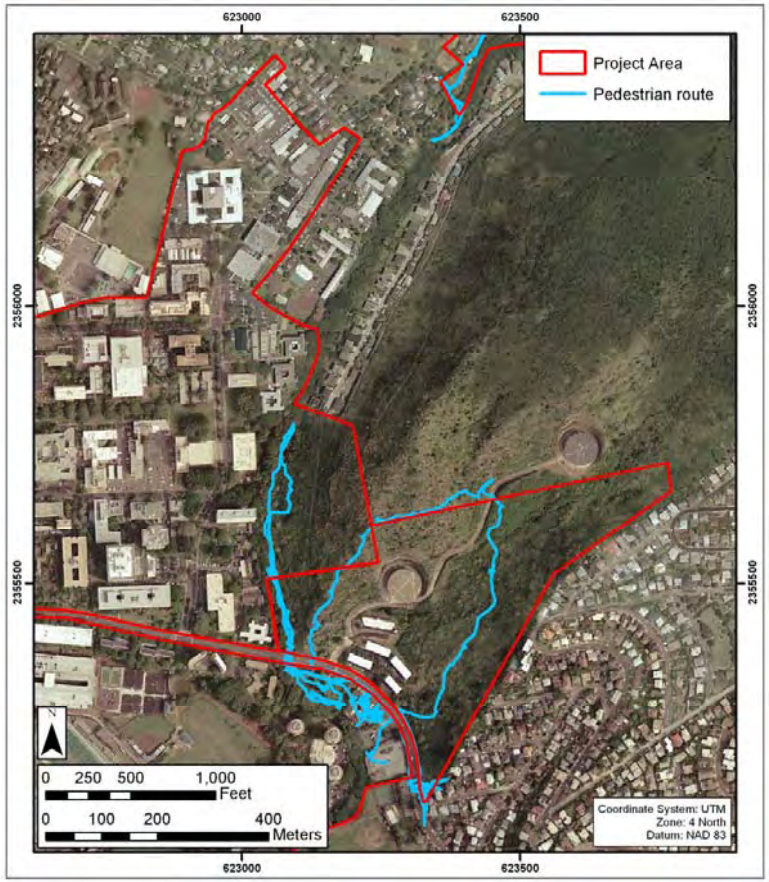


Figure 52. GPS tracking of pedestrian reconnaissance during the field inspection

Figure 53. Possible rockshelter located west of the Faculty Housing complex at Wa‘ahila Ridge

6.4 Hipawai Heiau

CSH staff visited the posited location of the Hipawai Heiau, which was accessed by way of UH’s agricultural research facility (the “Magoon Property”), adjacent to Woodlawn Drive (see Figures 48 and 49). As discussed above (Section 5.1.4; see Figure 38), as recently as 100 years ago, stone ruins have been depicted on historic maps in and around the reported located of Hipawai Heiau. We discovered what appears to be a very old remnant of stone wall (i.e., built in the traditional dry-stacked, core-and-fill style) located just outside of (and abutting) the chain-link fence defining the *makai* boundary of UH’s “Mauka Campus” (Figures 54 and 55). There is a good possibility that the main core of this wall remnant dates to pre-Contact or early historic times; as such, the wall should be treated carefully in the event that the existing fencing is altered or replaced (see recommendations below).

This old stone wall remnant lines up fairly well with the northern portion of the stone enclosure depicted in Figure 38 (Section 5.1.4). Accordingly, it is possible that as yet undiscovered subsurface deposits containing historically-significant cultural materials associated with Hipawai Heiau may be located in portions of the UH property.

Figure 54. Stone wall remnant at the location of Hipawai Heiau, facing northwest

Figure 55. Stone wall remnant at the location of Hipawai Heiau, facing north-northwest

Section 7 Summary and Interpretation

At the request of Group 70 International, Inc., Cultural Surveys Hawai‘i, Inc. (CSH) prepared this Archaeological Literature Review and Field Inspection for the University of Hawai‘i at Mānoa’s Long Range Development Plan (LRDP). The project area consists of the entire approximately 304-acre campus located in Mānoa [Waikīkī] Ahupua‘a, Kona District, Hawai‘i.

The scope of work called for an assessment of archaeological potential within the project area based on background research and a limited field inspection to identify any surface sites; recommendations for future archaeological work; and mitigation recommendations if there are archaeologically sensitive areas that need to be taken into consideration.

7.1 Historic Properties in the Project Area

The following historic properties located within the boundaries of the University of Hawai‘i at Mānoa’s (UHM) campus have previously been assessed as eligible for the Hawai‘i Register of Historic Places (HRHP):

1. The historic core of the campus (State Inventory of Historic Properties [SIHP] No. 50-80-14-1352), consisting of Hawai‘i Hall, George Hall, Dean Hall, Gartley Hall, Crawford Hall, Varney Circle, Founder’s Gate, Andrew’s Outdoor Amphitheater, Wist Hall and the Pineapple Research Center. These historic structures were added to the HRHP in 1984.
2. Kānewai Cultural Garden (SIHP No. 50-80-14-4498), consisting of modern surface features (irrigation ditches feeding into taro pondfields) overlying centuries-old deposits consistent with a long history of gardening at this spot along the Mānoa Stream. Subsurface testing (archaeological excavation), radiocarbon dating and pollen analysis by International Archaeological Research Institute, Inc. (cf. Liston and Burtchard 1996) demonstrate use of the area as a taro *lo‘i* from the middle 1400s, and perhaps earlier. It is also important to state the nearby “Dole Street burials” documented by CSH (Hammatt and Shideler 1991) are reburied on the grounds of the Center for Hawaiian Studies (see recommendations below).
3. SIHP No. 50-80-14-4191, a traditional-style presumably pre-Contact-era burial discovered during construction activities at Keller Hall (Smith and Kawachi 1991).

The following historic properties located within the boundaries of the UHM campus have not been previously assessed for eligibility for the HRHP:

1. Koana Cave, which has apparently never received a site number designation (see recommendations below), has yielded human skeletal remains (accessioned by the Bishop Museum in the 1960s), and probably contains as yet undiscovered historically-significant cultural materials consistent with habitation and / or gardening, in addition to more human skeletal remains.

2. Hipawai Heiau was designated by McAllister (1933) as “Site 63,” that is, SIHP No. 50-80-14-63, but no archaeological observations were made since the site was reported as “torn down” earlier by Thrum. CSH archaeologists may have identified a remnant section of stone wall associated with this *heiau*, however, as discussed in some detail above, this feature is located just outside the boundaries of the UH property.

In addition to the aforementioned historic properties located on the UHM campus, two areas in the Wa‘ahila Ridge portion of the campus containing possible rockshelters were identified during the course of the subject field inspection. As explained in detail above, additional testing (controlled archaeological excavations) would be needed to more accurately determine whether these possible rockshelters contain any historically-significant cultural materials.

7.2 Recommendations

CSH generally recommends the State Historic Preservation Division be afforded the opportunity to review any major proposed undertakings at UHM. In addition to this general recommendation, CSH also offers the following specific recommendations:

1. Alterations to, or near, the historic structures included in SIHP No. 50-80-14-1352 should be assessed by a qualified Architectural Historian. Potential impacts to historic structures include not only direct effects, but indirect effects as well (e.g., view plane issues affecting historic buildings and areas of campus).
2. Any major (deep) excavations or ground disturbance at Kānewai Lo‘i should be preceded by additional archaeological testing (controlled excavation) and / or should be conducted in association with monitoring by a qualified Archaeologist, in order to mitigate the potentially negative impacts of damaging or destroying as yet undocumented historically-significant cultural resources in subsurface deposits. Plans or proposals for any such work (including the flood-control project along the Mānoa Stream) should be conducted in full cooperation and consultation with the Center for Hawaiian Studies.
3. Given the Keller Hall burial discovery (SIHP No. 50-80-14-4191), in particular, it is possible that as yet undiscovered burials may still be present at some locations on the UHM campus; however, it is fairly difficult to predict with any specific certainty where burials might occur. Recent work in the “Old Quadrangle” portion of campus (McIntosh and Cleghorn 2007), and earlier work near the School of Architecture Building (Jones et al. 1994) did not find burials or any other historic resources; thus, CSH recommends consultation with the SHPD on future excavation projects on the UHM campus.
4. Koana Cave should be formally assessed by a qualified Archaeologist and assigned a State Site number. Given reports of human skeletal remains from this cave, it should also be preserved and protected from those who might disturb or desecrate its contents. Archaeological testing (excavation) of the cave might yield important evidence (e.g., radiocarbon dating samples), but this work would have to be balanced against the possibility of encountering / discovering

additional human skeletal remains. From a scientific perspective, the cave has relatively low potential for advancing archaeological knowledge of the area, given its relatively small size and apparently shallow soil.

5. No further work is recommended for the rock wall remnant that may be a portion of the Hipawai Heiau; however, should deep excavation or major development be planned for the adjacent Magoon Property, against which the wall remnant rests, archaeological monitoring or preliminary subsurface testing (excavation) might be warranted in order to ensure that no historically-significant cultural resources associated with the old *heiau* are damaged. Thrum's comments in reference to Hipawai Heiau, made approximately 100 years ago (see Sterling and Summers 1978:286), are instructive: "…partly destroyed many years ago, then used as a place of burial."

6. Finally, if the Wa‘ahila Ridge area is slated for major development, the two possible rockshelter areas should be subject to formal archaeological inventory, including subsurface testing (excavation), prior to any substantial ground disturbance.

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APPENDIX F.
CULTURAL IMPACT ASSESSMENT FOR THE UNIVERSITY OF HAWAIʻI AT MĀNOA LONG RANGE DEVELOPMENT PLAN PROJECT

Cultural Impact Assessment for the University of Hawai‘i at Mānoa Long Range Development Plan Project

Waikīkī [Mānoa] Ahupua‘a, Kona [Honolulu] District O‘ahu Island

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Prepared for

Group 70 International

Prepared by

Chris Monahan, Ph.D.

and

Lehua Ka‘uhane

Cultural Surveys Hawai‘i, Inc.

Kailua, Hawai‘i

(Job Code: MANOA 16)

August 2008

O‘ahu Office
P.O. Box 1114
Kailua, Hawai‘i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
1993 Main St.
Wailuku, Hawai‘i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Cultural Impact Assessment for the University of Hawai‘i at Mānoa Long Range Development Plan Project, Waikīkī [Mānoa] Ahupua‘a, Kona [Honolulu] District, O‘ahu Island, TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004 (Monahan and Ka‘uhane 2008)
Date	August 2008
Project Number	Cultural Surveys Hawai‘i (CSH) Job Code MANOA 16
Project Location	The Mānoa Campus occupies some 304 acres of land in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mō‘ili‘ili and McCully communities. Its principal physical boders are the Mānoa residential community on the mauka (inland) side, the Wa‘ahila Ridge on the Koko Head side, the H-1 Interstate Highway on the *makai* (seaward) side, and the lower Mānoa and McCully residential commuities on the ‘Ewa (west) side. The project area is depicted on a USGS topographic map, Honolulu 1998 quadrangle (see Figure 1)
Land Jurisdiction	State of Hawai‘i
Agencies	State of Hawai‘i Department of Health / Office of Environmental Quality Control (OEQC), State of Hawai‘i Department of Land and Natural Resources / State Historic Preservation Divison (SHPD)
Project Description	The 2007 Long Range Development Plan (LRDP) focuses on projects that are on the Capital Improvement Program and/or are anticipated for development within the next 5-10 years. At this time, a total of at least seventeen (17) new buildings and/or building expansions are included in the LRDP (see Figure 4).
Project Acreage	Approximately 304 acres
Area of Potential Effect (APE)	The Area of Potential Effect (APE) consists of the entire approximately 304-acre campus, in the wider cultural and natural context of Mānoa Valley, greater Honolulu and the Kona District.
Document Purpose	The project requires compliance with the State of Hawai‘i environmental review process [Hawai‘i Revised Statutes (HRS) Chapter 343], which requires consideration of a proposed project’s effect on cultural practices and resources. CSH is undertaking this CIA at the request of Group 70 International, Inc. Through document research and (ongoing) cultural consultation efforts, this report provides preliminary information pertinent to the assessment of the proposed project’s impacts to cultural practices (per the OEQC’s Guidelines for Assessing Cultural Impacts). The document is intended to support the project’s environmental review and may also serve to support the project’s historic preservation review under HRS Chapter 6E-8 and Hawai‘i Administrative Rules Chapter 13-275.

Community Consultation	Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the project area and the vicinity. Organizations and members / representatives of these organizations consulted included the SHPD, the Office of Hawaiian Affairs (OHA), Hui Mālama I Nā Kūpuna o Hawai‘i Nei, faculty members of the Kamakakūokalani Center for Hawaiian Studies, the Mānoa Heritage Center, the Mānoa Neighborhood Board, Ho‘okahe Wai Ho‘oulu ‘Āina, and Mālama o Mānoa.
Results	Background research conducted for this project yields the following results: (1) Given its abundant natural resources—including several tributary streams that feed into the main stream and several *pūnāwai* (fresh-water springs)—Mānoa Valley has been an attractive place to settle and garden for as long as people have lived on O‘ahu (i.e., well over a millennium). Lower Mānoa Valley, within which the campus is located, represents the prime wet-taro-growing area and agricultural heartland of the entire valley. (2) Mānoa is exceedingly rich in places names, *wahipana* (legendary or storied places) and associated *mo‘olelo* (oral histories), reflecting the valley’s elevated cultural and historical significance to Hawaiians, in particular. Important *mo‘olelo* focus on Mānoa’s many *pūnāwai*, which are directly associated with the exploits of two primary Hawaiian gods, Kāne and Kanaloa. These springs include Kānewai (location of the current Kānewai Cultural Garden), Hualani, Wailele—located near the present day athletic field of the Mid-Pacific Institute and associated with Kūka‘ō‘ō Heiau, Punahou (a.k.a. Kapunahou), Ka‘aipū, Wa‘aloa and Waiakeakua. The valley is also home to many *pu‘u* (hills, mountains), peaks, ridges and caves—all with associated *mo‘olelo*; these include Wa‘ahila Ridge (which defines the eastern border of the valley) and its numerous peaks. Finally, Mānoa is also associated with a variety of other *mo‘olelo*, including “Pīkoi the Rat Killer,” “Maluae and the Underworld,” and “The Woman Who Died and Came Back to Life;” as well as famous events and people of the early historic era, including

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

	Kamehameha I, Ka‘ahumanu and Boki. (3) The archaeology of lower Mānoa is somewhat problematic in that most of the campus was developed before historic preservation awareness and laws were in place; thus many or most surface-level sites and features once present in the project area have been destroyed and / or damaged by being covered with sediments and structures. Before these historic impacts, however, the campus undoubtedly contained a patchwork of gardens, including many *lo‘i* (stone terraces) and *‘auwai* (irrigation ditches), and house sites, including many small stone enclosures, terraces and platforms. Undoubtedly, there are still subsurface cultural deposits within the campus containing signigicant historic and cultural resources. (4) Burials have been documented near Keller Hall and along Dole Street, immediately adjacent to the Kānewai Cultural Garden and Kamakūokalani Center for Hawaiian Studies. The latter burials, representing the remains of at least 18 individuals, have been interpreted as a traditional Hawaiian cemetery. It is likely that more burials are located in subsurface deposits within the project area. (5) A recent field inspection of the campus by CSH found a number of possible rock shelters and overhangs in the Wa‘ahila Ridge area. Additional study of these possible archaeological sites would have to be conducted in order to more fully understand their function, chronological age and archaeological significance. Community consultation conducted for this project yields the following main concerns: (1) Many participants voiced concern about the possibility of encountering as-yet undiscovered cultural and historic sites, including most importantly, human skeletal remains and burials in subsurface deposits. One participant (Dr. Davianna McGregor) also pointed out that the burial site preserve near Keller Hall, which used to be marked by a ginger plant, is no longer being maintained (i.e., the ginger plant is not there anymore). (2) A few participants stated that existing undeveloped

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

	areas, including ridges and valley slopes, should not be developed or impacted in any way, given the already significant loss of such natural portions of the campus and given the importance of retaining a Hawaiian sense of place and landscape integrity. This concern about preserving the last undeveloped portions of the campus extends specifically to the Wa‘ahila Ridge area. (3) Many participants voiced concerns about future buildings and projects being more harmoniously designed and integrated into the natural surrounding and themes inherent to the valley. It is important to note that this type of concern is fundamentally a cultural one for Hawaiians, in particular, whose ‘world view’ and deeper philosophical / spiritual beliefs are based on such concepts as *pono* (in this case, “right ways” of doing things) and *lōkahi* (“harmony”), among other related concepts (e.g., *mālama ‘āina,* or “taking care of the land”). (4) A few participants talked about the importance of understanding and incorporating Hawaiian-language words, phrases and concepts that extends beyond the superficial (e.g., naming buildings). (5) The current Director of Ka Papa Lo‘i o Kānewai (a.k.a. Kānewai Cultural Garden) shared his personal knowledge of a well-known master navigator and teacher who previously indicated the large albizia tree at Kānewai Lo‘i (which is scheduled to be removed in association with a stream-erosion-prevention project funded by the Federal Emergency Management Agency) could be used to construct a large traditional *wa‘a* (canoe). (6) Many participants talked about the importance of using native plants in future projects. (7) The Wa‘ahila Ridge area is an important natural and cultural resource, containing trails, native plants and other significant sites and features (e.g., possible rocksheleter and overhangs). (8) A few participants provided detailed accounts of well-documented *mo‘olelo, wahi pana* and other cultural sites in Mānoa; in one case, one participant (Palani Vaughn) suggested there is another, alternative legend associated with the origins of the

	well-known spring (Ka Punahou, widely attributed to Kāne), but he did not elaborate further on this point. (9) A couple participants called into question the State’s (i.e., Department of Land and Natural Resources, Historic Preservation Division) poor record of protecting and preserving important cultural sites in Mānoa, including *heiau* that have been damaged or compromised by recent construction projects. (10) One participant (Palani Vaughn) suggested the university has not done enough to promote education about the traditions of old Hawai‘i in Mānoa; and that it should build a “learning center” (perhaps located at the Center for Hawaiian Studies) that would integrate *mo‘olelo, wahi pana,* the landscape and other cultural and historical information about Mānoa. (11) One participant (Dr. Davianna McGregor) pointed out that the Long Range Development Plan (LRDP) is not detailed enough for meaningful review and comment, and that descriptions such as building “expansion” or “replacement” are too vague. There is concern that the LRDP will be used to guide development 20 years from now, which, given the lack of detail, is problematic. (12) Dr. McGregor also pointed out that there are many significant and commemorative trees on campus that should be systematically catalogued in order to ensure their protection during future development of the campus.
Recommendations	CSH recommends the following measures, which, if addressed in a good faith manner, will help mitigate potentially adverse effects of the proposed project: (1) Community consultation participants and the wider Mānoa community should be afforded the opportunity to review the subject draft CIA and offer their input for the final verision of this report. (2) Given that the LRDP includes seventeen new buildings, building expansions and other infrastructure improvements, and given the lack of specific plans for these projects, the community should be afforded the opportunity to review and

	comment on each individual project as details become finalized and as more specific potential impacts (both positive and negative) can be assessed. (3) The University should proactively develop a plan to avoid disturbing burials and historic and cultural sites located in subsurface contexts. Such a plan may include archaeological inventory surveys prior to ground disturbance and / or archaeological monitoring of excavations during construction; specific decisions should be made on a case-by-case basis, in consultation with appropriate government agencies (e.g., SHPD, OHA) and Native Hawaiian organizations and individuals. In particular, every effort should be made to proactively avoid inadvertent finds of human skeletal remains and burials. (4) Planning and design of proposed projects included under the LRDP should incorporate Hawaiian cultural and historical themes and concepts in order to restore and accentuate an authentic Hawaiian sense of place. This should include (a) use of native and Polynesian-introduced plants, (b) integration of *mo‘olelo*, Hawaiian language and other Hawaiian concepts and ideas beyond superficial applications of such information (e.g., building names) and (c) preservation and protection of undeveloped spaces and natural resources. (5) The Wa‘ahila Ridge area, one of the only undeveloped places in lower Mānoa Valley, should be carefully preserved and protected from future development, and from modern abuses and damage that have already taken their toll (e.g., soil erosion from “off-road” activities). (6) Ka Papa Lo‘i o Kānewai, also known as Kānewai Cultural Garden, should be treated with the utmost care and respect; any plans for future improvements, alterations or development in or adjacent to Kānewai Lo‘i should include comprehensive consultation with its director and with the Hawai‘inuiākea School of Hawaiian Knowledge. (7) The issue of removing the large albizia tree scheduled for removal in association with the

	stream-erosion-prevention project should be discussed with the Director of Ka Papa Lo‘i o Kānewai, who has indicated the tree may be used to make a large traditional *wa‘a* (canoe).

Table of Contents

Management Summary i

Section 1 Introduction 1

1.1 Project Background 1
1.2 Document Purpose 6
1.3 Archaeological Work at the Project Area 6
1.4 Scope of Work 7
1.5 Environmental Setting 7
1.5.1 Natural Environment 7
1.5.2 Built Environment 9

Section 2 Methods 10

Section 3 Traditional Background 11

3.1 Overview 11
3.2 Place Names 14
3.3 Mo‘olelo Associated with Specific Place Names 16
3.3.1 Mānoa, Pauoa, Nu‘uanu and Pālolo 16
3.3.2 Kāne and the Fish of Mānoa 16
3.3.3 Pīkoi the Rat Killer 17
3.3.4 Poki, the Dog of Kamehameha I 17
3.3.5 Malua‘e and the Underworld 19
3.3.6 The Woman Who Died and Came Back to Life 19
3.3.7 Kānewai Pūnāwai 20
3.3.8 Hualani Pūnāwai 21
3.3.9 Wailele Pūnāwai 21
3.3.10 Punahou Pūnāwai 23
3.3.11 Ka‘aipū Pūnāwai and Pōhaku 27
3.3.12 Wa‘aloa Pūnāwai 29
3.3.13 Waiakeakua Pūnāwai 29
3.3.14 Hills, Mountains, Peaks, Ridges and Caves 32
3.3.15 Wa‘ahila Ridge 33
3.3.16 Kaumana Pōhaku 34
3.3.17 Akāka and Kūmauna Peaks and the Princess of Mānoa, Kahala-o-Puna 34
3.3.18 Pali Luahine and Kamehameha’s Cave 37
3.3.19 Puka‘ōma‘o, or Puka‘ōma‘oma‘o 38
3.3.20 ‘Ulumalu Hill and Kūkaō‘ō Heiau 44
3.3.21 Pu‘u Pueo 45
3.3.22 Pu‘u o Mānoa (Rocky Hill) 46
3.4 Interview with Maka Woolsey about West Mānoa Valley 47
3.5 Settlement and Subsistence in Mānoa 49
3.6 Streams, Springs and Pōhaku 50
3.7 Trails of Mānoa 51

Section 4 Historical Background 52

4.1 Early Ownerhip and Use of Mānoa Valley 53
4.2 Mid Nineteenth Century and Land Commission Awards 54

4.3 The University of Hawai‘i at Mānoa Land Commission Awards 64
4.4 1900s to Present 71
4.5 Prominent Historic Structures 79
4.5.1 Mānoa Chapel and Cemetery of Kawaiaha‘o Church 79
4.5.2 Punahou School (Originally O‘ahu College) 79
4.5.3 Sacred Heart Church at Punahou 80
4.5.4 Wai‘oli Tea Room of the Salvation Army 80
4.5.5 Chinese Cemetery 81
4.5.6 Lyon Arboretum 82
4.6 Mō‘ili‘ili Quarry 83
4.7 Early Years of the University of Hawai‘i at Mānoa 83

Section 5 Archaeological Research 88

5.1 Overview 88
5.2 Heiau of Mānoa 88
5.2.1 Kūkaō‘ō Heiau 88
5.2.2 Kawapōpō Heiau 92
5.2.3 Hakika Heiau 93
5.2.4 Hipawai Heiau 93
5.2.5 Mau‘oki Heiau (Kamō‘ili‘ili Heiau) 95
5.3 Early Archaeological Surveys of Mānoa Valley 98
5.4 Post 1960 Surveys of Mānoa Valley 102
5.5 Division of Mānoa Valley 108

Section 6 Community Consultation 109

6.1 Office of Hawaiian Affairs (OHA) Response 112
6.2 State Historic Preservation Division (SHPD) Response 112
6.3 Mālama o Mānoa 112

Section 7 Summaries of Kama‘āina “Talk Story” Interviews 115

7.1 Al Harrington 115
7.2 Konia Freitas 115
7.3 Davianna McGregor 116
7.4 Jon Osorio 117
7.4.1 Wa‘ahila Faculty Housing 117
7.4.2 Hawai‘inuiākea School of Hawaiian Knowledge 117
7.5 Makahiapo Cashman 117
7.5.1 Hawaiian Language 118
7.5.2 Kūpuna of Kānewai 118
7.5.3 The Hale 119
7.5.4 Kānewai as a Pu‘uhonua 119
7.6 Scott Kekuewa Kikiloi 119
7.6.1 Trails 119
7.6.2 Gathering 120
7.6.3 Streams 120
7.6.4 Wahipana 122
7.6.5 Concerns Regarding the Proposed Project 124
7.7 Nāhoa Lucas 124

7.7.1 Kānewai 124
7.7.2 On Opening Kānewai 124
7.7.3 Land Use 126
7.7.4 Fresh Water Resources 127
7.7.5 Kānewai Spring 127
7.7.6 The Holowai 128
7.8 Claire Hughes 128
7.8.1 Background 128
7.8.2 Destruction of Cultural Sites 129
7.8.3 Mo‘o 130
7.8.4 Hōlua Sledding at Pūowaina 130
7.8.5 Graveyards 130
7.8.6 Natural Environment 131
7.8.7 Trails 132
7.8.8 Aesthetics 132
7.8.9 Preservation of the Atmosphere 133
7.8.10 Puka‘ōma‘o 133
7.8.11 Cultural Sites On Mid Pacific Institute 133
7.8.12 References 134
7.9 Palani Vaughn 134
7.9.1 General Comments 134
7.9.2 Wahipana 134
7.9.3 Burials 136
7.9.4 Hula 136
7.9.5 Trails 137
7.9.6 Recommendations 137

Section 8 Cultural Landscape of the Project Area 138

8.1 Plant Resources 138
8.2 Streams and Fresh Water Resources 138
8.3 Wahipana 139
8.4 Trails 139
8.5 Cultural and Historic Properties and Burials 140

Section 9 Summary and Recommendations 142

9.1 Summary of Results 142
9.2 Recommendations 144

Section 10 References Cited 147

List of Figures

Figure 1. USGS topographic map, Honolulu 1998 quadrangle, showing University of Hawai‘i at Mānoa campus lands 2
Figure 2. Map showing Tax Map Keys [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004 3
Figure 3. Aerial photograph of University of Hawai‘i at Mānoa campus lands 4
Figure 4. Long Range Development Plan 2007 Update 5
Figure 5. Soils map of University of Hawai‘i at Mānoa (data from Foote et al. 1972) 8
Figure 6. “Pre-Māhele Moku and Ahupua‘a” map and study of 1987 by the Hawaiian Studies Institute showing Mānoa as part of Waikīkī Ahupua‘a 12
Figure 7. 1929 Photograph of the Inter-Island Airway’s amphibian plane, Hawaii, passing over Mānoa Valley (Hawai‘i State Archives) 13
Figure 8. Outline of 1882 map by E. D. Baldwin, showing topographic points and traditional land units in Mānoa Valley 15
Figure 9. Identified as “Kua‘i o Mānoa” at Wailele Spring (from Bouslog et al. 1994:134) 23
Figure 10. Kapunahou Spring (photograph from Bouslog et al. 1994:132) 25
Figure 11. Possible (approximate) locations of Puka‘ōma‘oma‘o, house of Queen Ka‘ahumanu (tracing from 1882 map of Mānoa Valley, surveyed by E. D. Baldwin) 42
Figure 12. Portion of Coulter’s (1931) population-estimate map for O‘ahu in 1853 showing approximately 350 people in Mānoa Valley (each symbol represents 50 people) 49
Figure 13. Waterfalls in the back of Mānoa Valley as seen from Kanānā (photograph from Bouslog et al. 1994:4) 50
Figure 14. Early nineteenth century trails on the southwest coast of O‘ahu (illustration from ‘Ī‘ī 1959:93), showing locations of some place names in Mānoa 51
Figure 15. Kotzebue map of 1817 showing vicinity of project area (should be understood as somewhat schematic) 56
Figure 16. LaPlace map of 1855 showing vicinity of project area (should be understood as somewhat schematic 57
Figure 17. 1882 E. D. Baldwin map, showing Land Commission Awards and Grants in Mānoa Valley 58
Figure 18. Makai portion of 1882 E. D. Baldwin map with Land Commission Awards outlined in red 59
Figure 19. 1847 Hawaiian Government Survey map; surveyed by Theophilus Metcalf 60
Figure 20. 1881 O‘ahu Island Government Survey map 66
Figure 21. 1882 E. D. Baldwin map showing vicinity of project area 67
Figure 22. 1887 W. E. Wall map showing vicinity of project area 68
Figure 23. 1897 M.D. Monsarrat map showing vicinity of the project area 69
Figure 24. 1899 O‘ahu Island map showing vicinity of project area 70
Figure 25. Checkerboard taro fields on the floor of Mānoa Valley 72
Figure 26. 1919 Fire Control map showing vicinity of project area 73
Figure 27. 1927 US Geological Survey map showing vicinity of project area 74
Figure 28. 1938 map showing vicinity of project area 75
Figure 29. 1943 War Department map showing vicinity of project area 76
Figure 30. 1953 U. S. Geological Survey map showing vicinity of project area 77

Figure 31. 1956 map showing vicinity of project area 78
Figure 32. 1866 Photograph of Punahou School, Photograph attributed to Charles Burgess (photograph from Foster 1991:32).....81
Figure 33. Entrance to Line Yee Chung Chinese Cemetery in Mānoa (photograph from Bouslog et al. 1994) 82
Figure 34 View of the campus in 1917 from Wa‘ahila Ridge (Adapted from Kobayashi 1983:23) showing the two permanent buildings, Hawaii Hall (1912) is at center, the beginnings of the Young Engineering quad (still 4/5 intact by the present Campus Center) is at left of the relocated wooden building moved up from Young Street 85
Figure 35. 1926 aerial photograph showing seaward end of present University Avenue ending at Metcalf St. (extreme left), George Hall (1925) inland of Gartley Hall (1922; center), with Hawai‘i Hall (1912) at right and the Cooke Field Track (vicinity of present Sinclair Library) in the fore. The future Bachman Hall area is still in farm plots. 86
Figure 36. 1929 aerial photograph showing the western half of the present campus still in fields but University Avenue has now been extended seaward (extreme left, middle) and there has been significant clearing seaward of the Cooke Field track associated with construction of the original Gym (1928) just NW of the present Bachman Hall. 86
Figure 37. 1939 aerial photograph showing the campus dominated by the old quad (lower right) of Hawai‘i (1912), Gartley (1922) George (1925) and Dean (1929) and the new Crawford Hall (1938). The brand new Hemenway Hall (1939) is just seaward and old Gilmore Hall (1935-1973) with its two wings anchors the east end of campus at left 87
Figure 38. In this 1949 aerial photograph the campus is dominated by the central Hemenway Hall (1938), the old Gym and the on-going construction for Bachman Hall are near University and Dole streets, the University Farms still dominate the eastern campus.....87
Figure 39. Overlay of 1822 E.D. Baldwin map of Mānoa Valley on modern street map, showing possible *heiau* locations 89
Figure 40. 1908-1913 Corps of Engineers Fire Control map, showing L-shaped structure, possibly Hipawai Heiau, on land later *mauka* of the St. Francis High School Campus....96
Figure 41. 1883 S.E. Bishop map of Pa‘akea, showing location of a *heiau* near Mauoke Spring 99
Figure 42. Project area (in red) in relationship to archaeological sites identified in Sites of O‘ahu (Sterling and Summers 1978) 100
Figure 43. Circa 1900 photograph of artifacts displayed at Punahou College including the wooden idol (left foreground) possibly found in a cavern in Rocky Hill.....101
Figure 44. Previous archaeological studies in the vicinity of the project area 103
Figure 45. Previously identified archaeological sites in Mānoa Ahupua‘a (project areas with no identified sites are denoted by author and year of report) 104
Figure 46. Podmore map (1916 or 1917) of the boundary between the *‘ili* of Wa‘ahila and Kānewai showing an *‘auwai* and a “cave called Koana” 105
Figure 47. Office of Hawaiian Affairs response letter dated April 24, 2008.....114
Figure 48. Wailele Spring. 121
Figure 49. Punahou Spring. 122
Figure 50. Ka U‘i o Mānoa. 123
Figure 51. Old Kalei Road Bridge. 140

List of Tables

Table 1. Land Commission Awards for Mānoa Ahupua‘a 61
Table 2. Previous Archaeological Investigations in Mānoa Ahupua‘a.....106
Table 3. Community Consultation.....110

Section 1 Introduction

1.1 Project Background

At the request of Group 70 International, Inc., Cultural Surveys Hawai‘i, Inc. (CSH) prepared this Cultural Impact Assessment (CIA) for the University of Hawai‘i at Mānoa’s Long Range Development Plan (LRDP). The project area consists of the entire approximately 304-acre campus located in Mānoa [Waikīkī] Ahupua‘a, Kona District, Hawai‘i [TMK: (1) 2-8-015:001, 2-8-023:003, 2-9-004:005, 2-9-023:001 & 026, 2-8-029:001, 2-9-026:001 & 037, 2-9-027:054, 3-3-056:001 & 004]. The project area consists entirely of State of Hawai‘i-owned land.

The campus is located in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mō‘ili‘ili and McCully communities. Its principal physical borders are the Mānoa residential community on the *mauka* (inland) / north side, the Wa‘ahila Ridge on the Koko Head (east) side, the H-1 Freeway *makai* (seaward) / south side and the lower Mānoa and McCully residential communities on the ‘Ewa (west) side (Figures 1–3).

The proposed LRDP focuses on projects that are on the Capital Improvement Program and/or are anticipated for development within the next 5-10 years (Figure 4). At this time, at least seventeen (17) new buildings or renovation/expansion projects are proposed:

- Kennedy Theatre Expansion
- Parking Structure at Kennedy Theatre
- Instruction Building at Henke Hall Site
- Campus Center Expansion to Northeast
- Law School Expansion
- I.T.S. - Bilger Hall Addition, Phase II
- Research Space - Infill South Courtyard of Biomedical Building
- Klum Gym Replacement
- Instruction Building - College of Education
- Media Facilities at KHET Site
- Parking Structure IIB/Bookstore
- Faculty Housing – Wa‘ahila Ridge or Mauka Campus
- Research Buildings – North and East of Biomedical Building
- Research Buildings - Mauka Campus
- Johnson Hall - Replacement Dormitory
- Hale Noelani - Replacement Dormitory
- School of Hawaiian Knowledge

These projects address current space and activity needs on campus. They are not based on any anticipated increase in enrollment over the next planning period. Enrollment declined from an all-time high of over 22,000 students in 1972 to a low of approximately 18,000 in 1987. Since then, enrollment has slowly increased reaching 20,644 students in the fall of 2007. Enrollment is projected to remain relatively stable through 2012, as indicated by a 2007 estimate by the University of Hawai‘i's Institutional Research Office. The anticipated opening of the new West O‘ahu Campus is also anticipated to reduce the pressure on undergraduate enrollment.

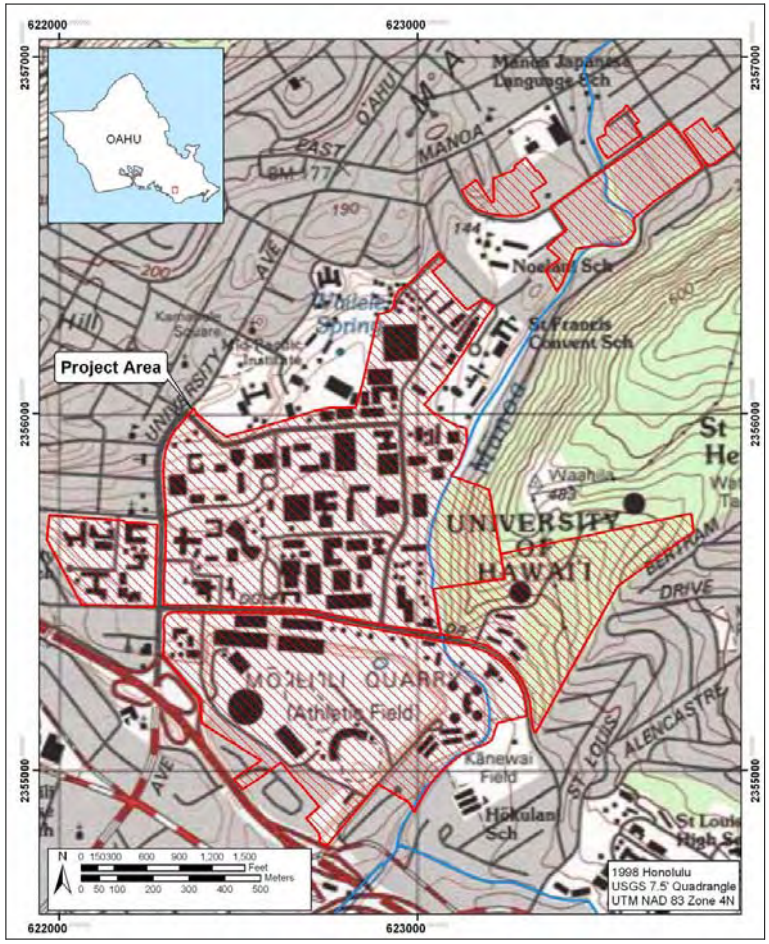

Figure 1. USGS topographic map, Honolulu 1998 quadrangle, showing University of Hawai‘i at Mānoa campus lands

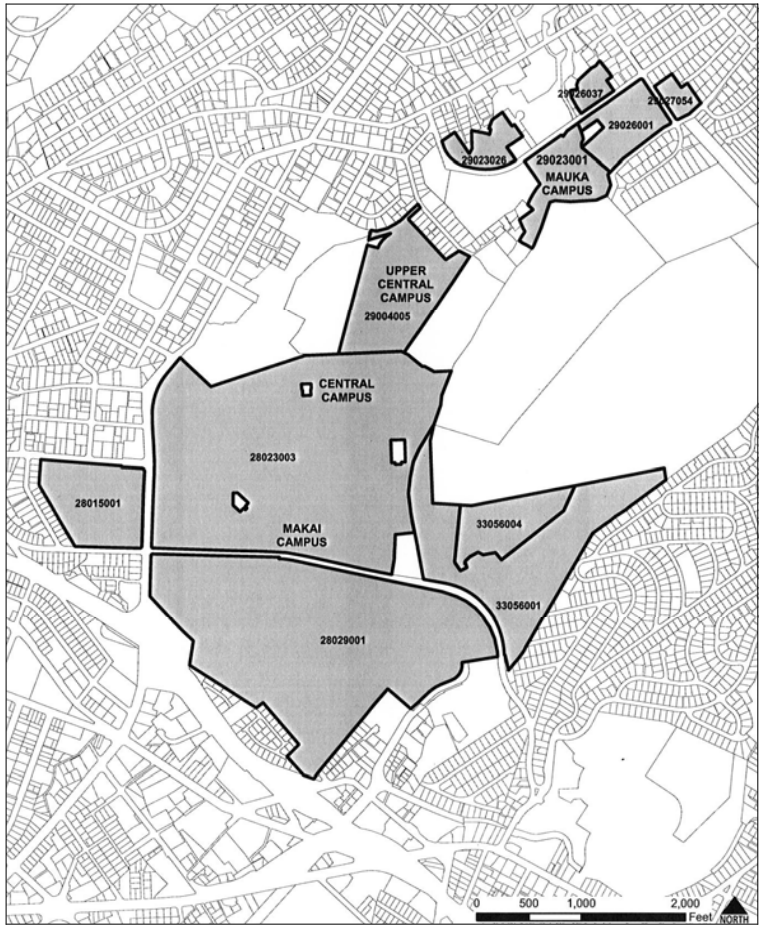

Figure 2. Map showing Tax Map Keys [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Figure 3. Aerial photograph of University of Hawai‘i at Mānoa campus lands

Figure 4. Long Range Development Plan 2007 Update

Rather than enrollment growth, campus development at the University of Hawai‘i-Mānoa (UHM) is now stimulated by current facility needs and the desire to provide a more complete campus community experience. Universities across the country have focused on enhanced environments for learning, working, and living. Campuses of the future envision uses and activities not unlike that of any vital urban center.

Graduate and research space needs will also continue to fuel growth on the Campus. In a pattern typical of other major universities, research and administrative support facilities are related to the availability of research funding rather than enrollment. Overall, extramural funding at Mānoa has increased by 50% over the past ten years. In 2003, the Top American Research Universities ranked UHM among the top 50 public universities in federal research funding. New laboratories, offices and library resources will continue to be required to support evolving graduate work and research activities.

While not all research and graduate education will be campus-bound, as evidenced by the John Burns School of Medicine in Kaka‘ako, telescopes atop Mauna Kea and research facilities on Coconut Island, the great majority of research and graduate student activities seek a direct relationship to the resources of the Campus. While distance learning and virtual teaching methods also promise changes to higher education, their immediate impact appears to be at the lower division and undergraduate level. Institutions such as UHM with large upper-division and graduate programs, successful professional schools and burgeoning research programs are anticipated to grow in-place. UHM’s challenge is to use the opportunity afforded by this growth to achieve higher levels of quality in its physical and academic environment. The 2007 Update to the LRDP will serve as guidance towards this important goal.

1.2 Document Purpose

The project requires compliance with the State of Hawai‘i environmental review process [Hawai‘i Revised Statutes (HRS) Chapter 343], which requires consideration of a proposed project’s effect on cultural practices. CSH is conducting this CIA at the request of Group 70 International, Inc. Through document research and (ongoing) cultural consultation efforts this report provides preliminary information pertinent to the assessment of the proposed project’s impacts to cultural practices and resources (per the OEQC’s Guidelines for Assessing Cultural Impacts). The document is intended to support the project’s environmental review and may also serve to support the project’s historic preservation review under HRS Chapter 6E-8 and Hawai‘i Administrative Rules Chapter 13-275.

1.3 Archaeological Work at the Project Area

CSH is also conducting a companion Archaeological Literature Review and Field Inspection Report (CSH Job Code MANOA 15) for the subject project. The literature review and field inspection is designed to identify archaeological site types and locations in the project area, and to allow for future archaeological-work recommendations, if applicable. The goal is to identify cultural resources and historic properties, from a specifically archaeological perspective, and to provide recommendations related to the State of Hawai‘i’s historic review process. Results from the Archaeological Literature Review and Field Inspection Report are included in this document.

1.4 Scope of Work

The scope of work for this CIA includes:

1. Examination of cultural and historical resources, including Land Commission documents, historic maps, and previous research reports, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal, and other resources or agricultural pursuits as may be indicated in the historic record.
2. A review of previous archaeological work at and near the subject parcel that may be relevant to reconstructions of traditional land use activities; and to the identification and description of cultural resources, practices, and beliefs associated with the parcel.
3. Consultation and interviews with knowledgeable parties regarding traditional cultural practices at or near the parcel; present uses of the parcel; and / or other (non-Hawaiian) practices, uses, or traditions associated with the parcel.
4. Preparation of a report summarizing the results of these research activities.

1.5 Environmental Setting

1.5.1 Natural Environment

Mānoa Valley was formed during the volcanic eruptions that formed the Ko‘olau Mountains starting about 10 million years ago. This volcanic activity and the following erosion caused amphitheater-headed, deep V-shaped valleys on the southeast coast of O‘ahu, which are separated by sharp, high ridges. The Ko‘olau volcano reactivated approximately 250,000 years ago, pouring lava into the valley. This eruption built up new cones, including Pu‘u ‘Ōhi‘a (Tantalus) in the upper valley, and lower down the smaller cones of Pu‘u Kākea (Sugar Loaf), Pu‘u ‘Ualaka‘a (Round Top) and Pu‘u o Mānoa (Rocky Hill). The erupted lava cascaded down the western ridge of Mānoa Valley. This filled in the V-shaped valley, giving it a more rounded U-shaped appearance (Bouslog et al. 1994:4-5).

According to Foote et al. (1972), soils within the campus are mostly varieties of clay loam (Figure 5). The northeast portion of the campus and most of the central campus is Makiki Stony Clay Loam (MIA) with some Tantalus Silty Clay Loam (TCC) in the northwest corner. The Wa‘ahila Ridge area north of Dole Street includes a large portion of Rock Land (rRK) as well as Ka‘ena Very Stony Clay (KanE) and Pāmoa Silty Clay (PID) soils. South of Dole Street the southeastern portion of campus includes Kawaihāpai Clay Loam (KIA). The quarry area that dominates the lower campus was developed to exploit a thick dense deposit of epheline-meililite (so-called “blue stone”) basalt.

A notable feature of the dominant Makiki Stony Clay is “that there are enough stones to hinder cultivation” making up 15% of the soil by volume (Foote et al. 1972:92). Basalt outcrops are common. Several of the other soil types (rRK, KanE, PID) are described as having poor “workability” owing to the very sticky, very plastic nature of the clay. The best agricultural soil

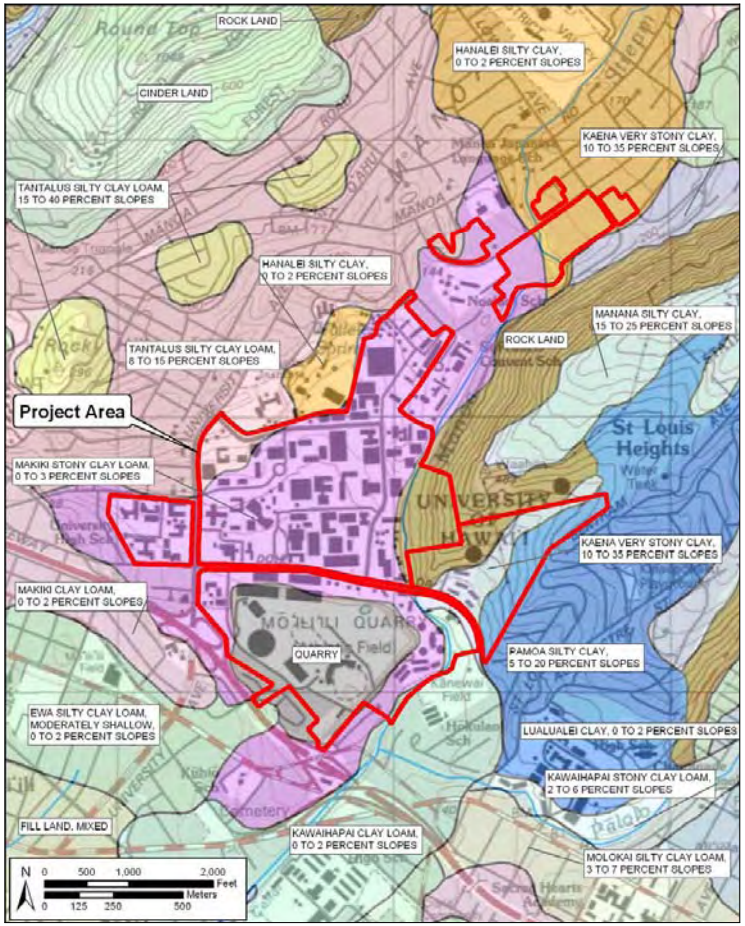

Figure 5. Soils map of University of Hawai‘i at Mānoa (data from Foote et al. 1972)

appears to be the Kawaihāpai Clay Loam – which rather notably lies in a very small area where the Kānewai taro *lo‘i* (probably a traditional Hawaiian gardening complex) is located.

The Mānoa sub-basin watershed covers 6,150 acres and 12 miles of stream. ‘Aihualama, Waihī, Lua‘alaea, Nāniu‘apo, Wa‘aloa, and Waiakeakua are the tributary streams in the upper valley that merge at an elevation of 400 feet into the main Mānoa Stream. Half-way down the center of the valley, the Sugar Loaf eruption has pushed the streambed to the extreme east of the valley. Before the construction of the Ala Wai Canal, the lower portion of the stream, called Kālia Stream, flowed in a westerly direction, then made a wide bend to the east where it joined the Pālolo Channel in the general vicinity of the present-day Date Street near the *makua* side of the Ala Wai Golf Course.

Annual rainfall at the head of Mānoa Valley can reach up to 160 inches per year. At the lower boundary, rainfall is only 35 inches per year. The valley is often swept with strong winds that bring rain, including *ala‘eli*, the “cool wind of the land,” and *kākea*, a “stormy wind” (Bouslog et al. 1994:6). However, it is the Tuahine or Kuahine rain, a misty rain, for which the valley is most well known.

Before Hawaiian settlement, the slopes of Mānoa’s ridges were probably covered with a dense forest, dominated by *‘ōhi‘a lehua* (*Metrosideros macropus*), *koa* (*Acacia koa*), and *loulu* (the native fan palm, *Pritchardia* spp.). The undergrowth would have included shrubs such as *naupaka kuahiwi* (*Scaevola* spp.), ferns such as *hāpu‘u* (*Cibotium splendens*), *‘ama‘u* (*Sadleria* spp.), and *pala‘ā* (also known as *palapala‘ā*, *Sphenomeris chinesus* syn. *chusana*), and vines such as *‘ie‘ie* (*Freycinetia arborea*) (Bouslog et al. 1994:8). Mānoa, due to its broad, well-watered valley, was probably settled early by the Hawaiians, who probably cleared much of the lower areas near streams for wetland taro cultivation.

1.5.2 Built Environment

Since its founding in the early twentieth century, nearly the entire campus has been developed with numerous buildings, facilities and infrastructure. The only major areas of undeveloped land still remaining are located east of Mānoa Stream near the base of Wa‘ahila Ridge (leading up to St. Louis Heights) and across from the existing East-West Center.

Section 2 Methods

Historical documents, maps and existing archaeological information pertaining to the sites in the vicinity of this project were researched at the CSH library. Information on Land Commission Awards was accessed through Waihona ‘Aina Corporation’s Māhele Data Base (www.waihona.com). The State Historic Preservation Division, Office of Hawaiian Affairs, O‘ahu Island Burial Council, and community and cultural organizations in Mānoa were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the project area and the surrounding vicinity. The names of potential community contacts were also provided by colleagues at CSH and from the authors’ familiarity with people who live in or around the project area. The cultural specialist conducting research on this assessment employed snowball and judgment sampling methods, an informed consent process and semi-structured interviews according to standard ethnographic methods (as suggested by Bernard 2005). Some of the prospective community contacts were not available to be interviewed as part of this project. A discussion of the consultation process can be found in Section 6 on Community Consultations. Please refer to Table 3, Section 6 for a complete list of individuals and organizations contacted.

Section 3 Traditional Background

3.1 Overview

Mānoa is sometimes treated as a portion of the *ahupua‘a* of Waikīkī and sometimes treated as a distinct *ahupua‘a*. It seems rather unlikely, given its geographic location and its overall size and general physiography, that Mānoa was its own land-locked (i.e., separate from Waikīkī) *ahupua‘a* in pre-Contact times. The well-known “Pre-Māhele Moku and Ahupua‘a” map and study of 1987 by the Hawaiian Studies Institute, which shows “major land divisions of O‘ahu prior to the *Māhele* of 1848,” does not show Mānoa as its own separate *ahupua‘a* (Figure 6). It seems unlikely that Mānoa’s residents would not have enjoyed unencumbered access to the seashore in pre-Contact times, although this may have changed with the late 18th century invasions of O‘ahu from the windward islands (Maui and Hawai‘i). Regardless, given its abundant natural resources—including several tributary streams that feed into the main Mānoa Stream and several *pūnāwai* (fresh water springs)—the valley has clearly been an attractive place to settle and garden for as long as people have lived on O‘ahu (Figure 7).

At various times throughout this long history, Mānoa was home to kings and other high-ranking *ali‘i* (chiefs), as described in legends, land records, early maps of Honolulu and other documents. Two chroniclers of historic Hawai‘i talked about Kamehameha I’s affinity for Mānoa:

> The places Kamehameha farmed and the houses he lived in at those farms were show places. His farmhouses in Nuuanu stood several hundred fathoms away from the right side of Kapahala, a knoll on the western side of Nuuanu Street and Hanaiakamalama House. Perhaps the location was chosen to enable him to look both inland and seaward to his food patches. Some elevated houses seem to have been for that purpose. So it was with Puupueo [today known as Roundtop, on the west side of the valley], directly below Ualakaa. (‘Ī‘ī 1959:69)

Thrum also stated that Kamehameha often stayed in Mānoa Valley:

> It is evident that Manoa has for several generations past, been held in high esteem by Hawaiians of rank. Kamehameha I was no stranger to the valley, and it early became the favorite resort of his immediate household and followers. (Thrum 1892:113)

This section begins by describing some of the many place names in the valley. Compared with other locations on O‘ahu and the rest of the Hawaiian Islands, Mānoa is relatively rich in places names; this abundance of names—and their associated *mo‘olelo* (oral histories) and legends, is a reflection of the valley’s elevated cultural and historical significance to Kānaka Maoli (Native Hawaiians), in particular. For example, there are many *mo‘olelo* and legendary accounts of Mānoa’s *pūnāwai*, which are directly associated with the exploits of two primary Hawaiian gods, Kāne and Kanaloa. These springs include Kānewai (location of the current Kānewai Cultural Garden), Hualani, Wailele—located near the present day athletic field of the Mid-Pacific Institute and associated with Kūka‘ō‘ō Heiau, Punahou (a.k.a. Kapunahou), Ka‘aipū,

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

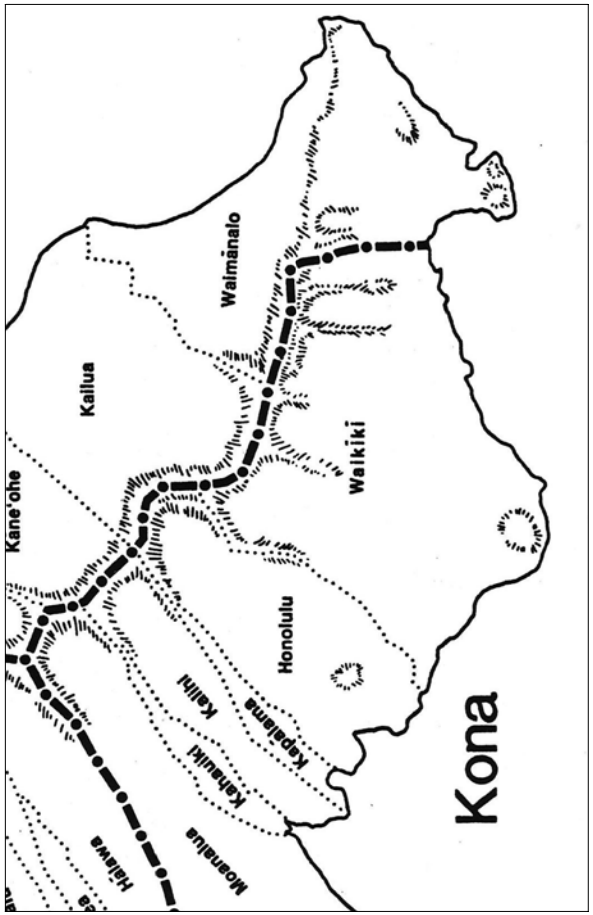

Figure 6. “Pre-Māhele Moku and Ahupua‘a” map and study of 1987 by the Hawaiian Studies Institute showing Mānoa as part of Waikīkī Ahupua‘a

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Figure 7. 1929 Photograph of the Inter-Island Airway’s amphibian plane, Hawaii, passing over Mānoa Valley (Hawai‘i State Archives)

Wa‘aloa and Waiakeakua. The valley is also home to many *pu‘u* (hills, mountains), peaks, ridges and caves—all with associated *mo‘olelo* and legendary accounts; these include Wa‘ahila Ridge (which defines the eastern border of the valley) and its six peaks [Keanapoi, Pu‘u Pia, Pūkele, Paliluahine (also known as Kapaliluahine or Pali Luahine) Akāka and Kūmauna], ‘Ulumalu, Pu‘u Pueo (“Roundtop”) and Pu‘u Mānoa. Mānoa is also associated with a variety of other *mo‘olelo* and legends, including “Pīkoi the Rat Killer,” “Maluae and the Underworld,” and “The Woman Who Died and Came Back to Life;” as well as famous events and people of the early historic era, including Kamehameha I (and his famous dog Poki), Ka‘ahumanu and Boki (Governor of O‘ahu under Kamehameha I and brother of Kalanimōkū).

3.2 Place Names

Translations presented without attribution in this subsection are from Pūku‘i et al. (1974), unless indicated otherwise. Figure 8 shows some place names of Mānoa Valley from an 1882 map by E. D. Baldwin.

The literal meaning of the word **Mānoa** is “vast,” or “wide and vast” (Pūku‘i cited in Sterling and Summers 1978:281). Along with Pauoa, Nu‘uanu and Pālolo, Mānoa is one of the famous “valleys of the rainbow,” as described in the legend of “The Lady of the Moon” (see below).

Place names for the many *pūnāwai* of Mānoa typically refer to the sacred nature of *wai* (fresh water), and stress the relationship between the water-giving gods (primarily Kāne, but also his companion Kanaloa) and *kānaka* (people) whose lives depend on it. According to numerous accounts (e.g., Williams 1935), the *kaona* (hidden or more subtle meaning) for **Kānewai** (location of the current Kānewai Cultural Garden) is “the healing waters of Kāne,” reflecting a widespread traditional belief in its curative properties. According to Bouslog et al. (1994:134), **Hualani** means “dug up by heaven,” but this interpretation may be problematic because the word for “to dig” (as in “dug up”) is actually *hua‘i*. According to Pūku‘i and Elbert (1986), one of the primary meanings of *hua* is “fruit, tuber, egg, produce, yield, ovum, seed…[etc.],” which suggests a more accurate interpretation for Hualani Pūnāwai is something like “heavenly fruit” or “seed” or “fruit” or “seed of heaven.” In any case, this is an evocative name for a *pūnāwai*. **Wailele** has been interpreted as “flying water” (Bouslog et al. 1994) or “waterfall” (Pūku‘i et al. 1974), and can also mean something closer to “leaping water,” based on one of the primary meanings of the word *lele*, as in a spring that bursts forth with water. **Punahou** means “new spring,” and in some older references it is called Kapunahou (or “the new spring”). **Ka‘aipū**, literally “the eating together,” is associated with a famous “supernatural woman” who lived under a stone there (see several other oral-historical associations for this spring, below). **Wa‘aloa**, “the long canoe,” and **Waiakeakua,** “water [used] by god,” are two more *pūnāwai* in Mānoa associated with many famous supernatural phenomena and events.

The five tributaries that fed into the main Mānoa Stream in the lower valley are: **‘Aihualama** (literally, “eat the fruit of the lama tree”), **Waihī** (literally, “trickling water”), **Nāniu‘apo** (literally, “the grasped coconuts”), **Lua‘alaea** (literally, “pit [of] red earth”), and **Waiakeakua** (literally, “water provided by a god”).

There seven principal waterfalls in the back of Mānoa Valley are: **Wai‘ihī‘iki** (literally, “small trickling water”), **Wai‘ihī nui** (literally, “big trickling water”), **Lua‘aulaea**, **Nāniu‘apo**, **Wa‘aloa**, **Kahuwai‘iki** (literally, “little water tender,” as in one who takes care of the water) and **Waiakeakua**.

Some of the primary *pu‘u*, ridges, peaks and caves include: **Wa‘ahila** (which Pūku‘i et al. 1974 do not define, but note is the name of a famous rain in the valley), **Keanapoi**, **Pu‘u Pia** (literally, “arrowroot hill”), **Pūkele** (literally, “muddy”), **Paliluahine** (also known as Kapaliluahine or Pali Luahine), **Akāka**, **Kūmauna** (these latter two are associated with “The Princess of Mānoa” (Kahala-o-Puna), **‘Ulumalu**, **Pu‘u Pueo** (literally “owl hill”) and **Pu‘u Mānoa**.

Figure 8. Outline of 1882 map by E. D. Baldwin, showing topographic points and traditional land units in Mānoa Valley

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

3.3 Mo‘olelo Associated with Specific Place Names

3.3.1 Mānoa, Pauoa, Nu‘uanu and Pālolo

One version of the legend of “The Lady of the Moon” describes the natural phenomena of Mānoa:

> Almost all day long the valley is open to the sun, which, looking on the luxuriant verdure and clinging mist, sends its abundant blessing of penetrating light. Rainbows upon rainbows are painted on the steep precipices at the head of the valley. There are arches of exquisite beauty, smashed fragments of scattered color, broad pillars of glorious fire blazing around green branches of ghost-like trees, great bands of opal hues lying in magnificent masses on the hillside, and lunar rainbows almost circular outlined in soft prismatic shades in the time of a full moon. (Irwin 1936:18)

> When showers creep down the valley one by one, rainbows also chase each other in matchless symmetry of quiet, graceful motion. Sometimes the mist in the doorway of the valley has become so ethereal that splendid arches hang in the apparently clear sky without cloud support. (Westervelt 1963a:128)

3.3.2 Kāne and the Fish of Mānoa

After Kāne had created all of the springs of Mānoa, Kāne and Kanaloa were at Waikāne (on the northeastern shore of O‘ahu), when Kanaloa asked Kāne to provide fish to the people of Mānoa. Kanaloa called upon his fish god Pōhaku-kū‘ula to go out and drive the fish up Mānoa Stream. He also commanded Kukalia, the daughter of the *kahuna* of the *heiau* Kulumalu to wave her *lepa* (flag) as a signal to the fishermen when to lower the ‘*upena* (fishnet). Pōhaku-kū‘ula first drove the fish up through the lands of Waikīkī, dropping the fishnet for the first time at Akuakekau to feed the people of Akuakekau and Kanaloa, and then to Makawiliwili where the net was dropped for the second time. This fish god continued to drive the fish inland into the lands of Mānoa to Kapilpili.

> Then the fish came up to Kūkana, where Kukalia again signaled to drop the fishnet. When Kanaloa drew the net up, the fish were given to the chiefs of Kumu‘ulu and their people. The fourth net was put down at Hipawai-that catch of fish being for the people of Pāmoa. Still the fish came, following the water course. When they arrived at Halelena, Kukalia, the ever-watchful sentinel, signaled to drop the fishnet; and that catch went to the people of Ka‘aipū. The sixth catch was at Kalehua just as the evening star Hōkūloa was rising and the fish were given to Wa‘aloa and the Kaululā‘au chiefs. The number of fish had decreased, for the waterway was getting narrow, but Kukalia, the beautiful sentinel, kept signaling to Kanaloa to put down the seventh net. This was at Kukuio, a part of the Mānoa Stream where the fish came one by one. The fish came to Kahakiamano, then to Hopenui, where they began to be bewildered and excited. They swished back and forth and started up again in the excitement. They stayed there overnight and at dawn, just as the first red cloud broke over the mountain, the fish followed the water course up to Niuapō, then they spread, some

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

> going to Wa‘aloa and Waiakekua, others turning to the swamp, called Lua‘alae, or the Gulch of the Mud Hen, and on to Waihī, where most of the fish disappeared. (Bouslog et al. 1994:138)

After having provided the people of Mānoa with fish, the two gods traveled back to Konahuanui to rest. They started for home at Waihī, climbing the pathway of the ‘Opihi at ‘Aihualama and ascending the heights to Konahuanui, where they sailed for the east and above the clouds (Bouslog et al. 1994:137-138).

3.3.3 Pīkoi the Rat Killer

Another legendary beauty of Mānoa is described in the “Legend of Pīkoi the Rat Killer.” In this tale, a chief on Kaua‘i had eight children, six god daughters or demi-gods called *kīko‘o,* who were rats (*kīko‘o* is the name for the Hawaiian bow used to hunt rats), one *kanaka* daughter and one *kanaka* son. The *kanaka* son, Pīkoi, became a noted rat hunter on Kaua‘i, using a bow and arrow to kill the rats. The *kanaka* daughter, named Ka-ui-o-Manoa (“The Beauty of Mānoa”) moved to O‘ahu and married the chief of Mānoa, Pāwa‘a. They made their home in Mānoa Valley at Kahaloa and also had the land called Kaho‘iwai. One day Pīkoi and his father decided to travel to O‘ahu to visit their sister at Mānoa. While in O‘ahu, Pīkoi wandered from Mānoa toward the harbor at Honolulu, and joined several *ali‘i* in the sport of rat shooting. Pīkoi impressed a chiefess and her followers by shooting at a hidden rat, and striking and entangling the whiskers of three rats in one shot. He then proceeded to kill an additional number of rats in one shot, all strung along the length of the arrow.

The king of O‘ahu, Kākuhihewa, heard about this boy and wanted to find him. Only the caretaker of the high chiefess had seen the boy and she suggested to the king that he command all of the men of O‘ahu, each district for one year, to come to his residence at Ulukou in Waikīkī. In the sixth year it was the turn of Mānoa, and Pīkoi, his father, and Ka-ui-o-Mānoa made ready to travel to Waikīkī with other men of the lands of Mānoa, mentioned in the following passage.

> She [Kauiomanoa] went from their home at Kahaloa, (a place in the upland of Manoa) to a spot called Kaho‘iwai. There she made four lehua leis, two for the neck and two for the head and went home. They made ready to go to the lowland with their food which the stewards carried. All the members of Pawa‘a’s household went, none remained, and so it was with all the families in the upland of Manoa. The men and women of every locality in Manoa went, from Ka‘apakahua, Kawailele, Puahia, Kanewai, Kamo‘ili‘ili and Kamoku. (Kaui 1865; translation in Hawaiian Ethnological Notes, Vol. II, p. 713)

In another rat-shooting contest, Pīkoi again impressed the king, who made him his personal rat-hunter and gave him a grass hut in Mānoa, which Pīkoi returned to with his relatives to live (Westervelt 1963a:171-172).

3.3.4 Poki, the Dog of Kamehameha I

Pu‘u Pueo was also a favorite haunt of Poki, the wonder-dog of O‘ahu, whose home was on a little knoll behind Punahou College (now enclosed in the small Mānoa Par) (Taylor 1953). This dog was owned by Kamehameha I. By tradition, the dog was brought to the islands on the American trading ship *Eleanor*, which visited the islands in 1790 (Dorothy Barrere, cited in

Sterling and Summers 1978:285). Poki, or Boki, is a transliteration of the English name “boss,” and is not a Hawaiian name (Pūku‘i and Elbert 1986:338). According to legend, this dog was prayed to death (Titcomb 1969:22). After Kamehameha’s death, the dog was deified and worshipped; tales of the dog were possibly confused with other tales of other spirit dogs. The legends of this dog may date to Kamehameha’s time, or may have been borrowed from older legends of a dog apparition whose name is lost (Dorothy Barrere, cited in Sterling and Summers 1978:285).

Beckwith (1940:346) says that Poki has been confused with the legend of the ghost dog Kaupē and other spirit forms. In these legends, Poki is a dog-like creature “spotted or brindled in color and very long in body, who guards a certain section of Honolulu, but may appear in other places.”

> Travelers report having seen the creature and having made a long detour to avoid it. It sometimes appears as a form in the clouds, either resting or in motion. A foreigner reports seeing, as he was entering Moanalua valley from Honolulu just as the moon was rising, “a shapeless white form,” a mist “convulsed with movement,” which passed over the treetops from the Koolau range, preceded as it came by “the wailing of dogs” and followed as it passed by “a deathlike stillness.” (Beckwith 1940:346)

The spirit form of Poki may be connected with signs in the sky that the Hawaiians call *‘ōuli*, which are animal shapes seen in the clouds that were used to foretell the movements of the chiefs. The *ali‘i* believed that these denoted the presence of their *‘aumakua* (guardian spirits) in the heavens (Beckwith 1940:346-347). Poki had magic powers – he could stretch himself along the mountains, his hind feet on the mountain ridge and his head in the valley below, just as:

> . . . the night clouds, sometimes darkened by falling rain, sometimes enriched by the halo of lunar rainbows, and sometime glorified by the silver moonlight, continue to stretch from peak to peak along the mountains and watch over all the various forms of life in the valleys below. (Westervelt 1963a: 88-89)

Poki is also seen at night in Mānoa, especially if one is standing on Pōhaku kīkēkē, the bell-stone located in Kamō‘ili‘ili. By tradition, the bell stone gives clear vision to one who stands on it. If while standing on the stone, one wishes to see Poki, then he appears “stretched along the mountain and silvered by moonlight” (Westervelt 1963a: 87-88).

The association of Poki with Mānoa may be due to the dog’s shared name with Boki Kama‘ule‘ule, the high chief who owned much of the land in lower Mānoa. High chief Boki’s original name was ‘Īlio-punahele, meaning “favorite dog”; when Kamehameha got the dog “Boss” (Boki or Poki) he changed the name of the young chief from ‘Īlio-punahele to “Boss,” which was pronounced as Poki or Boki (Day 1984:13). Pūku‘i et al. (1974:188) say that many dogs were named Poki around the time of Boki’s birth, including dog guardians (*kia‘i*). Some Hawaiians say that the dog Poki is the spirit of Boki, who watches over and protects Mānoa Valley (Westervelt 1963a:88).

In recent times, several people still report seeing a strange dog that they identify as Poki. In 1971, a visitor at the Bishop Museum saw a white puppy, which began to grow larger and more terrifying as it ran towards him. He did not stop running from this apparition until he got to the Kamehameha Shopping Center (Grant 1996:215).

3.3.5 Malua‘e and the Underworld

In the tale of “Maluae and the Underworld” (Kamakau 1991b: 51-52; Westervelt 1963b: 14-20), Malua‘e was a farmer who lived at the back of Mānoa Valley.

> He kanaka mahiai o Maluae no uka o Manoa, o Kanaloaohookau kona ‘āina, a o ka maia kana ai kanu nui, he maia na ko akua, a ua mahiai i na ai e ae na laua me kana keiki a me kana wahine. (Kamakau, Ke Au ‘Oko‘a, Oct. 13, 1870)
>
> Translation:
>
> Malua‘e was a planter in the uplands of Manoa, Oahu. Kanaloaho‘okau was his land. He raised a lot of bananas as food for the gods, and he planted other food, ‘ai, for himself, his wife, and his son. (Kamakau 1991b:51)

Malua‘e always honored the gods by placing some of his crop on an altar to the gods, Kāne and Kanaloa, before taking the rest home.

> His bananas grew rapidly by the sides of the brooks, and yielded large bundles of fruit from their tree-like stems; his taro filled small walled-in pools, growing in the water like water-lilies, until the roots were matured, when the plants were pulled up and the roots boiled and prepared for food; his sweet potatoes . . . were planted on the drier uplands. (Westervelt 1963b: 14)

He had a son called Ka‘ali‘i, meaning “rolling chief,” who was a careless, rollicking child. One day the boy grew hungry and ate some of the bananas that Malua‘e had placed on the altar to the gods. In anger, the gods struck the boy dead. Malua‘e found the dead boy with a piece of banana still stuck in his mouth. He was so distraught that he lay down on his bed and refused to eat or drink. The gods regretted their action, remembering the long devotion of Malua‘e.

The gods gave Malua‘e a spirit body (*‘ano kino lani*) and a marvelous hollow cane (*ko‘oko‘o mana*) called Maku‘uko‘o, which contained food to give him strength, a war club and spear to fight off ghosts, and a piece of lava for fire. They took him to Moanalua where there was an entrance to Pō (*po pau ‘ole*), the underworld. After many confrontations with ghosts who tried to impede his journey, he found his son “down in the *papa-ku*” (the foundation of Pō), still choking on the banana. The father caught the spirit of the boy and began his way up, again, fighting ghosts with his club and spear and gaining strength from the god’s food. Finally they were completely surrounded by the ghosts, and Malua‘e poured out the lava from the hollow cane, causing the spirits to flee. The father stuffed his son into the hollow cane and escaped from the underworld. He made his way home and returned the boy’s spirit to his body. Forever after, both the father and son took food to the altar of Kāne and Kanaloa to honor and thank them.

3.3.6 The Woman Who Died and Came Back to Life

An historic account of a woman who died in Mānoa was told in the newspaper *Aloha Aina* in 1903 and recounted in the book “The Legend of Kewalo.” The account was given by Mrs. Lydia Kaloio and by Mrs. Malie Kamana, the half sister of Mrs. Keakealani Maikini, the woman who died.

> Keakealani was very ill and asked to see all her immediate relatives. When they had assembled she told them that she was about to die, and soon after she expired

> in the arms of her sister Malie. They laid her on a couch. *Rigor mortis* set in, but after three hours Malie noticed one of her sister’s big toes jerk once violently. Another hour passed, then the woman crowed like a rooster just learning to crow. Two hours later a slight breathing was noticed, after which she was heard to murmur “*I wai* (water).” Water was poured carefully between her clenched teeth. After another two hours she opened her eyes and spoke. (Green and Pūku‘i 1936:120)

Keakealani dreamt that she rose from out of her body, ran from the house, and began to ascend the slopes of Punchbowl.

> On the summit were many people making merry. Just below the summit on the west side stood a dark man who waved to her to hasten and join the crowd; on the east side stood an older relative and immediately behind her aunt she saw her sister Anela who had died some years before. The aunt beckoned and her sister called “Sister, come!” She noticed that her aunt wore a short blue *mu‘umu‘u* which she had been fond of in life. She hurried toward them and as she drew near, her aunt gave her a violent push which sent her rolling down to the foot of the hill. She rose to reclimb the hill, but her aunt kept shoving and pushing her toward her home in Manoa until she had returned to the place where her body lay. Then the aunt forced her to reenter her body through the big toe. The ankle-joint looked to her like a dark cave and she would have drawn back, but her aunt forced her on. She continued up through her body, each joint looking to her more terrifying than the last. The torso was like an inky-black cavern. At last as air filled her lungs, she felt herself crow and she awoke from her deathlike sleep. (Green and Pūku‘i 1936:120-121)

Sometime later Keakealani felt death coming again. She insisted that a new purple silk *holoku* (loose dress) be made for her to wear, since she had learned during her last illness that what one wore at the time of death is what one would wear in the spirit world.

3.3.7 Kānewai Pūnāwai

Kōnāhuanui is the highest peak in the Ko‘olau Mountains and is the northwest corner of the Mānoa Ahupua‘a boundary. It was the home of the gods Kāne and Kanaloa. It was where their parents came on their way to and from the east from above and from the right (*mai kahiki a mai ka hiwamai*), meaning it was the starting and resting point of the gods since the first formation of the islands (Bouslog et al. 1994:133). Kāne and Kanaloa fished in the ocean off Kahala (east of Mānoa Ahupua‘a). One day the two gods traveled inland, looking for fresh water to wash off the saltwater on their bodies. They came to Kamō‘ili‘ili, and Kanaloa said:

> “Where are the springs and streams of living waters? Our people are always singing the chants of your life-giving springs and stream. They tell me that they are in the clouds, the sun and the bowels of the earth. Can you give it to me now?...Kane turned to Kanaloa saying “Be patient, thirsty one.” (Bouslog et al. 1994:134-135)

Kāne struck his staff into the soil and the water flowed so that the sand was washed from their bodies. The white sand is still found in the area today. The spring is called Kānewai, or “the

waters of Kāne," and the stretch of sand is called Kanaloa. At this place Kanaloa placed a stone, called Pōhaku-kū-ula, a god to attract and snare fish (Bouslog et al.1994: 134).

This underground pool Kānewai was known for the healing powers of its waters (Williams 1935). These legends do suggest that the locale of Kānewai would have attracted the infirm, some of whom may have expired there in the course of seeking healing and have been interred in the area. It is also notable that myths of the waters of Kāne emphasize a theme of eternal return, a theme played upon in the account of the repeated subterranean passage of fishes to Kānewai from the sea. Such associations may have increased the perceived auspiciousness of the area as a place to inter the dead.

This spring is also mentioned in a legend concerning the Hawaiian pig god, Kamapua‘a, who made both a spring at Kānewai and a spring called Pa‘akea (also called Kumulae or Hausten Spring) in the adjacent land section of Kamō‘ili‘ili.

3.3.8 Hualani Pūnāwai

Kāne and Kanaloa traveled further up the valley and Kanaloa suggested that Kāne again use his stick to produce water. Kāne struck the cane deep into the earth to bring forth a crystal water. Kāne commanded that a spirit guard the water gourd bottle Hualani, meaning "dug up by heaven." The name given to the land around was Maka‘īlio, "the dog's watchful eye" (Bouslog et al. 1994:134).

3.3.9 Wailele Pūnāwai

Kāne and Kanaloa then traveled to the northwest, near to the present day athletic field of the Mid-Pacific Institute. He struck the ground so forcefully that the water came flying up, so it was called *wailele*, or "flying water." This spring became a fishpond filled with *‘o‘opu* (used by Hawaiians to describe a large variety of fishes included in the families Eleotridae, Gobiidae, and Blennidae), *‘anae* (mullet, *Mugil cephalus*), and *awa* (milkfish, *Chanos chanos*). Kāne put a *kapu* (prohibition) on this spring so that no woman should bathe in it, and he commanded that a sacrifice at Wailele should always be a yellow dog, "*he ‘īlio ka mōhai puakea.*"

One *mo‘olelo* related to Wailele Spring concerns a larg *pōhaku*. This

> "Near this spring stands a huge rock known as Kua‘i o Mānoa, which at times took the form of a magnificent youg chieftain whose favorite past time was surfing. From his home at Wailele he would watch the ocean and, when he saw the nalu ōpū, the budding waves, he would lift his surfboard and wander down to Ulukou at Waikīkī. When he saw the shadows of the Mānoa hills fall across the valley, he would say to the surf, "E ho‘i i kua‘i o Mānoa ua ahiahi"- "I must return to the beauty of Mānoa. It's evening." (Bouslog et al. 1994:134)

This version of the story is found in *Mānoa The Story of A Valley* (Bousloug, et al). The spelling of Kua‘i is questionable in that it is very similar to Kau‘i [the beauty]. Pūku‘i defines "kua‘i" as "to remove internal organs of animals, disembowel; to clean, as chickens." *Kau‘i* rather then *kua‘i*, would be more logical especially when looking at the author's translation of "*kua‘i*" as "beauty" in the saying "E ho‘i i kua‘i o Mānoa ua ahiahi- I must return to the beauty of Mānoa. It is evening." Also the above version states that the "huge rock" is "near this [Wailele] spring," but the accompanying photo is of a smallish rock located inside the spring (Figure 9).

Mo‘olelo similar to the one described above, identifies a large rock to the west of Wailele Spring as Ka U‘i o Mānoa, and describe a very similar story with the exception that "chieftan" is a chiefess. See Nakuina's version below.

An alternate origin for the name of Wailele ("leaping water") Springs was recorded by Mrs. Emma Nakuina:

> The old belief was that these clear, bright waters had their origin on the heights above the valley, on the western side, at Kakea, and came leaping down through underground channels, to appear again in the Springs of Wailele, from which the adjacent lands took their name. (Nakuina 1907:25)

According to Nakuina (1907:24), there was one *heiau* and a sub-*heiau* associated with Wailele. The *heiau* was called Ka-ua-la‘a, meaning "the sacred rain." It was located under a grove of mango trees towards the eastern and lower ridge of Mānoa. A picture of this stone structure is printed in the August 1907 Mid-Pacific Student, so it must have been still extant at that time. Thrum does not record a *heiau* in Wailele in his list of the *heiau* of O‘ahu in 1907, but it may be one of the *heiau* mentioned by Thrum in his list of forts built by the chief Kūali‘i after his victory over the *menehune* at Kūka‘ō‘ō Heiau in Mānoa. Thrum (1892:112) reported: "After Kuali‘i obtained possession [of the menehune fort at Kūka‘ō‘ō], he made it the principal temple fort of a system of heiaus, extending from Mauoki, Puahia luna and lalo, Kumuohia, Kaualaa, Wailele, and one or two other points between Kaualaa and Kukao‘o."

A land area adjacent to Wailele is Kauwala‘a, which by Nakuina's description and the similarity of the name (Ka-ua-la‘a) is probably where the *heiau* was located.

> Here once stood the heiau or temple devoted to the cult of Ua-ku-a-hine or the "Rain of Manoa." She was a fabled goddess who was married to a human consort and here they dwelt together. In the lifetime of her husband she took on human form. But this happy union must perforce come to an end with the death of the poor mortal husband. The goddess, in her grief at this loss, dissolved in mist and rain, and floated away to her home in the Manoa range, where she dwells immortally on the ridge of Kumauna. From this vantage ground, high up amid the cold-capped peaks, she sweeps down daily, along the mountain side to her old home at Ka-ua-laa. (Nakuina 1907:24)

The sub-*heiau* of Ka-uwalo-malie was located west of Ka-ua-laa, across the baseball field on the Mid-Pacific Institute under a grove of Pride-of-Indian trees. The son of the goddess Ua-ku-a-hine was the high priest of both of these *heiau*. The smaller *heiau* was named for his daughter, Ka-uwalo-malie (meaning "the place of the silent crying"), ". . . whose application suggests the grief of her grandmother, the goddess, as she melted away into the rain of the valley on the death of her husband" (Nakuina 1907:24-25).

The high priest also had a granddaughter, called variously Kumu-hau-nani (meaning "the beautiful hau tree") or Kau‘i o Mānoa (meaning "the beauty of Mānoa"). She lived on a rounded knoll on the grounds of the Mid-Pacific Institute. She was betrothed to the chief Kāne-wai, who lived in Mō‘ili‘ili. She lived in sacred seclusion at Wailele, but longed to be allowed to go with the other maids of Mānoa to surf at the Waikīkī coast. Her grandfather, the high priest, granted her desire, with the condition that she should return at a certain hour to her *kapu*-guarded home at Wailele.

> With this condition she willingly complied in spirit, but, at times, amid the excitement of the ocean – sport, she would forget the directions given and tarry beyond the stated hour. Then her retainers would seek their charge and would call to her in words which were destined to live through coming years. “E hoi, e ke Ui o Manoa, ua ahi-ahi.” “Come, come home, O Beauty of Manoa; it is now sunset.” “Ke hea mai nei ka Ua-ku-a-hine ia oe.” “The rain Ku-a-hine is calling to you.” (Nakuina 1907:26)

This poetic phrase became a common saying and was used to call out to friends as they wended their way homeward once the days’ work was done.

Another reference says Kau‘iomānoa lived near the large rock called Kau‘iomānoa. She leant “her mantle of beauty to the Mānoa girls, as the valley was famous for its beautiful young women thirty years ago” (Dictionary of Hawaiian Localities, Saturday Press, Dec. 15, 1883).

Figure 9. Identified as “Kua‘i o Mānoa” at Wailele Spring (from Bouslog et al. 1994:134)

3.3.10 Punahou Pūnāwai

Punahou is also associated with the gods Kāne and Kanaloa (Figure 10). Kāne and Kanaloa came to O‘ahu on a pointed cloud from the land of Kuaihelani, one of Kāne’s twelve islands in the heavens. They traveled from Hanauma to Waikīkī. Kanaloa would often complain of hunger,

and Kāne, a kindly, courteous god, would strike the earth with his staff. This would cause water to gush forth, which they would use to mix their ‘*awa* (kava, *Piper methysticum*) drink.

As described by Pūku‘i and Curtis (1951):

> Ma ko laua alahele, ua hoomaha ihola ma ka puu o Keapapa (o keia kahi e kapa ia nei o Punahou) a hoomaka hou no o Kanaloa e ne i wai, me ka hoouluhua pu nohoi i ka hiki ole ia Kane ke hoopii mai i wai na laua. Aka ihola o Kane, no ka mea, ua lohe aku nei kona pepeiao i ka halulu o ka wai ma kookoo, a hu maila ka wai a nui. Ua lilo keia wai i mea e hoopomaikai i na kanaka o ka aina, oiai, ua olelo ia o keia ke kumu a ka wai i koaa ai kala wai ma kahi i kapa ia nei i keia wa o McCully Tract. Ua kapa ia keia wai a Kane, o Ka-puna-hou.
>
> Translation:
>
> On their way they rested on the Keapapa hill (at the place now called Punahou) and again Kanaloa teased his brother for water and challenged his ability to produce it. Kane smiled, for he could hear the noise of water within the hill, and he thrust his staff into the ground and the water gushed forth in abundance. It has been a great blessing to the natives of that region . . . This water of Kane was called “The new spring,” Ka-puna-hou. (Pūku‘i and Curtis 1951:112-115)

There is a second version of the origin of the spring.

A chief Kaha‘akea once lived in the Ka‘ala Mountains and had two twin children, a boy named Kauawa‘ahila (Wa‘ahila Rain) and a girl Kauakiowao (Mountain Mist). The children’s mother had died, and Kaha‘akea married a woman named Hawea to help take care of his children. Hawea also had a son, but since he was deformed and ugly, she soon grew jealous of the twins’ beauty. When Kaha‘akea went on a visit, Hawea began to persecute her step-children:

> Driven to desperation they fled to Konahuanui, the mountain peak above the Pali of Nuuanu, but were soon discovered and driven away from there by the cruel Hawea. They then went to the head of Manoa Valley. The step-mother was not at all pleased at their getting out of the way of her daily persecutions, and searched for them everywhere. She finally tracked them by the constant appearance of rainbows at the head of Manoa valley, those unfailing attendants of rain and mist. The children were again driven away and told to return to Kaala where they would be constantly under her eye, but the children ran and hid themselves in a small cave on the side of the hill of Kukaoo whose top is crowned by the temple of the Menehenes. Here they lived some time and cultivated a patch of potatoes, their food at this time being grasshoppers and greens. The greens were the leaves and the tender shoots of popolo, aheahea, pakai, laulele and potato vines by rolling hot stones around among them in a covered gourd. This is called the “puholoholo.”…When the potato tubers were fit to be eaten, the brother (Waahila-rain) made a double “imu,” having a “kapu,” or sacred side for his food and a “noa” or free side for his sister. The little cave that was their dwelling was also divided in two, a sacred and a free part for brother and sister. The cave can still be seen and the wall of stone dividing it in two was still intact a few years

> ago, as also was the double imu. In older times it was tabooed to females to appear at any eating place of the males. (Nakuina 1893:102)

The stepmother drove them away again, and the children found two caves in the rocky hill back of Punahou, one occupied by the brother and the other by the sister (Thrum 1998:133-136).

> In his [Kauawa‘ahila] trips around the neighborhood for fruit and greens he had noticed a large rain-water pond to the east of the hill on which they dwelt. This pond was called Kanewai. Here he sometimes came to snare wild ducks. He also had met and knew the Kakea water god, a moo, who had charge of and controlled all the water sources of Manoa and Makiki Valleys. This god was one of the ancestors of the children on the mother’s side, and was on the best of terms with Waahila rain. The boy paid him a visit, and asked him to assist him to open a watercourse from the pond of Kanewai to a place he indicated in front of and below the caves inhabited by himself and his sister. The old water god not only consented to help his young relative, but promised to divide the water supply of the neighboring Wailele spring, and let it run into the watercourse that the boy would make, thus insuring its permanence. (Thrum 1998:136-137)

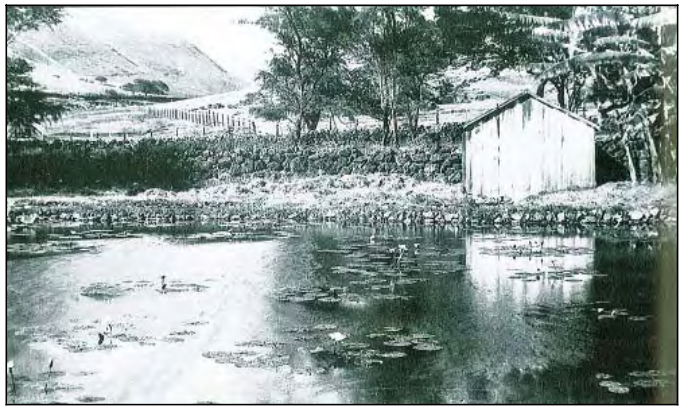

Figure 10. Kapunahou Spring (photograph from Bouslog et al. 1994:132)

The *mo‘o* (water spirit) made a passage to open the underground. Kauawa‘ahila dove into Kānewai Pond and came out at the place now called Kapunahou (the new spring). The gushing water soon formed a basin, which Kauakiowao was most surprised to see upon awakening. Kauawa‘ahila planted some *kalo* (taro) patches around the spring, which attracted people to live nearby and become vassals to the twins. At the return of the children’s father, Kaha‘akea learned of the cruelty of Hawea; he killed her and then killed himself. Rocky Hill (also called Kaha‘akea), the home of the children, was named for him (Thrum 1998:137-138).

A third story for the origin of Punahou spring concerns an old couple who lived at the foot of Rocky Hill in Mānoa. At a time of drought, the husband had to walk far into the valley for famine food, such as *kī* (or *tī*) roots and ferns. The woman, Kealoha, had to walk all the way to Kamō‘ili‘ili to fill her gourd with water. One night, after another tiring walk to Kamō‘ili‘ili, the woman had a dream. In the dream, a man asked why she was crying. She replied that she was so weary from the daily long walks to get water. The man told her that she did not have to go again, because there was a spring below a *hala* (pandanus or screw pine, *Pandaqnus odoratissimus*) tree near their home. Kealoha told her dream to her husband, Mukaka, the next day, but he made light of it. That night, Mukaka had a similar dream; the man told him of the spring under the *hala* tree and told him to make an offering of a red fish, wrapped in *tī* leaves, and cooked. The next morning, Mukaka made the offering and pulled up the *hala* tree. When the water began to gush, he cried out “Ka punahou! The new spring!” (Pūku‘i and Curtis 1960:83-87).

A version of this story with more details was told by W.F. Alexander in 1911, who recorded that it was told to his grandfather by an old Hawaiian and his wife that had a *kuleana* (small family parcel) close to the spring of Kapunahou. In this version, the ceremony and offering are described:

> . . . He [Mukaka] went home with the fish, lighted the imu and cooked them in ti leaf wrappers. In the meantime the people gathered to eat the fish that had been prepared.
>
> The ancestral god was brought from its customary place with the ipu-o-Lono container. When the fish was cooked, the offering to the god was put into the ipu-o-Lono. The remainder was eaten by the people. (*Ka Nūpepa Kū‘oko‘a* 1915:5; translation from Hawaiian Ethnological Notes, Bishop Museum Archives)

From this legend, Punahou School adopted for their seal the *hala* tree with two taro leaves in the water flowing under it (Alexander and Dodge 1941:35-36).

The stone Pōhakuloa was a boundary marker placed at Punahou soon after this area was given to the American missionaries by Chief Boki. An appropriate stone was sought to serve as a marker and was found on the northeastern slope of Rocky Hill, nine feet long, seven feet high above ground, and two feet below ground. The workers dug hard the first day, but barely dislodged the stone. The second day, they were surprised to find their labors of the first day had been in vain, and the stone had worked its way even more firmly into the ground. The chief consulted a *kahuna* (priest) who said:

> Kuka kamailio iho nei lakou i keia mea ano e, a noonoo iho nei he pohaku kupua keia. Hele aku nei ke alii i ke kahuna e ninau pono ai, a i maila no hoi ke kahuna, “Aole kela he pohaku, aka, he kanaka! Mai kena aku e hele, e hoomalimali mua ia, a pau ia, nana no e hele.” Kuhikuhi mai ke kahuna e hana i paina. E kii i puaa

> hiwa, niu hiwa, awa hiwa, moa hiwa, ia ula, poi lehua, a e kono i na kanaka hana e ai me no poe i akoakoa mai. A i ka pau ana o ka paina, eli hou aku nei na kanaka, o ka hemo no ia o ua pohaku nei.
>
> Translation:
>
> They discussed the marvel and came to the conclusion that his was a kupua stone. The chief consulted a kahuna. He said, “This is not a stone, it is a man, He is not to be forced, but coax him and he will go.” The kahuna proposed that a feast be prepared consisting of black pig, black awa, green coconut, black fowl, red fish, and pink poi, and the workmen and a number of others be invited to attend. After the feast the digging began again and the stone was soon out of the ground. (Green and Pūku‘i 1936:116-117)

Chief Paki (father of Bernice Pauahi Bishop), a powerful man said to be seven feet tall, lifted the stone upright. With men supporting the stone on each side, the stone moved of its own accord to its prepared place at Punahou. Laura Green and Mary Pūku‘i relate the later destruction of the stone:

> Some years later, Pohaku-loa was broken up. Annie Harris thinks that a part of it was removed to the Kapi‘olani Maternity Home and that the remainder is still to be seen standing at the front gate of the Punahou campus. (Green and Pūku‘i 1936:117)

Another version of this *pōhaku* is found in the archives of the Bishop Museum (Henriques Collection, 1925 Sites Commission Tablet).

> The Pohakuloa stone was worshipped in the old days by Hawaiian women, who prayed for the endowment of their children with wisdom and strength.
>
> Appropriately, this stone was used as part of the wall when Punahou School was founded in 1830. The tabu which endangered anyone who helped move the stone was removed by Kamehameha III, who challenged the tabu by sitting on the giant Pohakuloa stone—twelve feet long and weighing several tons. By the grace of the king’s presence, the Hulumanu or body guard of the king were able to carry the stone to its place in the wall. The men were “numerous as ants tugging at a kernel of corn.” Pohakuloa was broken up in 1856. This is the largest piece of Pohakuloa that is in existence today. (Henriques Collection, 1925 Sites Commission Tablet, cited in Sterling and Summers 1978:283)

3.3.11 Ka‘aipū Pūnāwai and Pōhaku

After Kāne created the spring at Kapunahou, Kanaloa suggested that they return to their home at Kōnāhuanui. They traveled through Mānoa over ‘Aihualama to the heights of Pu‘u o Mānoa (Rocky Hill) onto the plains to the land of Kulumalu (where the Castle home was later built on ‘Ulumalu Hill), which means “the shade of the breadfruit.”

> Kulumalu was *o‘io‘ina o nā akua*, the rest temple of the gods and the place where the food for the gods was cooked. Kanaloa, as usual, complained of being thirsty and Kāne answered gently, “Wait, thirsty one, until we get to Kala‘i” . . . [now the

> site of the Salvation Army’s Mānoa headquarters]. Kala‘i, known as the road of the gods, is where they rested and dined. At Kala‘i, Kanaloa still chided Kāne by saying, “Where are the springs of living water, Kāne? My mouth is dry and I shall wither up.” Kāne then turned to Kanaloa and said, “Let us go down the knoll and there we will find the entrance to the lizard goddess’ home, where you will find cool waters to quench your thirst.” After they had walked a few rods for Kala‘i and down a hollow place, Kane struck his magic cane into the ground and there burst forth the spring of Ka‘aipū, “the girdle of the cluster,” meaning a gateway. Kāne then created a supernatural guardian called Ka‘aipū, who was formed into a stone fish with its mouth wide open to guard the spring. This spring was the first gateway to the home of the Kihanuilanilulumoku, the Mo‘o or lizard goddess of Mānoa, who lived in the upper springs with her other fairy companions. These were the wives of Kāne and Kanaloa. Ka‘aipū the stone god is still on the premises of Ka‘aipū. It is said that Ka‘aipū often changed its form when it dwelled in the spring it would be an eel and represented a beautiful mermaid; at other times it would take the shape of a warrior. (Bouslog et al. 1994:135-136)

Thrum (1892:115) also discusses this sacred stone of Mānoa:

> Kaipu figures also in the valley legends as possessing a stone of peculiar merit and power, from which the land takes its name, and was believed by the natives to bring good or ill-fortune to its possessor according to the honor bestowed upon it. The stone is about four feet in length, somewhat tapering toward one end, and having a rather smooth bore of about three inches in diameter running through its entire length. The larger end has sufficient irregular regularities to furnish those superstitiously inclined with the idea of a face, the bore mentioned serving for its mouth, into which sacrifices of food used to be placed. Thus the god Kaipu held power over Manoans in days gone by.
>
> Ka‘aipu was an akua wahine pohaku. A local pohaku god in Manoa, with an opening on the top of his “Head,” which was considered as another mouth. (Malia Kamana, as told by Mrs. M. Pūku‘i, 3/16/54, to C.C.S, cited in Sterling and Summers 1978:285)

A third legend says that Ka‘aipū was the name of an area noted for the sweetness of its mountain apples. A great wizard who lived there was turned into the stone (Dictionary of Hawaiian Localities, *Saturday Press*, Dec. 15, 1883). This stone was in the *‘ili* of Ka‘aipū, which was later owned by a farmer Carlos A. Long, who used the land for a fruit orchard; and then owned by the Montanos, who used it to graze the cows for their business, the Ka‘aipū Dairy. It later became the site for the Salvation Army’s Wai‘oli Tea Room.

This spring is also called Pū‘ahu‘ula (Sterling and Summers 1978:288, citing an article on “O‘ahu Place Names,” *Hōkū o Hawai‘i*, Feb. 11, 1930). The famous female *mo‘o*, Kiha-nui-lūlū-moku (great island-shaking *mo‘o*), lived here; she had eel, lizard, and woman forms, and made plants thrive in Wa‘a-loa ravine. Pū‘ahu‘ula means “feather-cloak spring” (Pūku‘i et al. 1974:190-191).

3.3.12 Wa‘aloa Pūnāwai

After leaving the Pū‘ahu‘ula springs of the *mo‘o* Kahanuilanilūlūmoku, Kāne and Kanaloa traveled up the valley, past Puka‘oma‘oma‘o, later the residence of Queen Ka‘ahumanu.

> They traveled on to Kahoiwai, where again the petulant Kanaloa said, “Where are your waters, Kāne? Your waters do not follow you!” Then Kāne gently said to Kanaloa, “Thirsty one, why not drink from this stream of rushing water?” The mischievous Kanaloa answered, “I do not want these waters. I want the waters that you profess to bring forth by your magic power. I am wandering with the god of bubbling springs and still do not have water to mix my ‘awa.’”
>
> Kāne turned to Kanaloa for the last time and said most kindly. “Wait a little longer, thirsty one, and I will give you of the life-giving water of Wa‘aloa, or ‘long canoe,’ at the garden of Kihanuilanilūlūmoku, where she happily spends her hours near the falls of *nāniu a pō*, the coconut trees of night. At this place her retinue cultivates the *kalo, hō‘i‘o* and sweet potato in our canoe for food.” (Bouslog et al. 1994:136)

The gods entered a ravine shaped like a canoe and Kanaloa struck his cane into the bowsprit of the canoe, creating Wa‘aloa Springs. Kāne and Kanaloa stayed awhile in this place in the company of the mermaids at the garden of Kihanuilanilūlūmoku.

A Hawaiian chant also speaks of Wa‘aloa as the garden owned by a legendary woman named Kihanuilūlūmoku-wahine. This woman, in a company of mermaids and *menehune*, went to her garden each month a few nights before the full moon. They planted taro, sweet potatoes, bananas, *hō‘i‘o*, bamboo, *kī*, *hala*, ginger, *lehua*, and other plants. As they worked they chanted:

O moon of the night of Hua,	Until Māhealani, the Full Moon, comes;
That brings fruit and food to the plants	For when Māhealani is here, Kulu, the Moon of
Here is the *kalo* plant,	Moisture will follow
The life of the land,	And the plants will show a bud
I give to the earth, Honua;	Then comes Kaloukūlua, thy companion.
Here is the sweet potato branch	To the plants they will bring two shoots,
I plant for thee and me;	And help thee, Hua, to bear the fruit.
Here is the shoot of sugar cane,	So, Kāne, God of Water,
So sweet to taste and eat,	And Hina, Mother of Mists,
The emblem of desire’s success;	Send your aloha down to us in moonlit mists.
I place it in the earth, Mother Earth.	Let it sweep along the hillside.
O Moon of the night of Hua,	Keep the new growth a-growing
Keep the plants green and alive	That your people from the night will live.

The mermaids would sing this as they came from the central springs of Mānoa Valley to the mountain freshets, all of which would provide water to the *‘auwai* used to grow crops (Bouslog et al. 1994:213-214).

3.3.13 Waiakeakua Pūnāwai

According to the “Legend of the Waters of the Gods,” Waiakeakua is one of the many springs in Mānoa associated with the brother gods, Kāne and Kanaloa. When Kanaloa was weary of his stay with the mermaids at Wa‘aloa, he journeyed into the next ravine.

> As he traversed along the steps of the *menehune*, the legendary race of small people, and stood on the fern-clad slopes running down to the edge of the stream, he saw for the first time the beautiful virgin Kameha‘ikana sitting on a rock next to a nearby spring, accompanied by her stubborn old nurse. Rogue that Kanaloa was, he immediately made up his mind to possess her and began to chant to her of her beauty. Although she was somewhat flattered by Kanaloa’s attention, Kameha‘ikana resented his boldness. Her watchful, stubborn old nurse, seeing his attitude, called out in anger. “You cannot have this water,” meaning the young virgin. Whereupon Kanaloa became very angry at being repulsed and suddenly rolled a huge boulder down upon them and covered up this spring. This stone is called the sensitive stone of Waiakeakua, the waters of the gods Kāne and Kanaloa. During the season when the *‘ōhia‘ai* mountain apple, is in bloom, the stone’s color changes to a brownish red. Delicate wild flowers called “Kameha’ikana’s tresses” grow around this rock. Upon being closed with the boulder, the water of the spring was forced up onto the moss-grown boulders, which form the basin at the base of the ravine. Two little trickling streams issue from this rock, which is known as the breast of the beautiful goddess Hina. These two streams then fall into the basin below, which is also known as Waiakeakua, the water of the gods. (Bouslog et al. 1994:136-137)

A second version of this story has both Kāne and Kanaloa traveling to Waiakeakua Waterfall.

> Ia laua e ku ana ma ia wahi, nana aku nei i ke alo pali, a ninau aku nei o Kanaloa i kona kaikuaana, ina ua manao oia he wahi noho ia no ke kupua. Pii aku nei laua i kekahi pali laumania, a ike aku nei i kekahi wahine ui e noho mai ana me kona kahu wahine. O Kamehaikana ka inoa o keia wahine kupua. I kahi wa he kino kanaka ko laua, a i kahi wa, he kino pohaku, oiai ua loaa in na kupua ka mana e hoololiloli ai i ko lakou ano. Komo ihola ka iini iloko o Kane a me Kanaloa no keia ui nohea o ke uka o Manoa. I kona haka pono ana mai nohai, ua komo no ka hoohihi no keia mau akua e ku aku nei. O ka hoomaka no ia Kamehaikana e mino aka ma ke ano hooha‘i. Aohe i ike ke kahu o ke kanaka hea la o laua i hoohihi ai kana hanai, a i kona ike pu nohoi, i koi anei hooha‘i maoli, ua piha oia i ka inaina. Minamina loa ia o lilo ka luhi ana, nolaila ua leleino aku nei oia mawaena o na malihini a me kana hanai, a kino ke poo ilalo a paa loa. Lele mai nei o Kane e hoopakale iaia, aka, aole nai i hiki. Ke ku nei no ke kino o ke kahu o Kamehaikana a hiki i keia la, ilalo ke poo a iluna ka wawae. Kahi a Kane i hehi ai, ke waiho ala
>
> no kona kapuai. Ma kahi o na akua i ku ai, na kupu ae he mau kumu ohia e luhe ana na lala maluna o ka ili wai. Ua make keia mau kumu laau, a o na keiki keia e ulu nei, a e ku kiai nei i “Ka wai a ke akua.”
>
> Translation:
>
> As they stood facing the cliff, Kanaloa asked his older brother if there were *kupua* [spirits that have human and other forms] in that place. The two climbed a perpendicular cliff and found a pretty woman living there with her woman

> attendant. Kamehaikana was the name of this *kupua*. Such was the nature of the two women that they could appear in the form of human beings or of stones. Both Kane and Kanaloa longed to possess this beauty of upper Manoa. The girl herself, after staring at them, was smitten with love for the two gods. Kamehaikana began to smile invitingly. The attendant saw that her charge did not know which one of the two gods she wanted and knew that if they both got hold of her she would be destroyed, and she was furious. Fearing death of her beloved one, she threw herself headlong between the strangers and her charge and blocked the way. Kane leaped to catch the girl but could not reach her. The body of Kamehaikana's attendant stands there to this day, with the head down and the feet up. The mark of Kane's footprint remains where he trod. At the place where the gods stood, mountain apple trees sprang up whose branches drooped over the surface of the water. The original trees are dead, but their seedlings are grown and guard **"**The water of the gods**." (**Green and Pūku‘i 1936:114-115)

Kameha‘ikana, meaning "a multitude of descendants," was one of the alternate names of Haumea, the goddess of childbirth (‘Ī‘ī 1959:44). Another name for Haumea is Walinu‘u (Beckwith 1940:281-283), who was a *mo'o* goddess.

A third version of this story names Kawaiakeakua, or Waiakeakua, as the pool associated with this legend. Kāne and Kanaloa found excellent *‘awa* (plant used to make a narcotic drink) in Mānoa Valley, but Kanaloa wished to know where they could find water.

> Kane replied, "Here in this hill side is water." So he took his staff and struck it fiercely against the precipice by which they had found awa. Rapidly the rocks were broken off. The precipice crept back from the mighty strokes of the god and a large pool of clear, cool water nestled among the great stones which had fallen. There they mixed awa and water and drank again and again until the sleep of the drunkard came and they rested by the fountain they had made. This pool is still at the head of Manoa Valley, and to this day is called Ka-Wai-a-ke-Akua (The water provided by a god). (Westervelt 1963a:41)

The waterfall above the pond was also known as Waiakeakua.

> He ua paa unau iluna o keia kuahiwi ma kona moolelo ma kona moolelo oia wahi e iini ni o na malihini e makaikai ai he wai hi lele mailuna mai, a hokio keia wai a nona keia inoa Kawaiekeakua he ui ke nana aku laia e kaulana nei. O kahi keia o ka poe menehune e hiamoe a i ke ao, a po hele nui e hana i na heiau a loko ia a o ke ano ae a lakou e ike ai. (Hōkū o Hawai‘i, February 18, 1930)
>
> Translation:
>
> Visitors like to go and see a certain waterfall that drops from above into a pool. The name of this famous place is Kawai-a-ke-akua and is beautiful to see. This was where the menehunes slept in the day time and when night came they went to build heiaus, ponds or whatever they chose. (translation in Sterling and Summers 1978:288)

The pond was formerly a favorite place for picnics, drinking water, and swimming for the *ali‘i* visiting and living within the valley (Mrs. Marie H. Brown, Informant, J.F. Stokes, Sites Notes, cited in Sterling and Summers 1978:288). It was known as *wai hui a Kanaloa*, and wives were supposed to drink from the life-giving waters (Bouslog et al. 1994:137). The servants of King Kamehameha filled calabashes of water from here, using a stalk of *kī* or a banana leaf to funnel the water on the rock to a gourd. They then traveled down the valley swinging the gourds from the ends of sticks laid over their shoulders.

> . . . When they came near any individual or group of Hawaiians they had to call out loudly, giving warning so that all by whom they passed could fall prostrate before the gift of the gods to the great king. (Westervelt 1963a:41)

3.3.14 Hills, Mountains, Peaks, Ridges and Caves

There are numerous hills, mountain peaks, and caves in Mānoa Valley which have legendary associations. On the *mauka* border in the Ko‘olau Mountain range are the peaks, Pu‘u Lepalepa, Awāwaloa (Mount Olympus) and Kōnāhuanui. The word *lepalepa* means "to hang in fringes or tatters" (Pūku‘i and Elbert 1986:203). Awāwaloa means "long valley or gulch" (Pūku‘i and Elbert 1986:35, 209). Kōnāhuanui, the home of the gods Kāne and Kanaloa, is the highest peak in the Ko‘olau Mountains. The place name means "large, fat innards" and refers to a story about a giant who threw his testicles (*kona hua nui*) at a woman who escaped from him (Pūku‘i et al. 1974:117).

> Konahuanui, pali of O-ahu, was named because when a man, probably a giant, chased a woman who escaped into a cave, he tore off his testes and threw them at her. (I heard Dr. Brigham give this explanation long ago.)
>
> Though the sexual explanations may be revolting it is perhaps better to make them than to have future malihinis [foreigners] delving into the meanings, and securing wrong translations. . . . (Lyons 1916:936)

The peak of Kōnāhuanui is pictured by Hawaiians as the highest point of the ridgepole of a house, the house is a legendary burial cave for the high *ali‘i* that the Hawaiians believed existed under the Ko‘olau Range between the districts of Kona and Ko‘olauloa.

> Hookahi anahuna kaulana ma Oahu. O Pohukaina ka inoa, aia ma ka pali o Kanehoalani mawaena o Kualoa a me Kaaawa, aia ka puka i manao ia ma ka pali o Kuolo e huli la i Kaaawa, a o ka loa o ka puka, aia ma ka punawai o Keahuula-punawai. He anahuna alii keia, a he nui ka waiwai huna iloko a me na‘lii kuhiko.
>
> . . . kekahi puka, a o kauhuhu o kauaoku o keia hale anahuna, oie no ka mauna o Konahuanui a iho i Kahuku. Ua olelo ia ma ka moolelo a kanaka, ua nui ka poe i komo iloko me ua ihioho kukui, inui Kona aku nei a puka i Kahuku.
>
> A maloko a keia anahuna, he mau halokowai, he mau muliwai a mau kahawai, ua hana kinohinohi ia, a ma kauwahi aku, he mau aina palahalaha. (Kamakau, Ke Au ‘Oko‘a, Oct. 6, 1870)
>
> Translation:

> There is only one famous hiding cave, *ana huna*, on Oahu. It is Pohukaina. The opening on Kalaeoka‘o‘io that faces toward Ka‘a‘awa is believed to be in the pali of Kanehoalani, between Kualoa and Ka‘a‘awa, and the second opening is at the spring Ka‘ahu‘ula-punawai. This is a burial cave for chiefs, and much wealth was hidden away there with the chiefs of old. . . .The mountain peak of Konahuanui was the highest point of the ridgepole of this burial cave “house,” which sloped down to Kahuku. Many stories tell of people going into it with kukui-nut torches in Kona and coming out at Kahuku. Within this cave are pools of water, streams, creeks, and decorations by the hand of man (*hana kinohinohi‘ia*), and in some places there is level land. (Kamakau 1991b:38)

On the western border of Mānoa are four peaks, Kaumuhonu, Pu‘u Makani (literally, windy hill), Pu‘u Laulā (literally, broad hill), and ‘Ualaka‘a, or Round Top. Pu‘u ‘Ualaka‘a, which is on the boundary between Makiki and Mānoa Valleys, has many legendary associations, and alternate stories of the origin of its name, which means “rolling sweet potato hill.”

On the eastern border of Mānoa, along Wa‘ahila Ridge, are six peaks: Keanapoi, Pu‘u Pia (literally, arrowroot hill), Pūkele (literally, muddy), Akāka, Kūmauna, and Paliluahine. Pūkele is also called Palikū, which means “vertical cliff.” Akāka, or Aka‘aka (meaning “laughter”), and Kūmauna are peaks mentioned in the Legend of the Princess of Mānoa. Paliluahine, meaning “cliff of the old woman,” has associations with Kamehameha I and older legends. In the central area of the western valley are a series of peaks and hills, Sylvas, Puka‘ōma‘oma‘o, Pu‘u Ahula, ‘Ulumalu, Pu‘u Pueo, and Pu‘u o Mānoa (Rocky Hill or Keapapa). The legendary associations for these landmarks are described in more detail below.

3.3.15 Wa‘ahila Ridge

Wa‘ahila is the name of the ridge dividing Mānoa and Pālolo Ahupua‘a. It is also the name of a beneficent rain associated with Mānoa and Nu‘uanu Valleys. This association is mentioned in the saying “*Ola ke kai o Kou i ka ua Wa‘a-hila*,” meaning “the land of Kou [Honolulu] lives by the Wa‘a-hila rain.” Wa‘ahila is also the name of a chiefess who excelled in a *hula* dance named for her (Pūku‘i et al. 1974:218; Pūku‘i and Elbert 1986:375).

The association of Wa‘ahila with wind and rain is also mentioned in the Legend of Kuali‘i. Kuali‘i was a celebrated chief who possessed some knowledge of the gods and sometimes could assume the attributes of a deity. He was a great warrior, and two brothers composed an *oli* (chant) to honor the chief and recount his exploits. Within the chant (Fornander 1917a, Vol. IV:392-393) is the following description:

I ke ala ihi, i ke alaloa,	Along the sacred road, along the long road,
I ke alaloa e heleia la-la,	Along the highway traveled by him.
Aole i like Ku.	Not like these art thou, Ku.
Aole i like i na laki,	Not like the ti leaf—
I ka laki pala o Nuuanu.	The yellow ti leaf of Nuunau,
I heheia e ka ua e ka makani a helelei.	Softened by the rain and wind till it falls;
Ka laki pala i ka luna i Waahila-la.	The yellow ti leaf on the heights of Waahila.
Aole i like Ku.	Not like to these art thou, Ku.
Aole i like i ka Waahila.	Not like the Waahila [wind].

3.3.16 Kaumana Pōhaku

Kaumana may have been an alternate name for Wa‘ahila Ridge, at least the *makai* portion of the ridge. Informant Solomon Kauai related an account of a fourth famous stone known as “Kaumana,” which may have been located near the present-day location of the Sacred Hearts Academy in the neighborhood of Mō‘ili‘ili. The legend of this *pōhaku* is presented in detail in the Waikīkī section of this report.

3.3.17 Akāka and Kūmauna Peaks and the Princess of Mānoa, Kahala-o-Puna

Several places in Mānoa are mentioned in the legend of “The Princess of Mānoa,” including the peaks Akāka and Kūmauna at the back of the valley. This story tells of the beautiful woman Kahalaopuna, also called Kaikawahine Ānuenue, meaning “the Rainbow Maiden” (Westervelt 1963b:84). This story has several versions with different place names emphasized and different endings.

The Princess of Mānoa was the daughter of Kahaukani (the *hau* tree wind of Mānoa) and Kauakuahine (the sister rain of Mānoa), who were the twin offspring of the mountain peaks ‘Aka‘aka (the peak now called Akāka), meaning “laughter,” and Nalehua‘aka‘aka, meaning “the *lehua* buishes of ‘Aka‘aka,” the neighboring promontory (Kalākaua 1990:511). In commemoration of this union, “the growth of *lehua* (*lehua ‘ōhi‘a*) bushes crowning the spur of ‘Aka‘aka, is said to still attest” (Thrum 1892:111). The twins were kept apart in their youth and raised by foster parents; the chief Kolowahi took the boy and his wife Pōhakuakalā took the girl. When the wind and rain twins of Mānoa were later married, it brought to Mānoa Valley “an inheritance of rainbows and showers for which it has since been distinguished” (Kalākaua 1990:512).

The union of the twin sister and brother resulted in a concentration of *mana* (power) in Kahalaopuna, so that she always gave off a rosy light.

> Her cheeks were so red and her face so bright that a glow emanated from them and shone through the thatch of her house when she was inside; a rosy light seemed to envelop the house, and bright rays constantly played over the house. When she went to bathe in the spring below her house, the rays of light surrounded her like a halo. The natives maintain that his bright light is still occasionally seen at Kahaiamano indicating that the spirit of Kahalaopuna is revisiting her old home. (Thrum 1998:119)

She lived in a grove of ‘*iliahi* (sandalwood) trees at Kahaiāmano on the road to Waiakeakua, a pool within the tributary stream to Mānoa Stream. She often bathed at the sacred spring called Lua‘alaea. Kahalaopuna was betrothed in infancy to Kauhi, a young chief from Kailua (or Waikīkī in some versions). She was famed for her beauty, and one day, two lesser chiefs, named Kūmauna and Keawaawaki‘ihelei, claimed that they had been intimate with her. Her fiancé, hearing this rumor and believing that she had been untrue to him, went to Kahaiāmano and led her away from her house to Hualea, where he killed her and buried her. An owl god, her personal guardian spirit, or ‘*aumakua*, dug her up and resuscitated her. Kahalaopuna sang a lament of her cruel fiancé, Kauhi. who heard the lament and returned to Hualea and told Kahalaopuna to follow him again.

Kauhi killed her twice more, each time telling him to follow him, then killing and burying her; each time the owl again resuscitated her and brought her back to the living. On the third time, Kauhi buried his fiancé under the roots of a tree and the owl could not free the girl; instead, two spirits revived the girl. A young man, in some versions called Mahana, found her and took her back to his home in Kamō‘ili‘ili (old name for Mō‘ili‘ili, a land area in Mānoa). Kauhi was eventually punished for his cruelty and Kahalaopuna married her young rescuer (Thrum 1998:188-132). The lands and fishponds of Kauhi were given to Mahana, who ruled as a chief of these lands, with the beautiful Kahalaopuna as his wife for many years (Skinner 1971:220-222).

A second version of this tale has a darker ending. Kahaiāmano, the home of Kahalaopuna, means “the shark sacrifice,” which is related to one alternate ending of the story. In this version, Kahalaopuna was killed five times by her fiancé, and revived four times by the owl. On the fifth murder, Kauhi buried her underneath a *koa* tree, so that the owl could not dig her up. Kahalaopuna’s spirit called to several passerbys, including a young man who carried her to his home in Mō‘ili‘ili. The man’s older brother and two spirit sisters carried Kahalaopuna to Mau’oki, an underground pool at Kamō‘ili‘ili to revive her. These healing waters were then called “the waters of Kahalaopuna.”

The young man next provoked Kauhi into a dispute, claiming that Kahalaopuna was alive, which Kauhi denied. Kahalaopuna appeared and her grandfather ‘Aka‘aka testified that this was indeed his granddaughter, proving Kauhi to be a liar. Kauhi was put on trial with the *mo‘o* of O‘ahu as judges. As punishment, Kauhi, his followers, and the two men who falsely accused Kahalaopuna were baked in an *imu* (oven) at Ulukou (“grove of *kou* trees”), Waikīkī, near the side of the stream ‘Āpuakēhau, a place close to where Mānoa Stream used to empty into the sea.

Some time following the night of the death of Kauhi, a tidal wave sent by a shark god swept over the land, carrying out the bones from the *imu* on the beach. The spirits of Kumauna and Keawaawakiihelie were transformed into two peaks at the back of the eastern side of Mānoa Valley (Thrum 1998:131). Kauhi, whose ‘*aumakua* was the shark god, was turned into a shark. ‘Aka‘aka learned of the transformation and urged his granddaughter to never go into the sea. The daughter obeyed her grandfather for two years, but one day when the surf was fine and there were many people in the ocean, Kahalaopuna decided the water was safe and took a surf board into the ocean. Kauhi now had his chance for revenge and bit her body in half, eventually dragging it to Wai‘anae where it was completely devoured in a school of sharks.

In sorrow Kahalaopuna’s parents and grandparents deserted their human forms. The father became the Mānoa Wind; his physical form was a grove of *hau* trees below Kahaiāmano. The mother became Mānoa Rain and her rain form could also sometimes be seen near Kahaiāmano. Kahalaopuna’s grandfather ‘Aka‘aka became a mountain spur, and his wife, Nalehua‘aka‘aka, became a thicket of *lehua* bushes on the spur (Kalākaua 1990:511-522).

Fornander’s version of the story tells of Kahala-o-Puna (the sweet-scented *hala* flower of Puna), called the princess of Mānoa (*ka‘iu-ol-Mānoa*). She was the beautiful daughter of Ka-ua-kuahine (The rain of the mountain ridge) and Ka-hau-kani (the Mānoa wind), who were the twin sister and brother born to ‘Aka‘aka and Na-lehua-‘aka‘aka, which are the names of a projecting spur of the ridge and the red *lehua* bushes that grow upon it. Kahalaopuna was so beautiful that rainbows always played about her home, called Kahaimano, which was on the trail to the spring Kawaiakeakua. Mānoa girls later born in this area were also known for their beauty (Beckwith

1940:152-153), so much so that it was also called *ka ui o Manoa*, the “valley of beauties” (Nakuina 1904:42).

Kahalaopuna was affianced to Kauhi, a man from a powerful family of Ko‘olau or Waikīkī. Two mischievous men said they had enjoyed her favor, which drove her fiancé into a jealous rage. Kauhi went to Kahalaopuna’s house and asked her to follow him. He led her to the uplands of Pōhākea (area between ‘Ewa and Wai‘anae), where he struck her. Kahalaopuna chanted the following lines (Fornander 1918, Vol. V:190-191):

Kuu kane mai ka uka o Kahoiwai,	My husband from the uplands of Kahoiwai,
Mai ka uka laau hihi i ka nahele	From the uplands where the creeping trees grow,
Kuu kane o Kahaiamano e! Auwe!	My husband from Kahaimano, alas!
Me he mano la no ka lili ia‘u,	Like unto a shark is your jealousy of me,
Ka hoi koke mai no nanahu ia‘u	Quickly returning to bite at me,
O kuu nui aloha, ua hai iho nei e! Auwe!	My great love for you is, however, broken, alas!

Kauhi then beat her to death, and her spirit flew to the top of the tree and chanted her story, where passersby heard her and informed her parents. The parents dug up the body, found it still warm, and revived her to life (Beckwith 1940:152-153).

After Kahalaopuna’s final death, her mother melted into the rain called Luahine-o-Mānoa. Her father became two things, a *hau* tree, and the wind in the valley. This *hau* tree supposedly could still be found up to the time of Queen Emma, and would groan and sigh whenever an *ali‘i* died. According to Mary Kawena Pūku‘i, March 16, 1954, cited in Sterling and Summers 1978:289), the property was later acquired and the tree was destroyed.

Kaho‘iwai was the name of the home of Kahalaopuna and the name of the area where she still is supposed to be “mourning and wailing her death in consequence of her husband’s rash anger” (Dictionary of Hawaiian Localities, *Saturday Press*, Dec. 1, 1883). A stream and adjoining land at the head of Mānoa Valley near Kaho‘iwai, is known as Kahaiāmano (Dictionary of Hawaiian Localities, *Saturday Press*, Dec. 1, 1883), and is mentioned in the legend of Kahalaopuna.

In a third version of the “Legend of the Princess of Mānoa,” the two men who accused Kahalaopuna of infidelity, were Kūmauna, who had a humped back and Keawaawaki‘ihelei, who had a disfigurement called *maka-helei*, in which the eyelid is turned in such a way as to display the inner red membrane. These men were mountaineers, dwelling with a few retainers in the eastern corner of Mānoa Valley, in a place called the Canyon of the Makaweli. In this version of the tale, Kauhi leads Kahalaopuna first up the slopes of ‘Aihualamaiki adjoining Kahaumakaawe. This slope was formerly covered by *koa* and *lama* (*Diospyros* spp.) trees. Near a large rock half way up the slope, Kauhi kills his fiancé with a blow to the head with a bunch of *hala* nuts.

> It was the belief of the mountaineers of the olden time that the spirit of the murderer Kauhi haunted the trail between Manoa and Nuuanu, and that often maile and fern gatherers were startled by a faint and mournfully sweet song changed by the spirit of Kahalaopuna, and the answering despairing wail of Kauhi, “O, my wife, come back to me! I was wrong.” “*E ku‘u wahine-e, hoi ma-i. Ua hewa wa-u*.”
>
> In the eastern corner of Manoa Valley can be the seen the peak of Kumauna, with a hump on the back of the ridge leading up the peak, and alongside of it the ravine

> of Keawawa-Ki‘ihelei. These places belong to and are called after the two wicked men who were the cause of the sad death of Kahalaopuna.
>
> And when the gods realized that their favored maiden had been murdered, they decreed that the rains would fall daily about the valley of beauty, their tears in memory of her graces. (Nakuina 1904:45)

An alternate version of this story transforms many of the main characters into gods. According to this version, at the head of Mānoa valley lived Hine, the spirit of the rain-clouds, and Kani, her husband, who was the god of the winds. They had one child Kaha, who was so beautiful that the god of the sea asked for her to be the wife of his son, Kauhi, the prince of the sea. Kaha cared nothing for Kauhi, but “loved best of a swift flight in the cloud-chariot of Hine, when, driven by the winds of Kani, it skimmed over the shining green earth and far out above the blue ocean. It was such fun to spy out the little grass huts of the earth-folk, and pour down swift gusts of rain, just to see the people scurry to shelter” (Day 1906:2). One day Kaha spied some Hawaiian youngsters dragging up their *hōlua* (traditional sliding) sleds to the top of a hill. The rain from Hine’s cloud poured down and made the sleds too wet to use. One of the youngsters, a chief called Mahana, looked straight up into the clouds and shook his fist. When Kaha looked into the man’s eyes, she thought he was much finer than her own fiancé, Kauhi.

Hine saw the look in Kaha’s eyes and took her for a while to the other side of the mountain valley. Mānoa became parched and all of the waterfalls dried up. Kaha grew sad on the damp windward side of the mountain, missing the sunshine of her own home. One day while she was sitting on a high rock looking into Mānoa, a dense cloud surrounded her and lifted her out of the mountains. When she reached the earth, her form was that of a beautiful mortal girl. Kaha found Mahana and the other people and spent a wonderful day sledding down the hill over and over. At the end, Mahana asked her to be his wife. Kaha, who now realized that she was mortal and could not return to her own air-people, accepted and lived with Mahana and his people. One day, Kaha swam far past the reef to gather seaweed. A shark could be seen from the shore, but Kaha was gone. The shark was a form of Kauhi, who had seen Kaha and meant to return her to her own air-people, but since Kaha had become mortal, the bite of the shark was fatal, and he returned her body sorrowfully to the shore. The people laid her in a grave in the central part of the valley where the weeping of Hine and the wailing of Kani can still be heard. The children of Mānoa sometimes say “Oh, there comes Hine with her tiresome tears!” (Day 1906:1-11).

3.3.18 Pali Luahine and Kamehameha’s Cave

On the eastern corner of Mānoa Valley there is a series of foothills called Kapaliluahine. The area was known for its very sweet *‘ōhi‘a* (Dictionary of Hawaiian Localities, *Saturday Press*, Dec. 15, 1883). The name, meaning “cliff of the old woman” refers to the legend of a *mo‘o* who once lived on the *pali* (cliff) back of the Maunalua fishpond. This woman annoyed the people of Maunalua and was driven out by Pele. She traveled to Mānoa and behaved herself there, calling her new home Pali Luahine.

> Luahine had two sons, Kumauna and Palihala. There are three stones. The lower one is Luahine, and the two higher up are her sons. Mrs. Pukui thinks that Pali Luahine is back of the “little green hill.” (M. Pūku‘i 5/28/53, cited in Sterling and Summers 1978:290)

Westervelt (1904:2) claimed that Kamehameha, who landed at Waikīkī when he invaded O‘ahu in 1795, lived with his warriors for a time in a great cave on the east side of Mānoa Valley: “The path to the entrance is marked by a few straggling coconut trees. The Hawaiians say this cave formerly extended through to the mountain spurs from Mānoa to Pālolo Valley.”

This cave, located in the area called Kapaliluahine, has been surveyed and the back is solid stone, and could not have led to Pālolo Valley. The location of this cave is on Wa‘ahila Ridge in the area now covered by Woodlawn Drive near the astronomy building of the University of Hawai‘i.

According to a long-term resident of Mānoa Valley, Mary Jane Montano, the name Kapaliluahine came from this historic association with Kamehameha I. This story relates that the warriors were homesick, and Kamehameha sent a message to an old chiefess named Waluwalu on the island of Hawai‘i. The wives of the warrior were brought to O‘ahu on a fleet of war canoes, and the place that the women camped was called “the hillside of the old woman,” or Kapaliluahine (Bouslog et al. 1994:14, 187).

3.3.19 Puka‘ōma‘o, or Puka‘ōma‘oma‘o

Puka‘ōma‘o means “green apertures or openings” (Pūkui et al. 1974:190), and probably referred to the green shutters on the Queen Ka‘ahumanu’s house in Mānoa Valley (Sterling and Summers 1978:287). The longer name Puka‘ōma‘oma‘o can mean “green gateway” and may refer to this point as the access point to the head of the valley. Ka‘ahumanu’s estate was large and extended across the upper valley, including Pu‘ulena, which in 1845 became the old Chinese burial ground. On her estate, there was a “kind of village of forty or fifty huts, the houses of the chiefs, a schoolhouse and a chapel” (Diary of Elisha Loomis, cited in Bouslog et al. 1994:153). In 1829, the location was described as in the back of the valley in East Mānoa by Charles Stewart, a chaplain on the American naval vessel, the *Vincennes*.

> The valley of Manoa, you recollect, was always a favorite resort of mine–this afternoon Mr. Bingham drove me in a wagon to it. There is now a good carriage road, in that direction, as far as the country house of Kaahumanu, nearly five miles from Honolulu. Her residence is beautifully situated, and the selection of the spot quite in taste. The house is an inferior building, but stands on the height of a gently swelling knoll, commanding, in front, an open and extensive view of all the rich plantations of the valley; of the mountain streams meandering through them, and the humble habitation of the farmer sprinkled around; of the district of Waititi; and of Diamond Hill, and a considerable part of the plain, with the ocean far beyond. On the right, the ground rises rapidly for a few rods, to a thicket of hibiscus and Eugenia, at the foot of a magnificent mountain, exhibiting from the base to its summit a perpendicular height of a thousand feet—as rich a variety of projecting cliff and wild recess, of dripping rocks and mantling foliage, of graceful creeper, pendant shrub, and splendid flower, as Arcadia itself can boast. On the left, there is a gradual descent, from the house, of two or three hundred feet to the depth of the valley. Here this is a half a mile wide, and bounded at that distance, by a spur of mountain, which, commencing at the entrance of the valley on the plain two or three miles in front, rises first in uncovered swellings, but rapidly assumes, as it runs inland, a boulder formation, till in several places it

> presents a succession of broad based and regularly defined pyramids, beautifully verdant and tufted with wood; giving a most peculiar character to that section of the scenery.
>
> Immediately behind the house, and partially flanking it on either side, is a delightful grove of the dark leaved and crimson blossomed Ohia, so thick and so shady as insensibly to remind one of Cowper's Wilderness at Olney---filled with cool and retired walks and natural retreats, and echoing to the cheerful notes of the little songsters, who find security in its shades to build their nests and lay their young. The view of the head of the valley inland, from the clumps and single trees edging this copse, is very rich and beautiful; presenting a circuit of two or three miles delightfully variegated by hill and dale, wood and lawn, and enclosed in a sweep of splendid mountains, one of which in the centre rises to a height of three thousand feet. (Stewart 1831:140-141)

Ka‘ahumanu retired to her estate in Mānoa to get away from the heat, dust, and political enemies that she made in Honolulu. In 1826, Ka‘ahumanu ruled against a libel charge made by a British whaling man, Captain Buckle, in favor of the Lahaina missionary, Mr. Richards. Mr. Richards had spread the news that the captain had purchased a Hawaiian woman for money, breaking the law against prostitution. This ruling by Ka‘ahumanu caused great anger among the critics of the missionaries, including the British Consul to Hawai‘i.

> Ua lilo o Kaahumanu i enemi no ke Kanikela a me na haole kalepa a pau e noho ana ma Honolulu, a ua kokua ia mai e Boti a me Manuia, pakele loa aela o Kapena Bakala a me Kapena Kalaka. . . .
>
> O ke kumu nae o ka pepehi ia ana, ua ai ka bipi a ua Kanikela nei i na mea kanu a Kaahumanu o uka o Manoa, a hopuhopu ia ka bipi a puka loa i Pawaa. Ua hoohei ia ke kanaka nana i alualu i ka bipi e ke Kanikela Beritania. O Kanekuahine ka inoa, he kanaka kiai no Kapukaomaomao i uka o Manoa. (Kamakau, Ka Nūpepa Kū‘oka‘a, June 6, 1868)
>
> Translation:
>
> The queen by this decision made enemies for herself of the consul and the foreign merchants and of Boki and Manuia of her own people. . . . The consul beat up one of her [Ka‘ahumanu's] keepers who had chased away the consul's cattle which roamed at large all the way to Pawa‘a and were eating Ka-‘ahu-manu's plantings at Kapuka‘oma‘oma‘o in Manoa. (Kamakau 1992:280-283)

Ka‘ahumanu died in this house. She was moved to Mānoa in 1832 from her house in Honolulu ". . . in hope that the salubrious air would prove beneficial, but which terminated fatally June 5th of that year" (Thrum 1892:113). John Papa ‘Ī‘ī (1959:158) stated "Kaahumanu died on June 5, 1832, at her house with the green shutters in Manoa valley, close to Kawaiho‘olana. Because of her love for Manoa she went there during her last illness after having been sickly for four or five years." The place name Kawaiho‘olana could not be found on the 1883 Bishop map, but a long-term resident of the valley, Maka Woolsey, placed this area *mauka*

of the *‘ili* of Kukuio, shown on the 1882 Baldwin map (see Figure 8) as just *makai* of the *‘ili* of Komoawa‘a. Samuel Kamakau reported:

> A hiki i ka poeleele ana iho, o ka loaa no ia i ka mai, a i ke ao ana ae, o ka hoihoi ia no ia i uka o Manoa, ma kahi i ku ai o kona hale hooluolu ma ka Pukaomaomao, ma ka lihi malu o ka ulu ohia apane me ka ulu kukui. Hookahi wale no ple me ka hapa ke kaa ana i ka mai, a i ka wanaao o ka Poalua, la 5 o Iune 1832, make ihola o Elisabeta Kaahumanu, i ke 64 o kona mau makahiki. Aohe i lu ia iho kona kino a me kona hanohano ui a maikai.
>
> I ka wa kakahiaka nui, ua hoihoi ia mai i ke kulanakauhale, i auamo ia mai ma loko o ka manele hale lole, a no ka lululi, ua komo pu laua me ke kaikamahine Kamanele i loko o ka hale lole [Kamakau, Ka Nūpepa Kū‘oko‘a, Aug. 29, 1868].
>
> Translation:
>
> Late that night she became ill and at daylight was removed to her rest house up Manoa Valley at Puka-‘oma‘oma‘o on the edge of the *‘ohi‘a* and *kukui* groves. A week and a half later in the early hours of Tuesday, June 5, 1832, Elizabeth Ka-‘ahu-manu died in her sixty-fourth year, while her body showed no look of age and her bearing was still impressive. Early in the morning she was brought into the city on a covered litter and it shook so much that her niece, Ka-manele, occupied it with her. (Kamakau 1992:308)

Thrum (1892:113) places her residence in the *‘ili* of Komoawa‘a:

> The locality where the good queen passed away shows little evidence now of ancient royal residence. It was situated well in the valley at a place known as Komoawaa; the residence itself being called Pukaomaomao, from its green painted doors and blinds. Puulena, the old Chinese burial ground, from the year 1845, situate at the head of the central road of the valley, is said to have been part of Kaahumanu‘s estate. (Thrum 1892:113)

An 1872 reminiscence in the Hawaiian newspaper, *Ka Nūpepa Kū‘oko‘a*, implies that Ka‘ahumanu's residence is at or near Kaho‘iwai.

> He aina maikai no o Manoa, oia ka helu elua o ke awawa a ka olu i noho ai, ua hoopulu mau ia oia e ka noe a me ka ohu, a he uliuli lipolipo hoi in na lauu, mai kona piko honua a i kona mau kuemaka pali; a nona hoi ka ua kaulana, he Kauhine a ka mahani kulakulei kauhale, he Kakea. A ma keia wahi no i luana mau iho ai ka Makuahine Alii Kaahumanu, e walea ana i ka olu o ka wai o Kahoiwai, a me ka huihui momona o ka wai peepee, palapalai o Waiakekua, a no ka honi mau paha i na ea oluolu o ka uka; a na kona a i alii no hoi a lei mau na lehua puakea o Naniuapo, a kuu aku la kona luhi. (Kaulilinoe, Ka Nūpepa Kū‘oko‘a, Nov. 16, 1872)
>
> Translation:
>
> Manoa is a fine land and one of the two vallies where coolness dwells. It is constantly kept moist by fog and mist and it is green with trees from the base to

> the top of the cliffs. To it belongs the famous Kuahine rain and the wind that pushes over houses, the Kakea. Here the Queen Mother, Ka‘ahumanu spent the time, enjoying the cool waters of Kaho‘iwai; the refreshing water of Waiakekua where the palai ferns hide [by the banks] and to inhale the cool air of the upland. Around her royal neck was always a lei of the white lehua of Naniuapo until she was released from this weary life. (translation from Hawaiian Ethnological Notes, Bishop Museum Archives, p. 605)

By 1932, only the stone foundation of the house remained. This newspaper article also places Ka‘ahumanu’s residence in the *‘ili* of Kaho‘iwai.

> Just past the junction of Manoa Road and Oahu Avenue in upper Manoa valley, surrounded by market gardens and where automobiles whiz past, a green overgrown path leads off the highway to a tiny clearing, shaded by fine old hau trees and bushes in which there is a stone foundation of a former house. The stones are moss covered and the structure which once covered them has long since disappeared. Yet this is historic ground, the homesite of one of the island’s greatest queens.
>
> Kaahumanu, queen of Kamehameha the Great, had her summer house on this cool spot. It was doubtless the same sort of grass house which was in general use, although probably more spacious and elaborate as befitted a queen. The dimension in one direction is 60 feet; the place was known as Kahoiwai, or “Returning Waters.” (cited in Sterling and Summers 1978:287)

As can be seen from the preceding citations, there are various interpretations about the exact location of Ka‘ahumanu’s house within her large estate. ‘Ī‘ī placed the house “near Kawaihoolana,” but this place name could not be found on any historic maps. Figure 11 shows the possible locations of the house as suggested by several other authors. The 1932 newspaper article places the house near the junction of Mānoa Road and O‘ahu Avenue. Bouslog et al. (1994:198) used this reference to suggest that Ka‘ahumanu’s house may have been in the general location of the Salvation Army’s Wai‘oli Tea Room in the *‘ili* of Ka‘aipū, where Mānoa Road and O‘ahu Avenue cross. This seems to contradict the 1932 article, which places the house in the *‘ili* of Kaho‘iwai, *mauka* of Ka‘aipū.

Several other references place the house in the *‘ili* of Pū‘ahu‘ula, which is the land adjacent and *mauka* of Ka‘aipū.

> Mahope iho oia noho ana, ua hoi aku ka Aliiwahine Kaahumanu uo uka a noho he hale pilimauu Hawaii nui o ka ui i Puu ahuula ma Manoa, he uluhau ie wahi o keia aina. (Hōkū o Hawai‘i, Feb. 18, 1930)
>
> Translation:
>
> After a while Kaahumanu went to Manoa to Puahuula to live in a large Hawaiian grass hut. There was a hau grove there. (Translation in Sterling and Summers 1978:288)

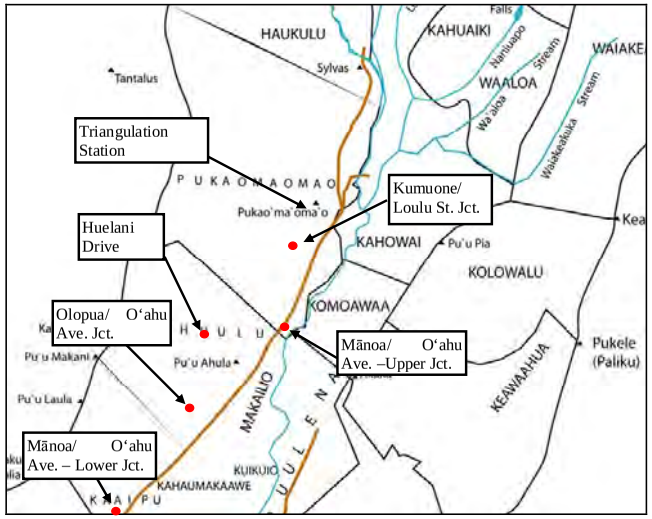

Figure 11. Possible (approximate) locations of Puka‘ōma‘oma‘o, house of Queen Ka‘ahumanu (tracing from 1882 map of Mānoa Valley, surveyed by E. D. Baldwin)

According to legends concerning the gods Kāne and Kanaloa journey through Mānoa Valley, Laura Green and Mary Kawena Pūku‘i state that:

> Hoomau no laua i ka laua huakai hele, a i Manoa, i Puahuula (I Puahuula i noho ai o Kaahumanu, ka wahine a Kamehameha naiaupuni).
>
> The two continued their journey up Manoa to Puahuula (the place where Kaahumanu lived, wife of Kamehameha the conqueror of the islands). (Green and Pūku‘i 1936:114-115)

Mary Kawena Pūku‘i describes the home of the queen within a grove of guava trees near a pool and spring.

> Queen Kaahumanu lived in Manoa. Her home was called Pukaomao. The first guavas and the first goldfish were brought there by the queen. Mrs. Malia Kakoi Kamana remembers her mother telling her that a tapu was placed on the guava; no one could have any unless the queen gave them to her. But the birds pecked the fruit, and soon the guava spread all over the island. (Mrs. Mary Kawena, Hawaiian Ethnological Notes, Vol. 1, p. 1378)
>
> Pu-ahu‘ula (Pu here is short for Puna) ‘Spring-of-the-Feather-Cape.’ There was a mo‘o who lived there. Somewhere mauka of Pukaoma‘o. (M. Pūku‘i, 3/26/54, cited in Sterling and Summer 1978:288)

A book on Ka‘ahumanu’s death mentions such a feather cape associated with this location:

> . . . Realizing that the end was near, Ka-ahumanu asked to be taken to Pukaomaomao, her mountain home far up in Manoa Valley. . . .
>
> The couch upon which Kaahumanu was to rest had been prepared with loving care. Spread first with sweet-scented maile and ginger leaves, it was then covered with a golden velvet coverlet. At the head and foot stood towering feather kahilis. Over a chair nearby was draped the Kamehameha feather cloak which had been worn by Kaahumanu since the monarch’s death. (Mellen 1952:270, 272)

Mary Kawena Pūku‘i believed that Ka‘ahumanu’s house was near the end of Huelani Drive in the *‘ili* of Pū‘ahu‘ula, where there was once a spring called Huelani. She believed that the name, *huelani*, the royal gourd, referred to the well that was once near Ka‘ahumanu’s home. This would place the house in the *‘ili* of Pū‘ahu‘ula, *mauka* of the hill Pu‘u Ahula. Princess Victoria Kamāmalu, the granddaughter of Kamehameha I, was said to have had a home on a hill in Pū‘ahu‘ula, *makai* of Ka‘ahumanu’s house (Bouslog et al. 1994:198). This seems to confirm that Ka‘ahumanu’s house was *mauka* of the hill Pu‘u Ahula.

A 1940 article by Ethel Damon also placed the house in Pū‘ahu‘ula, at the end of Olopua Street.

> On the north slope of the valley, leading the way for present-day roads and houses, Kaahumanu built a home where she often retired for quietness, she said, and freely moving air. Here she planted choice *lehua* trees and the tiny red Hawaiian hibiscus which still grew there not so long ago. Her Green Gateway she called this home, Pukaomaomao, through which she looked out over the valley

> below. Until very recently one could clamber up to the foundations stones of Pukaomaomao, in a little Japanese flower garden above Olopua Street, a short mile mauka of the Waioli Tea room, and today a thicket of hau trees still twists itself protectingly about some of those stones. (Damon 1940:5-6)

Most of the recent research on this question has placed the house in the *‘ili* of Puka‘ōma‘oma‘o. As noted previously, the 1932 newspaper article said that the house was at the junction of Mānoa road and O‘ahu Avenue. Mānoa Road and O‘ahu Avenue actually merge at a second point farther up the valley. This location is within the *‘ili* of Puka‘ōma‘oma‘o, just *makai* of the *‘ili* of Kaho‘iwai. This location is also just west of the border of the *‘ili* of Komoawa‘a, where Thrum (1892:113) placed the house.

Bouslog (1983:13) believes that the question has finally been answered. On the 1882 map of Mānoa Ahupua‘a (see Figure 11), there is a triangulation station marked “Pukaomaomao.” This map was drawn by Erdman D. Baldwin, the grandson of the missionary Dwight D. Baldwin who had personally visited the queen’s house. Thus E. D. Baldwin would have known exactly where the queen’s house was located. This mapped point is about at the modern junction of Kumuone and Loulu Streets in the *‘ili* of Puka‘ōma‘oma‘o. Of all the suggested locations, this last is the most *mauka*, which would agree with the descriptions of Ka‘ahumanu’s house as at the “head” of the valley.

3.3.20 ‘Ulumalu Hill and Kūkaō‘ō Heiau

According to legends, the *menehune* built a fort and a temple at the top of the hill ‘Ulumalu. They were driven away from their fort by the high chief Kuali‘i during his reign (sometime in the 1700s). Kuali‘i rebuilt it after his seizure of the fort.

Another legend says that the *menehune* were driven from their fort and temple by the owls, who became their bitter enemies.

> The legends say that the fairy people, the Menehunes, built a temple and a fort a little farther up the valley above Pu‘u-pueo, at a place called Kukaoo, where even now a spreading hau tree shelters under its branches the remaining walls and scattered stones of the Kukaoo Temple. It is a very ancient and very noted temple site. Some people say that the owl-god and the fairies became enemies and waged bitter war against each other. At last the owl-god beat the drum of the owl clan and called the owl-gods from Kauai to give him aid. (Westervelt 1963a:132)

With the aid of the Kaua‘i owls, there was a great battle and the “fort and temple” were captured; the *menehune* were driven out of the valley. The *heiau* and the hill were also associated with a legendary cave. In “The Legend of Punahou Spring” (Thrum 1892:113), the twin sister and brother Kauawaahila and Kauakuahine hide themselves in this cave when they run away from their cruel stepmother.

In the late nineteenth century, the Castles (descendents of an early missionary family) built a large estate on this hill, called Pu‘uhonua. The house was later torn down and many small houses were built in this area during the 1910s. Several owners of these houses have heard the “ghostly footsteps of children” running up and down their stairs in these houses over the years. Glen Grant (1996:113) has speculated that these sounds may be related to the child-size *menehune*, running over the area on which their fort once stood.

3.3.21 Pu‘u Pueo

In several versions of the story of Kahala-o-Puna (Sterling and Summers 1978:285), the owl that revives the Princess of Mānoa lives on Pu‘u Pueo, or “Owl Hill” (Pūku‘i et al. 1974:205). Kauhi, the fiancé, first leads Kahala to the foot of the valley near a spot called ‘Aihualama (the name of one of Mānoa’s tributary streams). The owl god finds her, revives her, and carries her back to the head of the valley. In the second attempt by the fiancé to kill Kahala, he leads her along a ridge of the valley and kills her with a bunch of *hala* nuts. The owl again finds her and revives her. At the third attempt, the fiancé leads Kahala across the ridges of Mānoa to Nu‘uanu, and kills her there. The longest waterfall in the back of Mānoa Valley is supposed to be the tears of Kahala for the suffering caused by her jealous fiancé (Westervelt 1963a:129-130).

The owl of Pu‘u Pueo was sometimes known as Pueo Ali‘i, the king of the owls. He was associated with other ghost spirits who he led as an army along the hillside below Pu‘uhonua Temple (the Castle home). Kāhuna would consult with him by signs or oracles (Westervelt 1963a:130-131). The owl king ruled over the valley and acted as an avenging spirit. One time, the owl “sought to execute judgment upon a culprit for some alleged transgression, but upon the pledging of the accused for a hearing before executing judgment, it became thereafter the established custom that no one should be condemned till tried and proven guilty” (Thrum 1892:111).

Pu‘u Pueo (or the nearby ‘Ulumalu hill) may have been the site of the *heiau* mentioned in the “The Story of Kapo‘i,” which was introduced in the Makiki Valley section of this report. Kapo‘i, who lived in Makiki, had gathered some owl eggs for his supper. Pueo, the owl followed him to his home and begged for the return of the eggs. In kindness, Kapo‘i returned the eggs, and in return the owl agreed to be Kapoi’s personal ‘*aumakua*, or guardian god.

> Ka lilo ana o ka pueo i akua no Kapoi.
>
> Kauoha mai la ka pueo ia Kapoi e hana i Heiau; a e kukulu i kuahu a i lele, a o ka inoa o kahi e kukulu ai o Manoa. Kukulu iho la o Kapoi i ka Heiau a pua. A kau iho la i ka mohai a me ka maia iluna o ka lele, a kapu iho la, a noa ae la. (Kamakau, Ka Nūpepa Ku‘oko‘a, July 22, 1865)
>
> Translation:
>
> The owl then became a god for Kapo‘i. He commanded Kapo‘i to build a *heiau* and a *kuahu* and a *lele* [altar where sacrifices are placed] altar within it. The *heiau* was to be built in Manoa. Kapo‘i built the *heiau* and placed his sacrifices and bananas on the *lele* altar; he imposed the *kapu* and freed it. (Kamakau 1991b:23)

This angered the king of O‘ahu who was building his own *heiau*, and had announced that no one else could set a *tabu* on a *heiau* and lift that *tabu* before him. Since Kapo‘i committed this very act, the king decided he must be killed and sacrificed at the chief’s own *heiau*, at Kūpalaha in Waikīkī. The owl ‘*aumakua* made an appeal to the king of the owls, who lived in Mānoa Valley. The owl king summoned all the owls of the islands, who attacked the king’s men and set Kapo‘i free. The place of this great battle in Waikīkī was known as Kūkae-unahi-o-pueo, meaning “the-confused-noise-of-owls-rising-in masses” (Westervelt 1963a:127-137). Another version says that the owls scratched at the eyes and noses of the men and covered them in excrement, so the place of battle was called Kūkae-unahi-o-pueo, meaning “the scaly excrement

of owls.” The ‘*auamkua* of Kapo‘i was from then on worshiped as the god Kū-kaua-kahi. (Kamakau 1991a:23).

3.3.22 Pu‘u o Mānoa (Rocky Hill)

According to the eminences of boys who attended Punahou School, there were many caves in Pu‘u o Mānoa, which they called Rocky Hill. Some boys once found a wooden idol “in a cave on Rocky Hill, a vestige of the *heiau* that once stood in that area” (Foster 1991:128). The *heiau* they refer to must be Kūkaō‘ō Heiau, which was actually on ‘Ulumalu Hill, *mauka* of Rocky Hill. It is possible that since both hills are on the same ridge, that the boys considered ‘Ulumalu part of Rocky Hill. The boys at the school gave this hill its current name, as they did many of the peaks and hills of Mānoa Valley, including Tantalus and Mount Olympus.

> There is a small hill back of Punahou, which is very rocky. And for that reason the Punahou boys gave it the name of Rocky hill. . . . The sides are covered with cliffs about 40 or fifty feet high. Some times on Saturday the boys go up to Rocky hill and roll down the great rocks over the cliffs. Which come down with a great crash.
>
> There are also some magnificent caves there. Which we boys have found. There are some Wilde cates [sic] which have dwelling in the caves. The boys Once had the success of killing one which we brot down to Punahou and bearid it with great seremony. (Boy’s composition 1848, cited in Alexander and Dodge 1941:136)

As previously noted in the above section on legends concerning springs, Rocky Hill had several alternate names. In the Legend of the Waters of Kāne at Punahou, Rocky Hill is called Keapapa. In the Legend of Kauawa‘ahila (Wa‘ahila Rain) and his sister Kauakiowao (Mountain Mist), the twin children of the chief Kaha‘akea hide in a cave in Rocky Hill to escape from their stepmother, Hawea. When Kaha‘akea learns of his wife’s cruelty to their children, he kills Hawea and then himself. The hill in which the children hid was named after the father, Kaha‘akea.

3.4 Interview with Maka Woolsey about West Mānoa Valley

Maka Woolsey, a Chinese-Hawaiian businesswoman, was the granddaughter of Nāholowa‘a, who had moved to O‘ahu from Maui during the reign of Kamehameha II and received a three-acre *kuleana* in Mānoa Valley called Keaulana. With her second husband, George Woolsey, she became involved in the growing of taro and the sale of *poi* (pounded taro), becoming the proprietor of the Mānoa Woolsey Poi Factory. During the writing of the book “Manoa, the Story of a Valley” (Bouslog et al. 1994:99-104), she was interviewed about legendary places in the valley. The interview is written as if one is walking up the western valley on the old trail, now covered by Mānoa Road.

Maka Woolsey began her story at Punahou College. She pointed out the location of Pōhakuloa, a *pōhaku kapu*, or sacred stone in the long rock wall of Punahou School, marking the boundary of Kapunahou. The stone was placed there during the reign of the chief Paki. Another sacred stone, Keapoapo, was also on the Punahou campus. According to Maka Woolsey (Bouslog et al. 1994:111), the two stones call to each other: “You come here,” says one, “No, you come here,” answers the other.

Heading into the valley, one next stopped at Kapukahau at the present junction of Hastings and Punahou Streets. A hut owned by Ke‘ilianu offered shade and rest to travelers. Further on was Keaeae, the “red in the rock.” This *pōhaku* was named for a legend concerning a young man named Keaeae, who was slain by his own family to save him from any possible misfortunes in his future life. When he was slain, this rock on the Mānoa path turned deepest red (Bouslog et al. 1994:111).

At the summit of the hill were once two high and two low stones, called *pōhaku kau kanaka*, which were placed as seats for resting (today just *makai* of Lanihuli Drive).

Across the road, in a Punahou pasture, was Nukalaiki, a *pōhaku* with the face of a man. From this point Maka pointed out stones on Pu‘u o Mānoa (Rocky Hill), which may have been *māheleāina* or “division stones” used to mark the boundary line between Mānoa (chiefs and commoners division). The summit of Pu‘u o Mānoa was also used to sight fish; if fish were sighted a signal was sent to the peak Pu‘u o Pia, in the upper valley, to tell people to come down to fish.

At Keoneakeke, a sandy *makai* slope near the junction of Mānoa Road and East Mānoa Road, was a dangerous place. It was here that sweet potatoes growing on Round Top would be dislodged by high winds and come rolling and bouncing down to the road. This legend is also used to describe the one hollow area at the base of Round Top. According to Maka Woolsey:

> The potato had once grown in a patch of an old couple. It grew larger and larger and the couple walled it up with sand, trying to cover it. One could see this sandy mound from great distances. One day the old couple went to Wai‘alae to catch fish for the ceremony of *‘uala*. When they looked back to Mānoa, they saw that the potato had vanished. When they hurried back, they saw that it had rolled down the hill, resting in the hollow below. All the people of the area saw the great potato, made an *imu* (earth oven) and each one in the village had a piece of the great ‘uala (Bouslog et al. 1994:112)

At Pu‘u Pueo, the last hill of the lower valley was a cave where the owl, Pueo, watched over the valley. It is said that Queen Ka‘ahumanu could see signals from Pueo from her house further up in the valley. Next was Kalumalu or “breadfruit shade,” the hill location of Pu‘uhonua, the Castle home. At a gulch near the head of Castle Trail was a *kū‘ula* or fish god stone name Kukalia. At this spot, fishermen could look down to the sea and search for schools of fish, such as *awa-no‘okina* (milkfish, *Chanos chanos*) and *āholehole* (Hawaiian flagtail, *Kuhlia sandvicensis*), fish that traveled into freshwater. These came up Mānoa Stream, then went past Ka‘iukūkalu in Mō‘ili‘ili, then to Kamakawiliwili, then Kaumake, Hipawai, Halelena Stream to Kalehua, then Kukuio, and finally to Kawaiho‘olana and Hopenui (Bouslog et al. 1994:112).

The hero Kawelo once threw his *‘ō‘ō*, or digging stick, which landed at Kukakao‘o on the ridge. This land once had a wall built by the *menehune* across it. On the same ridge was a peak called Kahuluokapua‘a, which was *kapu* and “even the birds turned and flew around it” (Bouslog et al. 1994:113).

At Kūkaō‘ō were two companion *pōhaku* called Hauola or “new life.” One could regain one’s health by sitting on these stones. On the nights of *Pō Kāne* (27th night of the lunar month), one could see Huaka‘i, the headless man, on these slopes.

In the upper valley was the land called Ka‘aipū, a well-watered area shaded by *‘ōhi‘a* trees where Kamehameha III once built his retreat. Ka‘aipū is near the present site of the Wai‘oli Tea Room. Near here was also a *pōhaku*, who spoke to a local woman in a dream. The stone was covered with rubbish, and told the woman that if she cleaned the stone and moved it to her *lānai*, it would provide good fortune to her family for many years. When the family moved away and left the stone behind, only misfortunes happened to the next owners of the property. Finally, the original owners moved the stone to their new home in Kalihi-kai.

The adjoining land is Pū‘ahu‘ula, which has a gulch named Kūwowowo, meaning “the place of the echo.” Any sound here forms an echo. Next is the land Kaukahōkū, meaning “the hanging star,” named because the *maka‘āinana* traveled by this place on the way to their taro patches in the upper valley in the early morning “by the light of the morning star.” There were six great taro lands in the upper valley. The most *mauka* was Kahaulani or “spreading *hau*.” Purple taro, called *mana ulu*, was grown at Hi‘iakawai, a part of Pu‘ulena. Ka‘ahai‘ioa was a taro patch at the site of the coconut grove near Woodlawn. Other taro patches were Puohau, Kukuio, and Kalehua.

Next was Puka‘ōma‘oma‘o, the home of Queen Ka‘ahumanu. *Makai* of the residence were the waters of Waiakeakua and a pool called Kawaiho‘olana, which means “to float.” Only the Queen could use this pool; it was *kapu* (taboo) to everyone else. On the mountainside of Puka‘ōma‘oma‘o, was Pukakomo, a natural opening into Pālolo Valley, which was used as a trail to this neighboring *ahupua‘a*. At Lili‘uokalani’s death in 1917, this opening was closed off by rocks. This may be the cave inhabited by Kamehameha and his troops during their invasion of O‘ahu (Bouslog et al. 1994:113).

> Maka also knew many other mysteries of Mānoa. Along the cliffs of the left side she could point out where the burial caves were located. From any of these caves, fragments of *tapa* waved ever so gently as a sign of remembrance. She spoke of Poki, the guardian dog of the valley, who if seen was a warning to the people of *kapu*. When you saw this dog, it was best to keep away from Mānoa. ‘Ololi‘i, the pig and dog *akua* [god], who had no hair, was also known to Maka. This god lived in upper Mānoa at the site of *‘aki‘aki* (rushes). (Bouslog et al. 1994:113)

3.5 Settlement and Subsistence in Mānoa

Handy’s (1940) description of Mānoa suggests it was once home to an extensive Hawaiian settlement supported by vast taro gardens:

> In upper Manoa the whole of the level land in the valley bottom was developed in broad taro flats. The terraces extended along Manoa Stream as far as there is a suitable land for irrigating…About 100 terraces are still being cultivated, but these do not constitute more than one tenth of the total area capable of being planted…Bennett…described the upper valley as “checquered with taro patches.” (Handy 1940:77)

The relative fertility and productivity of Mānoa is reflected in the “Indices of Awards,” which lists 74 Land Commission Awards (LCA) in 21 named localities at Mānoa (discussed in detail below). These and other Land Commission documents attest to the substantial population of the area in the middle nineteenth century and presumably early. Coulter’s (1931) population estimates for O‘ahu (Figure 12) show a large settlement in the Mānoa Valley. In the late eighteenth century, King Kamehameha I’s warrior-chiefs were attracted to the land for the cultivation of food for their invading army (‘Ī‘ī 1959; Kamakau 1961).

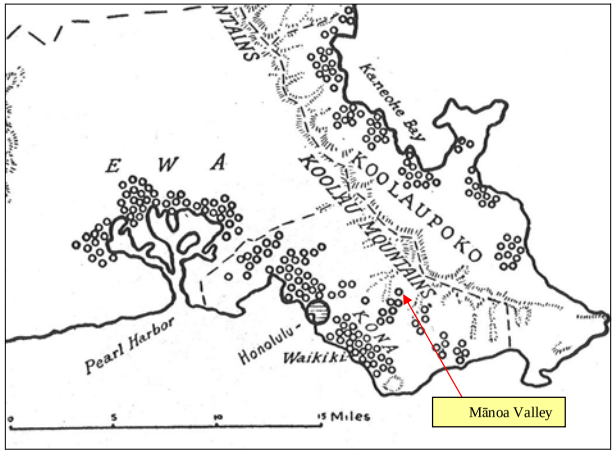

Figure 12. Portion of Coulter’s (1931) population-estimate map for O‘ahu in 1853 showing approximately 350 people in Mānoa Valley (each symbol represents 50 people)

3.6 Streams, Springs and Pōhaku

Mānoa Valley is watered by five tributary streams that merge to form the lower Mānoa Stream. The five tributary streams are ‘Aihualama (literally, eat the fruit of the lama tree), Waihī (literally, trickling water), Nāniu‘apo (literally, the grasped coconuts), Lua‘alaea (literally, pit [of] red earth), and Waiakeakua (literally, water provided by a god). There are seven waterfalls in the back of Mānoa Valley, named Wai‘ihī‘iki (literally, small trickling water), Wai‘ihī‘nui (literally, big trickling water), Lua‘aulaia, Nāniu‘apo, Wa‘aloa, Kahuwai‘iki (literally, little water tender) and Waiakeakua (literally, water [used] by the god) (Pūku‘i et al. 1974). Several of these waterfalls in the back of Mānoa Valley are shown in Figure 13.

The *‘ili* of Kānewai was given to Kaleiheana, a warrior ally of Kamehameha I, after the battle of Nu‘uanu in 1795. When Kaleiheana died the land was deeded to the descendants of Kamehameha and finally became part of the Bernice Pauahi Estate. In 1945, the land was deeded to the University of Hawai‘i, which evicted several farmers who were still growing taro. The abandoned taro *lo‘i* were rediscovered by students at the college in 1980, and were cleared and restored. This restored area was called the Kānewai Cultural Garden.

Figure 13. Waterfalls in the back of Mānoa Valley as seen from Kanānā (photograph from Bouslog et al. 1994:4)

3.7 Trails of Mānoa

Several place names within Mānoa are located on a map of early nineteenth century trails as described by John Papa ‘Ī‘ī (Figure 14).

> Our description of the trails of the royal town is finished, but we have not yet told of the trails going to lower Waikiki, Kamoiliili, and Manoa. . . . At Kawaiahao a trail passed in front of the stone house of Kaina, late father of Kikaha. The trial went above Kalanipuu’s place, along the stream running down from Poopoo to the sea, close by Kaaihee in Makiki, to Puu o Manoa, then below Puupueo, where a trail branched off to upper Kaaipu and Kahoiwai, and another to go below Kaahulue, to Kapulena [Pu‘ulena] and Kolowalu. (‘Ī‘ī 1959:92)

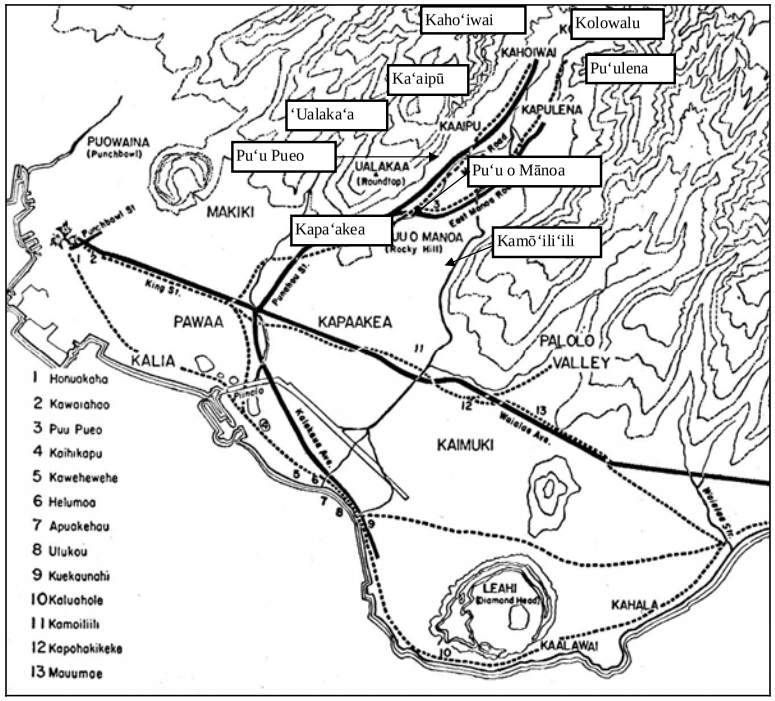

Figure 14. Early nineteenth century trails on the southwest coast of O‘ahu (illustration from ‘Ī‘ī 1959:93), showing locations of some place names in Mānoa

Section 4 Historical Background

In 1792, Captain George Vancouver described Mānoa Valley on a hike from Waikīkī in search of drinking water:

> We found the land in a high state of cultivation, mostly under immediate crops of taro; and abounding with a variety of wild fowl chiefly of the duck kind … The sides of the hills, which were in some distance, seemed rocky and barren; the intermediate vallies, which were all inhabited, produced some large trees and made a pleasing appearance. The plains, however, if we may judge from the labour bestowed on their cultivation, seem to afford the principal proportion of the different vegetable productions … At Wo‘aho‘o [O‘ahu], nature seems only to have acted a common part in her dispensations of vegetable food for the service of man; and to have almost confined them to the taro plant, the raising of which is attended with much care, ingenuity, and manual labor. In the several parts of its culture, the inhabitants, whether planting, weeding, or gathering, must, during the whole of these operations, be up to their middles in mud, and exposed to the rays of a vertical sun … (Bouslog et al. 1994:9-10)

Exactly one century later, before it was urbanized, the beauty of Mānoa Valley was described by Thrum:

> Manoa is both broad and low, with towering hills on both sides that join the forest clad mountain range at the head, whose summits are often hid in cloud land, gathering moisture there from to feed the springs in the various recesses that in turn supply the streams winding through the valley, or watering the vast fields of growing taro, to which industry the valley is devoted. The higher portions and foot hills also give pasturage to the stock of more than one dairy enterprise.
>
> . . .For nearly a mile the road leads by or along pasture fields with no vestige of tree or shrub other than the lantana pest and an occasional algeroba (kiawe), and passes along Round top or Ualakaa . . .
>
> At this summit of the road the whole valley opens out to view, the extensive flat area set out in taro, looking like a huge checker-board, with its symmetrical emerald squares in the middle ground, surrounded by pasture fields on the slopes at the base of the guarding hills. Here and there ‘mid sheltering trees, humble dwellings dot the scene around, while up the rugged slopes the almost endless shades of green with black worn seams of rock oft times lightened by ‘silvery thread of torrent’, forms the background to one of the most charming pictures, either in the clear sunlight, heightened as it often is by cloud shadows chasing rifts of sunshine down the mountain sides; or, as frequently, may be, to watch the drifting mist or rain sweep down one side of the valley, while the other basked in the sun, throwing over its weeping neighbor a “bow of promise” so radiant and bright that its-double, or even triple, reflection is no rarity. (Thrum 1892:110-111)

Mānoa Valley was a favored spot of the *ali‘i*, including Kamehameha I, Chief Boki (Governor of O‘ahu), Ka‘ahumanu, Ha‘alilio (an advisor to King Kamehameha III), Princess

Victoria, Kana‘ina (father of King Lunalilo), Lunalilo, Ke‘elikōlani (half sister of Kamehameha IV), and later Queen Lili‘uokalani.

> The site of the various houses that once sheltered Haalilio and his retinue is pointed out just above the old Ehu homestead, known later as the ‘Charley Long’ premises and, till very recently, part and parcel of Montana’s Kaipu Diary. Rev. H. Bingham, of early Hawaiian Mission fame, is also referred to by old timers as having had a residence adjoining the Haalilio premises, though his history makes no mention thereof. (Thrum 1892:114)

4.1 Early Ownerhip and Use of Mānoa Valley

Mānoa was given to the chief Kame‘eiamoku by Kamehameha I after his conquest of O‘ahu. After Kame‘eiamoku’s death, the land was inherited by his son Ulumāhiehie (or Hoapili), who became the governor of Maui during the reigns of Kamehameha II and Kamehameha III. Liliha, the daughter of Hoapili, inherited the lands in 1811 and brought them with her to her marriage with the high chief Boki, governor of O‘ahu. They had a residence at Punahou in Mānoa Valley which they often used (Bouslog et al. 1994:14-15). As noted previously, the entire floor of Mānoa Valley was a “checkerboard of taro patches.”

Boki traveled with Kamehameha II on his ill-fated trip to England. While there, Boki met John Wilkerson, a British agriculturalist who had once been a planter in the West Indies. Boki and Wilkerson traveled back to Hawai‘i on the English ship *Blonde*. In 1825, Wilkerson planted seven acres atop Punahou Hill (Pu‘u Pueo) with sugar cane, the first sugar plantation in the Hawaiian Islands.

> I ka makahiki 1826, ua hoomaka ia ke kanu koana ma Manoa, he haole Bertiania ka mea nana i hana. O Boti a me Kekuanaoa kekahi mau alii kokua nui i ka mahi ko, a o ia paha ka hoomaka mua ana o ka wili ko ma Hawaii nei. A i ka haalele ana o ka haole, ua lilo ka wili ko ia Boti, a o Kinepu ke kanaka nana e hooponopono. Ua kukulu ia ka hale puhi ko ma loko o ke kulanakauhale o Honoluu, ma ka pa kokoke i kahi o Keolaloa Sumner ma e noho nei. He mau hana maikai keia a Boti. (Kamakau, Ka Nūpepa Kū‘oko‘a, May 23, 1868)
>
> Translation:
>
> In 1826 the cultivation of sugar was begun in Manoa valley by an Englishman. Boki and Ke-ku anao‘a were interested in this project and it was perhaps the first cane cultivated to any extent in Hawaii. When the foreigner gave it up Boki bought the field and placed Kinepu in charge. A mill was set up in Honolulu in a lot near where Sumner (Keolaloa) was living. For this action Boki is to be commended. (Kamakau 1992:278)

Wilkinson died in 1826, the mill for the sugar was moved to Honolulu, and Boki lost interest in the endeavor. In 1828, he sold the sugar plantation and sugar mill (or took as partners) to four Honolulu businessmen: William French, Stephen Reynolds, John C. Jones, and John Ebbets (Kuykendall 1938:172). French encouraged Boki to turn the sugar mill into a distillery. When Ka‘ahumanu heard of this, she was outraged and took the Punahou lands away from Boki and gave them to Hiram Bingham and his wife as a base for mission work.

John Wilkerson was also the first to try to grow coffee in the islands.

> At the foothills just above Kaipu, is the reputed location of the first Coffee nursery of the islands, also the work of John Wilkinson, with plants brought by him in the Blonde, from Rio de Janeiro. All the shady recesses and glens at the head of the valley show evidences, to-day, of this early agricultural effort, but to no pecuniary or commercial advantage, for it is all neglected and overgrown. (Thrum 1892:114)

Captain John Kidwell brought a variety of pineapple to the islands called Smooth Cayenne in 1885. He conducted experiments with 31 varieties of pineapples on his farm, in the vicinity of current campus. Smooth Cayenne worked best, and this variety became the standard for the pineapple industry. The sugar cane plantation was destroyed, but some of the coffee plants were used to start coffee cultivation on the islands of Kaua‘i and Hawai‘i (Bouslog et al. 1994:15). The only remaining structures associated with this endeavor noted by Thrum in 1892 were a few filled-in cisterns and wells, and stones marking the western side of the sugar house foundation.

Prince Tute of Tahiti, who became the tutor of Kamehameha III, was also given a piece of land by Boki, in a lot adjacent to the sugar plantation. During the Māhele, he enclosed his lot with a stone wall. Tute died in 1859, but his descendants (the Sumners) continued to live in the area, which later became part of the Montano ranch, and then part of the fruit farms owned by Carlos Long (Bouslog et al. 1994:16). On the 1882 Baldwin map (see Figure 7), Ha‘alilio and Tute are shown owning two pieces of adjoining land in Kalehua and Pu‘upueo. Queen Lili‘uokalani later owned land on the old Brenig premises bordering the land of John Stevenson.

Ka‘ahumanu had a great estate in the upper valley, which included the lands of Pu‘ulena. After the deaths of Boki, Liliha, and finally Ka‘ahumanu in 1832, many of these royal lands were given to Charles Kana‘ina, the father of King William Lunalilo. Kamehameha II was also said to have maintained a summer house in Wai‘oli and Ka‘aipū. Lunalilo gave some of these lands to Kapōkini, who gave them to Ha‘alilio. When Ha‘alilio went on a diplomatic mission to England, he returned the lands to Kamehameha III (Bouslog et al. 1994:16).

An 1817 map by Otto Kotzebue (Figure 15) and an 1855 map by La Passe (Figure 16) show a dense concentration of population in Mānoa Valley. In 1836, French missionaries visited Mānoa, counting 50 houses. If each house contained five people, this would put the population at 250 Hawaiians. The general population of Honolulu and the coastal plain was about 6-7,000 people (Coulter and Serrao 1932:109), which probably represented only a small percentage of the total population of the area that existed before the Hawaiian people were decimated with war, exotic diseases, and the disruption caused by the influx of Westerners and Asians, and their influence on the economy and culture of Hawai‘i. An 1847 record lists 34 eligible landowners; only two were non-Hawaiian. An 1849 tax list includes 195 Hawaiian names, meaning the population of Mānoa was probably about 1,000.

4.2 Mid Nineteenth Century and Land Commission Awards

A total of 68 commoners were granted *kuleana* (Land Commission) awards in Mānoa *makai* of King Street, totaling 332.26 acres (Figures 17, 18 and 19; Table 1). Twenty-seven awards were less than an acre; 31 awards were less than five acres, four awards were less than 10 acres; and one award was for more than 10 acres (to ‘Akahi, a *wahine* [female] cousin of Bernice

Pauahi Bishop, in Kaipua *‘ili*, LCA 5368:1, RP 1262, 10.25 acres); five awards were for more than 30 acres (J. Stevenson [Ka‘aipū, 34.96 acres, and Nāniu‘apo, 30.17 acres], Kaleiheana, 66.59 acres, Kaunuohua, 35.40 acres, and Beckley, G. for heirs, 36.10 acres). Victoria Kamāmalu received most of Kānewai ‘Ili. C. Kana‘ina (father of King W.C. Lunalilo) received the *‘ili aina* of Kolowalu and Pāmoa, and all of Kukuio and Kalehua. The largest grant went to the American Board of Commissioners for Foreign Missions who received a total of 301.68 acres; this became the campus for Punahou School (Bath and Kawachi 1990:3-5). Chief Boki gave Hiram Bingham this piece of land in 1829 (DeLeon 1978:3).

The Land Commission documents suggest that most of the agriculture and habitation at Mānoa was in the east-central part of the valley (along Mānoa Stream) between the present-day Mid Pacific Institute and the Chinese cemetery. There were a few claims and awards in the far northern part of the valley, at Punahou, and a few in the Kānewai/Kalaepōhaku area.

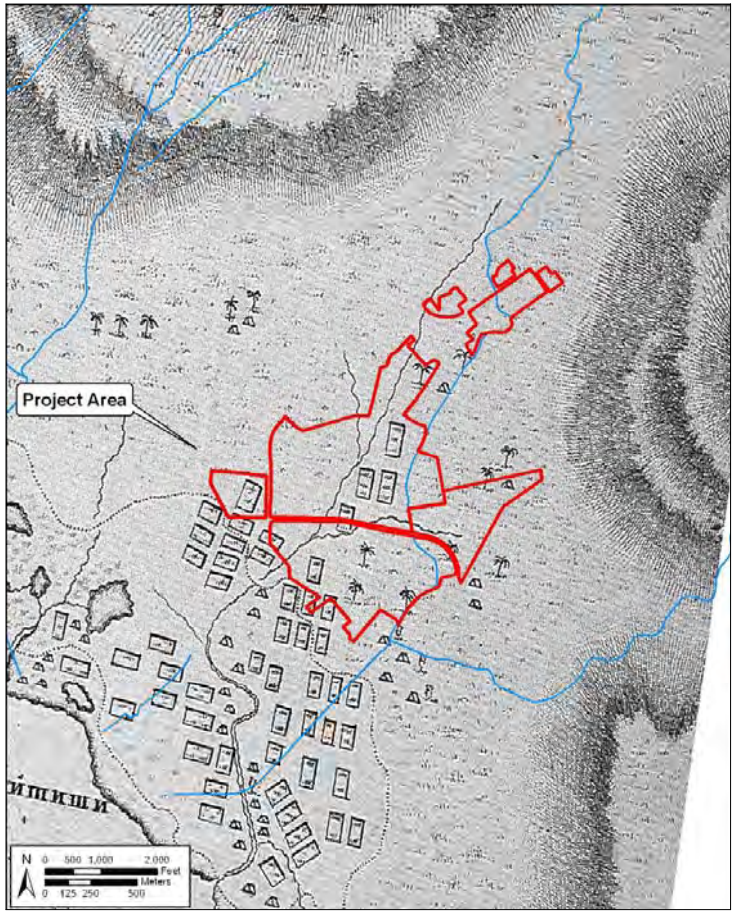

Figure 15. Kotzebue map of 1817 showing vicinity of project area (should be understood as somewhat schematic)

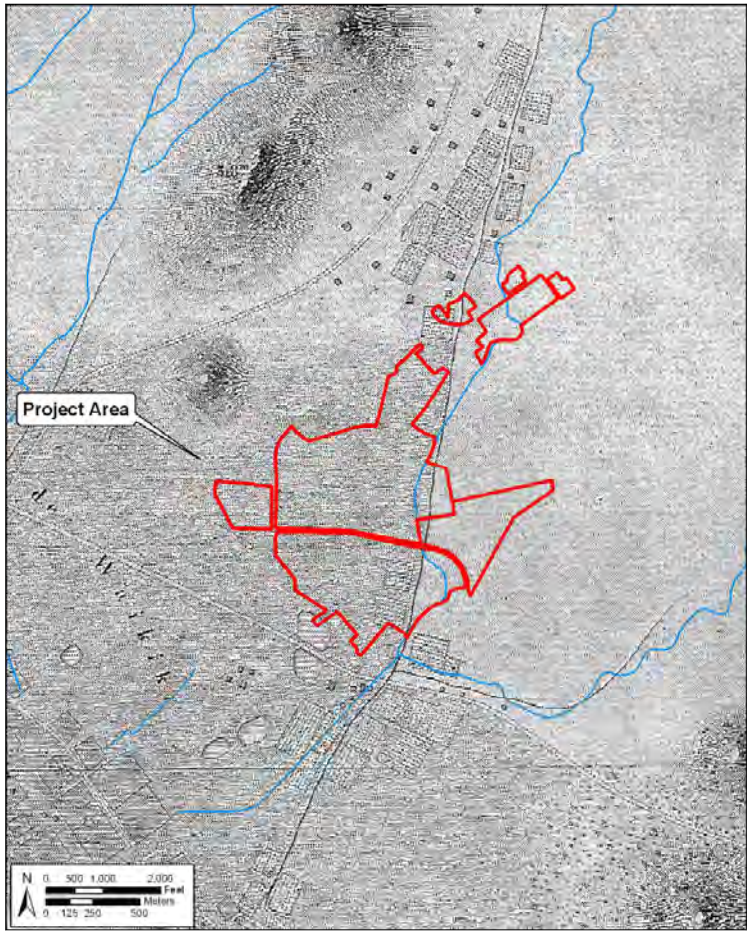

Figure 16. LaPlace map of 1855 showing vicinity of project area (should be understood as somewhat schematic

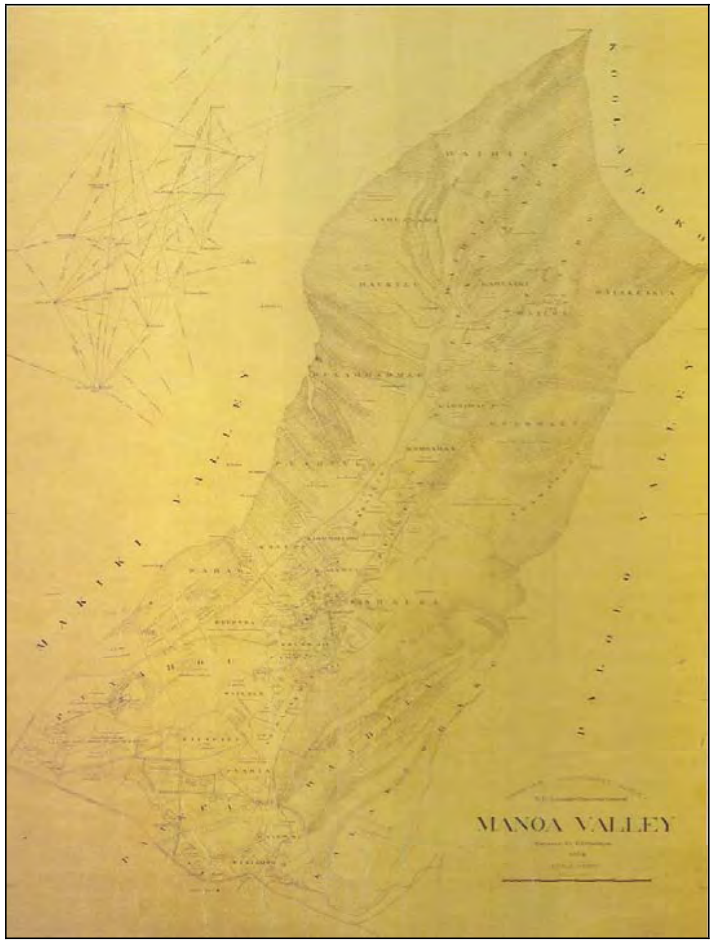

Figure 17. 1882 E. D. Baldwin map, showing Land Commission Awards and Grants in Mānoa Valley

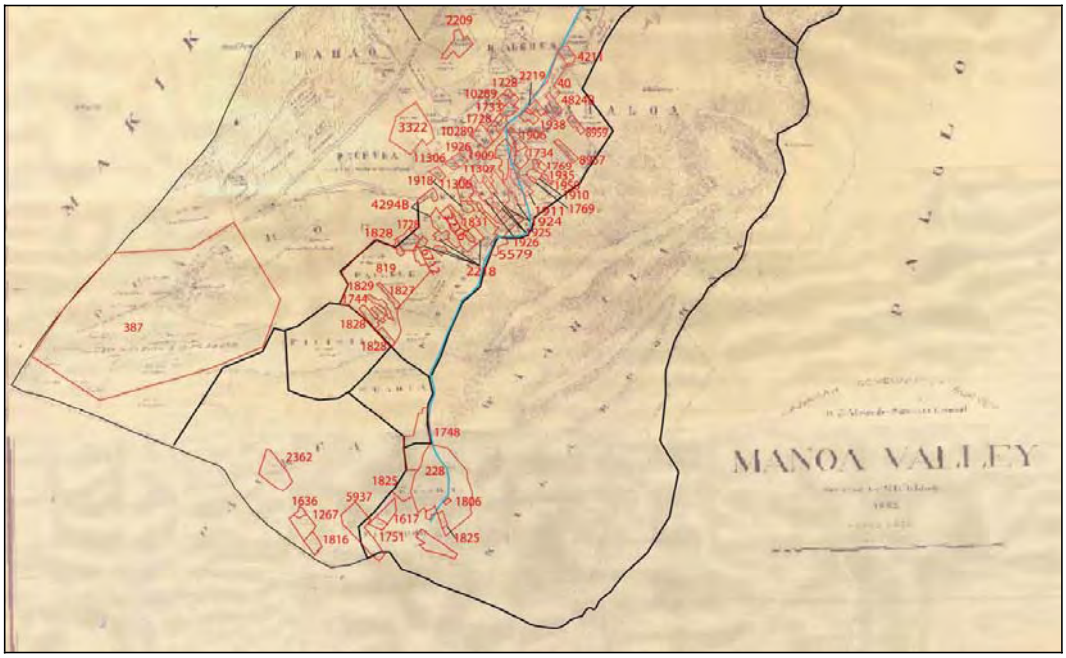

Figure 18. Makai portion of 1882 E. D. Baldwin map with Land Commission Awards outlined in red

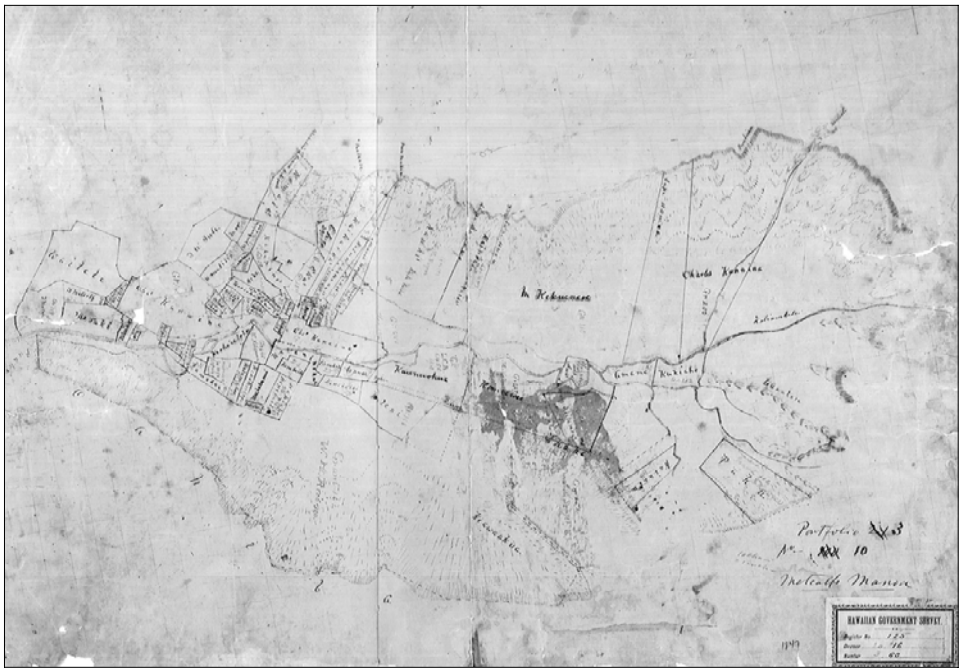

Figure 19. 1847 Hawaiian Government Survey map; surveyed by Theophilus Metcalf

Table 1. Land Commission Awards for Mānoa Ahupua‘a

Claim	Claimant	Location	Notes
17	Jones, Eli	Beretania St.	House
40	Kai, D.	Ka‘ahaloa	Māhele Award
42	Maigret, Louis	Wailele	
228	Kaleiheana	Kānewai	Kānewai Pool
387	ABCFM (mission)	Punahou	Received from chief Boki: spring, house
707	Kaiaina		Received land from Kamehameha
819	Beckley, George	Wailele	Farm called “Kawailele”
1130			House, 2 patches, pasture
1267	Kawela	Pa‘akea	3 *‘āpana*: taro *lo‘i;* taro *lo‘i*; house
1273	Spear	King St.	
1274	Hulilau	Piliamo‘o	Dry taro, 12 taro *lo‘i*, *hala* trees
1356	Namaka	Piliamo‘o	2 taro *lo‘i*
1525	Kuaana	Piliamo‘o	2 taro, house, pasture
1617	Kenao	Piliamo‘o	4 taro, 1 ditch, 2 houses
1627	Keonea	Kānewai	
1636	Haole	Pa‘akea	2 *‘āpana:* house, fence; house, fence
1728	Kuikuikahi	Halelena, Wailele	3 *‘āpana*: *pahale* (house); *lo‘i ma hale lena*; taro *lo‘i*, pasture
1733	Kaheenalu	Halelena	4 *lo‘i*
1734	Kauhi	Hamamakahwaha, Hipawai	2 *‘āpana*; house enclosed; 6 taro *lo‘i*
1744	Hakuole	Wailele	5 taro *lo‘i*
1748	Ono	Kānewai	Houselot
1751	Aea	Piliamo‘o	3 *‘āpana*: house; taro *lo‘i;* taro *lo‘i*
1755	Kaluaapana, Peter	Hamamakowaha	
1769	Malaihi	Hamamakawaha, Kahamama	Taro *lo‘i*
1806	Hinai	Kānewai	3 taro *lo‘i*
1813	Keaka, I.	Piliamo‘o	2 taro *lo‘i*
1816	Kaaha	Pa‘akea	2 *‘āpana*: 6 taro, pasture; taro *lo‘i*
1825	Kuewa	Kānewai	*‘Āpana* 3-4 - Pasture with 2 houses; *‘āpana* 5 - taro
1827	Wahahee	Wailele	6 taro *lo‘i*
1828	Ewaloa	Wailele	3 *‘āpana*: taro *lo‘i;* taro *lo‘i*, house
1829	Hoohoku	Wailele	8 taro *lo‘i*
1831	Mamala	Pāmoa	3 *‘āpana*, 8 taro *lo‘i*, *‘auwai*, house; taro *lo‘i*; house
1906	Kaumakaokea	Hamamakowaha	House at Kolowalu
1908	Kalaau	Kamo‘olepo	4 *lo‘i*
1909	Kaianui	Kolowalu	*‘Auwai*, 6 taro *lo‘i*, houselot
1910	Apiki	Hamamakawaha, Kolowalu	*‘Auwai*, *pili*, taro for *konohiki*
1911	Naihe	Hamamakowaha	Taro, house

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Claim	Claimant	Location	Notes
1918	Kamahiai	Kolowalu	2 *‘āpana: pahale*; 6 *lo‘i*
1920	Paaluhi	Pu‘ulena	3 taro *lo‘i*, pasture, house
1921	Moku	Kahawai	9 taro *lo‘i*, *kula*, house
1922	Nawaanui	Kali‘i	13 *lo‘i*, sweet potato
1923	Kekua	Kaho‘iwai	6-8 *lo‘i*, *‘auwai*, house
1924	Kealohapauole	Kauala‘a	3 *‘āpana,*: 7 taro *lo‘i*; taro *lo‘i*, house on south side; pasture
1925	Paniani	Koloalu, Koloaluiki	*‘Auwai*, *pili*, pasture, 2 houses
1925	Koi	Kolowalu	*Pili*, taro, land sinking in
1926	Nanauki	Kolowalu	1 *‘āpana*: pasture, house; taro
1927	Nawaakakele	Pāmoa	12 *lo‘i*, *kula*, house
1928	Aiia	Pu‘ulena	4 taro, pasture with house
1929	Kaanaana	Pu‘ulena	*Lo‘i* for *konohiki*, *‘auwai*, pasture
1930	Kaaea	Pu‘ulena	2 *‘āpana*: taro *lo‘i*, pasture, houselot; *lo‘i* for *konohiki*
1931	Kaiwi	Pu‘ulena	9 taro, pasture, house
1935	Puuwaewae	Kamamakoaha, Hamamo	7-8 taro *lo‘i*
1937	Kahalepohaku	Pu‘ulena	6 taro *lo‘i*, pasture, house
1938	Lupe	Kamo‘olepo	2-4 taro *lo‘i*
1940	Upepe	Pu‘ulena	Taro *lo‘i*, pasture
1944	Maemae	Komoawaa	14 taro lo‘i, *kula*
1945	Kamaikaaloa	Komoawaa	6 taro *lo‘i*
1946	Makalii		16 taro *lo‘i*, *kula*, houselot
1947	Puuki	Komoawaa	6 taro *lo‘i*, *kula*, houselot
1948	Ma	Komoawaa	7 taro *lo‘i*, *kula*, houselot
1949	Kipi	Hipawai	13 taro *lo’i*, *kula*
1950	Kalua	Hipawai	3-4 taro *lo‘i*
1951	Nui	Kaho‘iwai	Taro *lo‘i*, house
1980	Haole	Piliamo‘o	
2209	Keaulana	Kaaipuluna	*Kalo* taro & *kula*; pasture named
2216	Kaohe	Pāmoa	2 *‘āpana*: 16 taro, watercourse; house site near taro
2218	Kaawahua	Pāmoa	4 *‘āpana*: taro *lo‘i* and pasture in each
2219	Keawe	Kamo‘olepo	2 taro *lo‘i*
2209	Keaulana		*Kalo* taro & *kula*; pasture named
2362	Kaaimoa	Pa‘akea	2 taro *lo‘i*, pandanus, house
2530	Kaahu	Piliamo‘o	
3028	Kauhi	Punahou	
3322	Tute, T.	Haliimaile	Garden farm with stone wall
3906	Neki, K.	Kolowalu	Heiau of Kūkaō‘ō, fence; house in
4211	Kaululaau	Kaahaloa iki, Manuahi	10 taro patches & pasture in one
4294B	Kalaweaumoku	Pāmoa, Ka‘ahaloa	2 *‘āpana*

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Claim	Claimant	Location	Notes
4605	Hakau, wahine	Kaho‘iwai, Kaluohau, Hokeulu, Pi‘inaio	6 *‘āpana*: 5 taro *lo‘i*; 3 taro *lo‘i*; pasture; 1 ditch; 1 ditch; 1 fish pond
5368	Akahi	Ka‘aipū	8 taro *lo‘i*
5579	Kahapapa	Hipawai	5 taro *lo‘i*, Kahawai Stream
5937	Paukuwahie	Piliamo‘o	
6450	Kaunuohua	Pu‘ulena	Loko Kūwili
6616	Nuuanu	Kānewai	
6712	Paikau	Kalena, Wailele, Pu‘ulena	3 *‘āpana*: 2 *lo‘i*, *kula* house; mountain land; 28 *lo‘i*, *kula*, house
7713	Kamamalu, Victoria	Kānewai	
8555	Kaina, M.	Maka‘īlio	4 *lo‘i*, *‘auwai*, pasture
8559	Kanaina, C.	Kukuhio, Pāmopa	2 *‘āpana*: taro; *‘ili* of Kalowalu
8957	Kuhaumea	Ka‘ahaloa	5 taro *lo‘i*, house 2 *hala* trees
8958	Kahele	Ka‘ahaloa	1 taro *lo‘i*, *kula*, house
8959	Kuamoo	Ka‘ahaloa	8 taro *lo‘i*, sweet potatoes
10289	Namokae	Halelepa (Halelena)	2 *‘āpana*: 6 taro patches, pasture
11029	Stevenson, John	Ka‘aipū, Kapo, Kukona, Kamakela	3 *‘āpana*: *pali*, pasture (22 acres); pasture, *kalo*, stream (9 acres); *kalo* (2 acres)
11306	Kalama	Halelena, Kolowalu	2 *‘āpana*
11307	Kea	Kolowalu	9 *lo‘i*, house site

4.3 The University of Hawai‘i at Mānoa Land Commission Awards

Charles S. Bouslog (in Kobayashi 1983:183) gives the following summary account of the history of Hawaiian tenure of the University of Hawai‘i at Mānoa lands:

> The grantees of land at the mahele (mostly 1848-50) have their names recorded forever in all subsequent deeds and title search leads back to the first owner. All but one of these names for campus land were Hawaiian. Names seen are Ewaloa, Kapehana, Kaumakapili, Mooiki, Ono, Poonui, Puoa, Hakuole. Charles Kanaina (the father of King Lunalilo) at mid-century was the owner of much of the Mauka Campus and of the large areas now in the Lyon Arboretum. For most of these men, it is a one-time legal enshrinement; few of the names are seen again, except in deed.
>
> I have attempted to trace the ownership changes of some of the original grants: 718, 882, 1744, 1748, 1828 (see the 1882 map).
>
> In the “Native Register” (p. 270) Ewaloa signed with his mark. There is a reference to his widow in 1876, and to an heir in 1881, when the land passed into the hands of Emma Davison. No more Ewaloa.
>
> Hakuole has modern descendants but the land is no longer theirs. For Land Grant 1744, he made his mark in the “Native Register” and testified: “I got this land in 1830…for taro land for cultivating sweet potato at Kawailele in the land of Lui Palani (Louise French), the konohiki.” This was on December 3, 1847. An heir sold to Ilikealani in 1864. The family continued in the valley. One man is listed as a Manoa taro planter in the city directory of 1888. In 1894-95 one is listed as living in Manoa. The last kuleana seems to have been sold to a Magoon in 1896.

The largest parcel in Mānoa (LCA 228, 66.59 acres) for a private individual was awarded to Kaleiheana at Kānewai. John Papa ‘Ī‘ī (Native Register; August 14, 1846) relates the following

> Kalaiheana’s land, called Kanewai, is at Waikiki. It has some leles in Mānoa . . . that was the land of Keeaumoku at Waikiki, adjoining the north side of Kalaepohaku. This land became his upon the victory of Kamehameha I at the Battle of Nuuanu, also Waialua, as was the custom of granting land to chiefs at that time.

When the *peleleu* (Kamehameha’s fleet of large canoes) came, the land passed from Ke‘eaumoku to Papa and Kaleiheana and all the *leles* were also conveyed. In Foreign Testimony, ‘Ī‘ī relates the following:

> Kanewai is its name. It borders on the sea which enters part of it. On S. and E. is land of Kalaepohoku on NE & N is land of Waihi. From NW & W round is Piliamo. On W. Keokapu has land. This land belonged to Kiaumoku father of Kaahumanu. . . . When Kiaumoku obtained it was in 1804. Claimant is his descendant.

This later account is particularly interesting because of the reference to Kānewai bordering “on the sea which enters part of it.” This corroborates the account in the *Star Bulletin* (Williams 1935) of a subterranean passage linking Kānewai and the sea, and suggests that the famous Kānewai pool lay in Kaleiheana’s LCA. The reference to LCA 228 being bordered on the northeast and north by the land of Waihī is uncertain, but may refer to springs or seeps on the nose of Wa‘ahila ridge (Waihī – “trickling water”).

Testimony relating to Keliipo’s land claim (LCA 1635, 0.43 acres) is of particular interest in that it provides the clearest picture of land use in Kānewai. The Native Register offers the following account:

> ‘Ili of Kanewai, Ahupua‘a of Waikiki. I have two lo‘i. My lo‘i on the west is bounded on the north by the lo‘i of Kalama, on the east by the Kula of Maalahia, on the south by the lo‘i of Kalama, on the west by the lo‘i of Kanemakini, one small house.

The Foreign Testimony offers the following accounts:

> This land is Kanewai, Waipio, Waititi. Kalo land only. No house or fence. Mauka is a stream dividing it from upland Waialae, Kalama [is] Konohiki; Makai Stream and wasteland; Honolulu, Kalama. Claimant had this from Kalama about 8 years ago on account of friendship and work.
>
> One taro patch and the boundaries are Mauka is the ditch; Waialae, [lands of] Kalama; the Konohiki, Makai a stream; Honolulu, Kalama the Konohiki. Acquired in 1841, he has done Friday work for the Konohiki.

The testimony for Keliipio’s land claim suggests there were a number of small *lo‘i* (irrigated plots) in the area north of Mānoa Stream and south of the *‘auwai* (irrigation ditch), which were cultivated by different people with a number of *lo‘i* belonging to the *konohiki* (overseer) named Kalama.

The land claim of Nu‘uanu (LCA 6616:1, 0.96 acres) lists three *lo‘i*, four coconut trees, a small sweet potato *kula* (dryland plot), and a house lot. While it is not clear whether these are all in *‘āpana* (lot) 1, it seems a virtual certainty that he claimed a *lo‘i* there.

The testimony associated with Keonea’s land application (LCA 1627) relates that “Kaleiheana gave claimant these lots” and the presence of *lo‘i* and a house lot on the property.

Figures 20 through 24 illustrate some aspects of land use changes from the 1880s to the end of the nineteenth century in and around the project area.

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

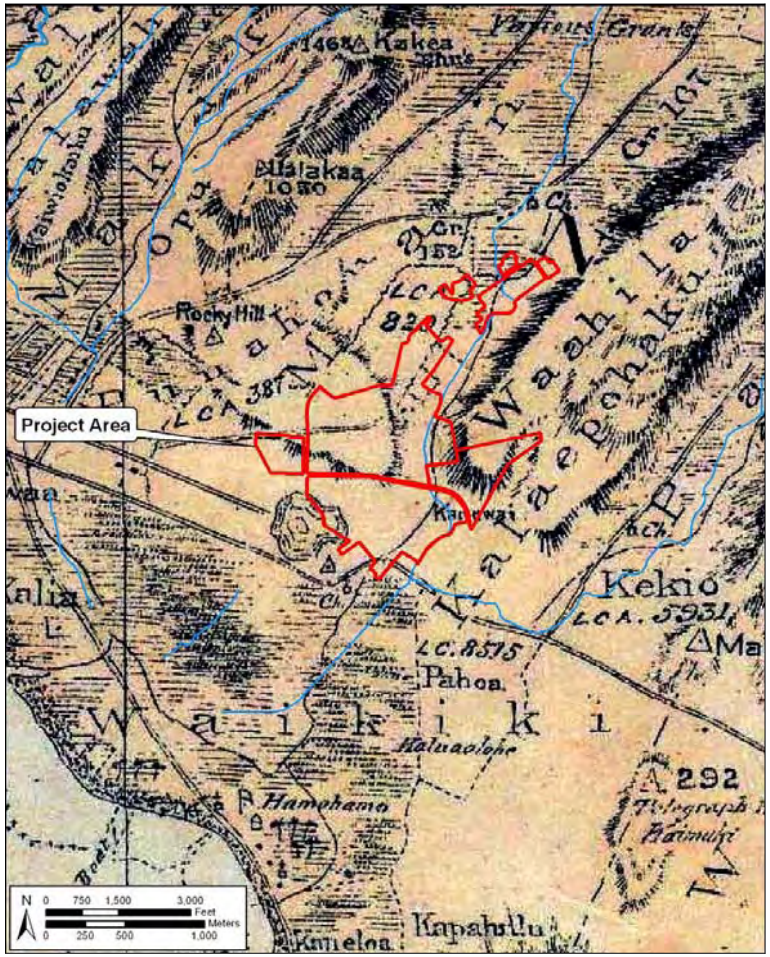

Figure 20. 1881 O‘ahu Island Government Survey map

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

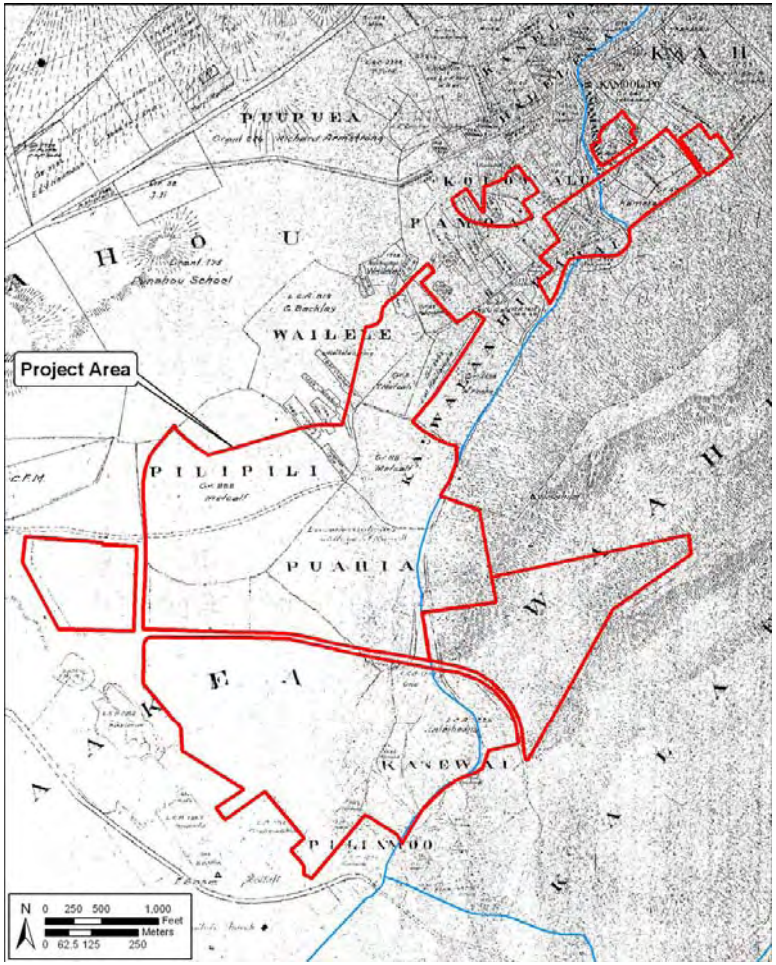

Figure 21. 1882 E. D. Baldwin map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

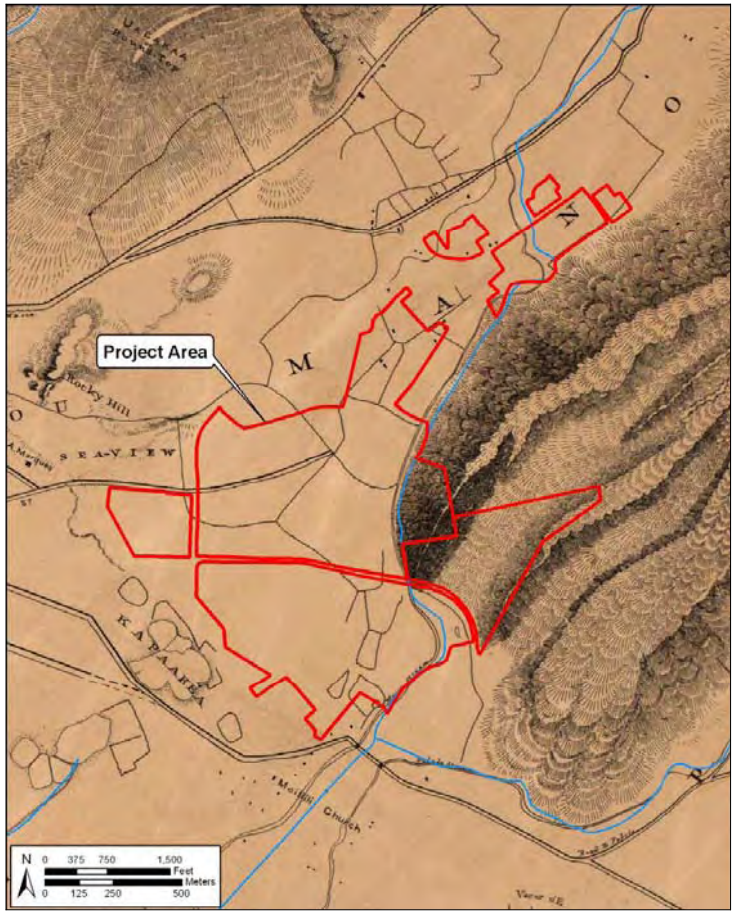

Figure 22. 1887 W. E. Wall map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

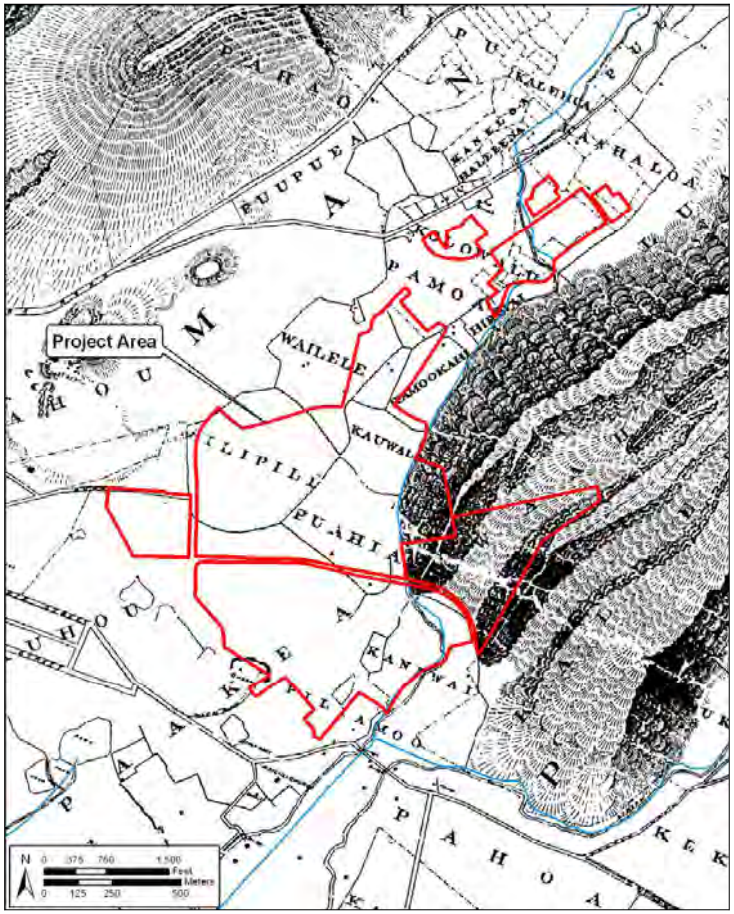

Figure 23. 1897 M.D. Monsarrat map showing vicinity of the project area

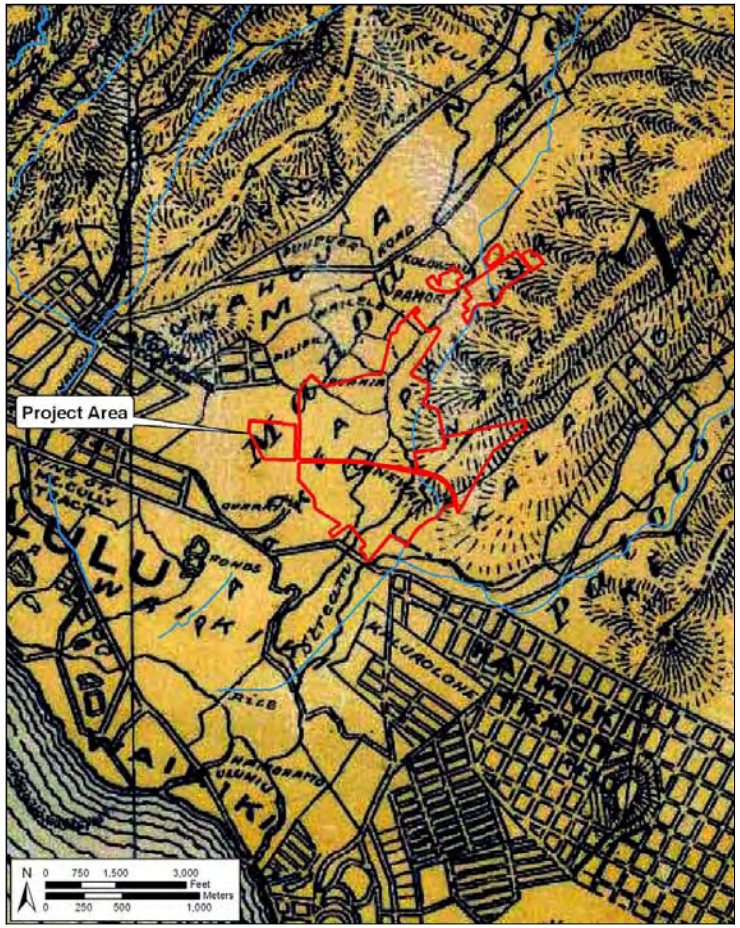

Figure 24. 1899 O‘ahu Island map showing vicinity of project area.

4.4 1900s to Present

Hawaiians and Chinese continued to grow taro on the floor of Mānoa Valley in the late nineteenth century (Figure 25). However, disease, out-migration to the centers of population, the loss of traditional culture, and other factors led to a decimation of the resident Hawaiian population. By the end of the century, half of the taro lands in Mānoa Valley were cultivated by Chinese. They also raised other vegetables and bananas. For a time pineapples were raised on the lower slope between Pu‘u Pia and Wa‘ahila Ridge (the eastern boundary of the *ahupua‘a*) (Emery 1956:57).

The well watered, fertile and relatively level lands of Mānoa Valley supported extensive wet taro cultivation well into the twentieth century. Handy and Handy (1972:480) estimated that in 1931 “there were still about 100 terraces in which wet taro was planted, although these represented less than a tenth of the area that was once planted by Hawaiians.”

In the early past of the nineteenth century, the Japanese began to move in to the upper valley to start truck farms, growing strawberries, vegetables, such as Japanese dry-field taro, Japanese burdock, radishes, sweet potatoes, lettuce, carrots, and soy beans, and flowers to sell to the Honolulu markets. Bananas were grown on the northeastern slopes of the valley. Several dairies were also opened in the area, including the first opened by William Harrison Rice in 1844. The result of the presence of these dairies was that many previously forested slopes were denuded by the grazing cattle (Emery 1956:57, 62).

Rice cultivation was attempted in Mānoa Valley by 1882, but the project was unsuccessful.

> Though the valley is under almost complete cultivation of taro, largely by Chinese companies, an effort was made by them in 1882 to divert it to the growth of rice, but after two years struggle with high winds, cold rains and myriads of rice birds it was abandoned. In the spring of 1884 a north wind, with the local appellation of Kakea, visited the valley, which blasted all the taro, withered all the growing rice, moved a number of houses bodily and demolished several entirely. This is said to have terminated the rice industry of Manoa, since which time its fields have been devoted to taro, as it had been for many preceding generations. Sweet potatoes and bananas are also cultivated in a limited measure, and some attention is being given to fruit culture . . . (Thrum 1892:116)

In the 1903-04 Honolulu City Directory, 148 names are listed, 107 haole (Caucasian), 11 Chinese, 9 Japanese, and 21 Hawaiians. In 1932, the valley had 1,000 homes (with an estimated population of 5,000), about 300 Caucasian, 173 Japanese, ten Chinese, ten Portuguese, six Hawaiian , five Puerto Rican, two Filipino and one Spanish (Coulter and Serrao:1932:109). By 1944, the population of Mānoa was 15,000. By the year 2000, Mānoa had a population of 21,112 (City and Co. of Honolulu 2000). Figures 26 through 31 show the growth of roads and residential areas during in Mānoa from the early to middle twentieth century.

Figure 25. Checkerboard taro fields on the floor of Mānoa Valley

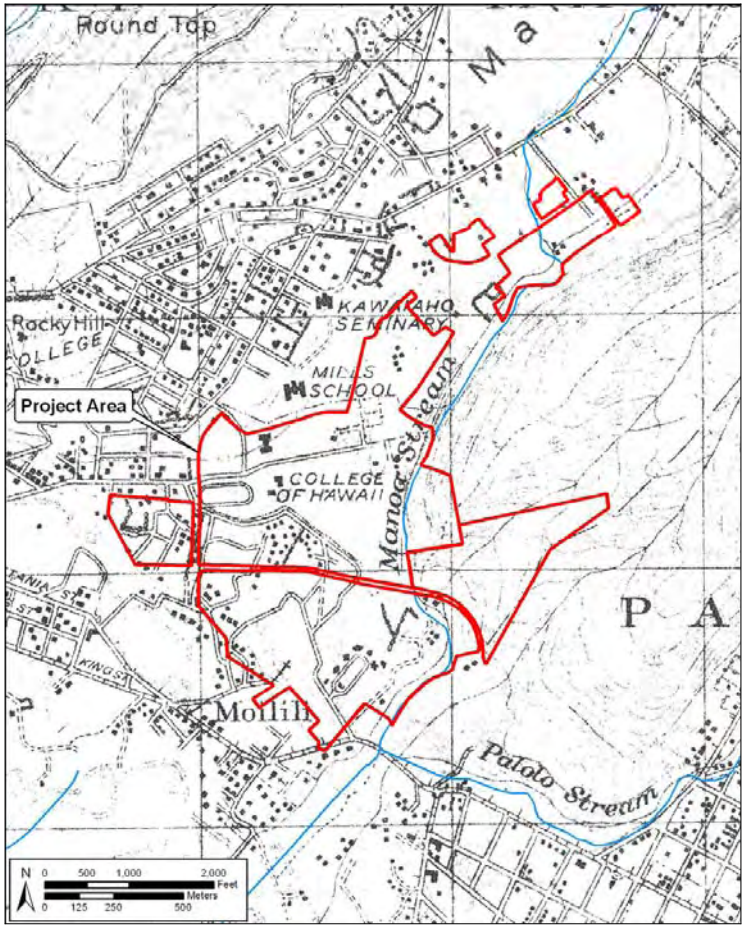

Figure 26. 1919 Fire Control map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

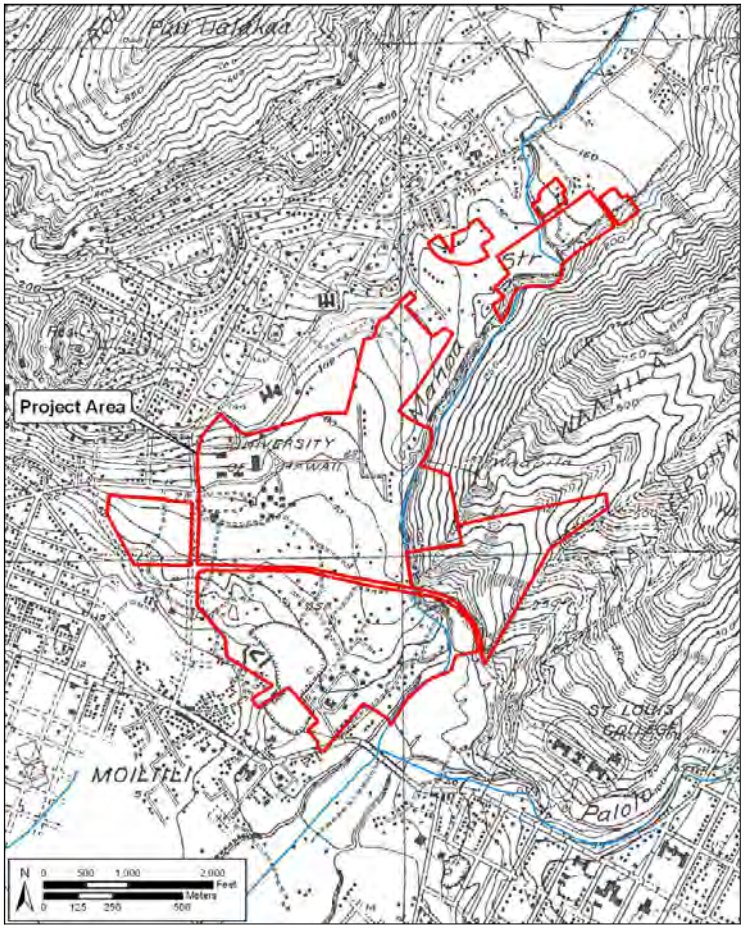

Figure 27. 1927 US Geological Survey map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

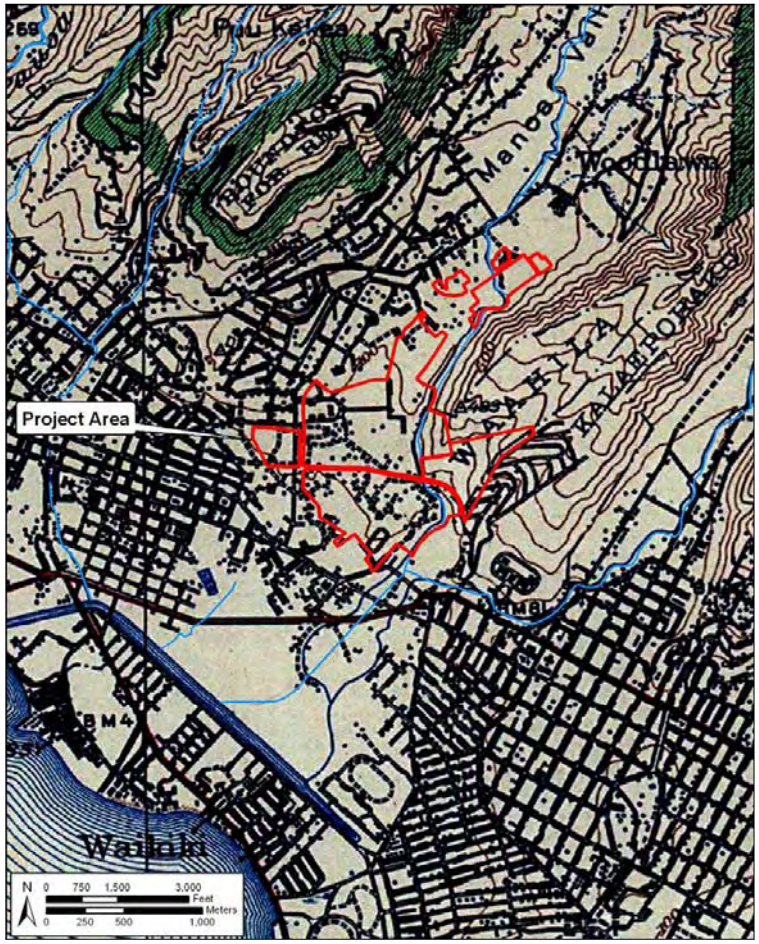

Figure 28. 1938 map showing vicinity of project area

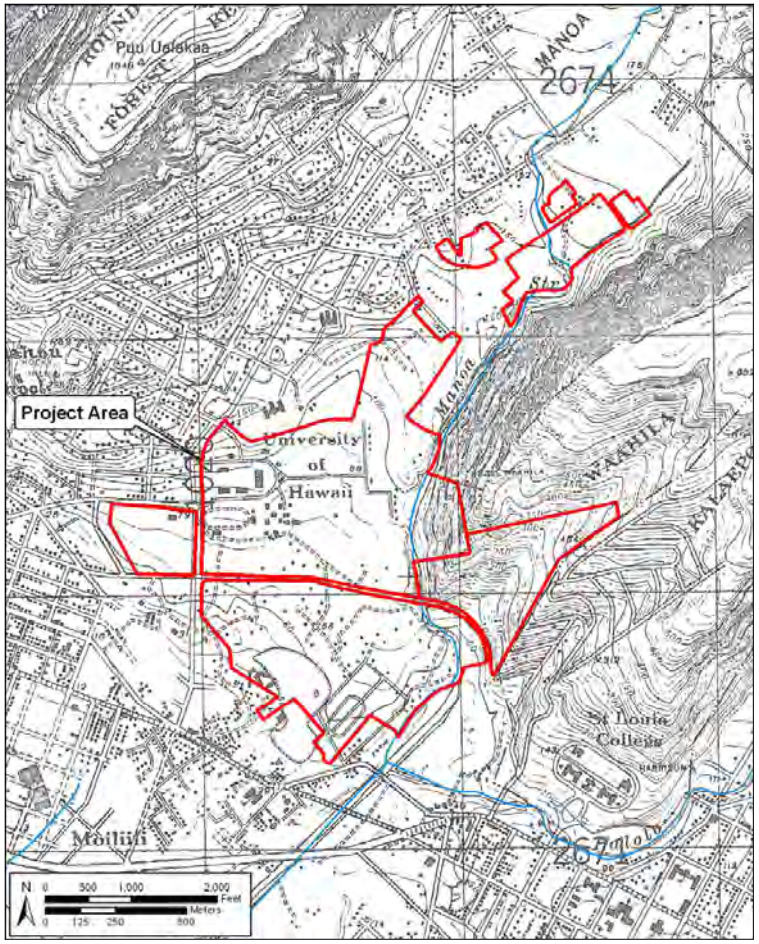

Figure 29. 1943 War Department map showing vicinity of project area

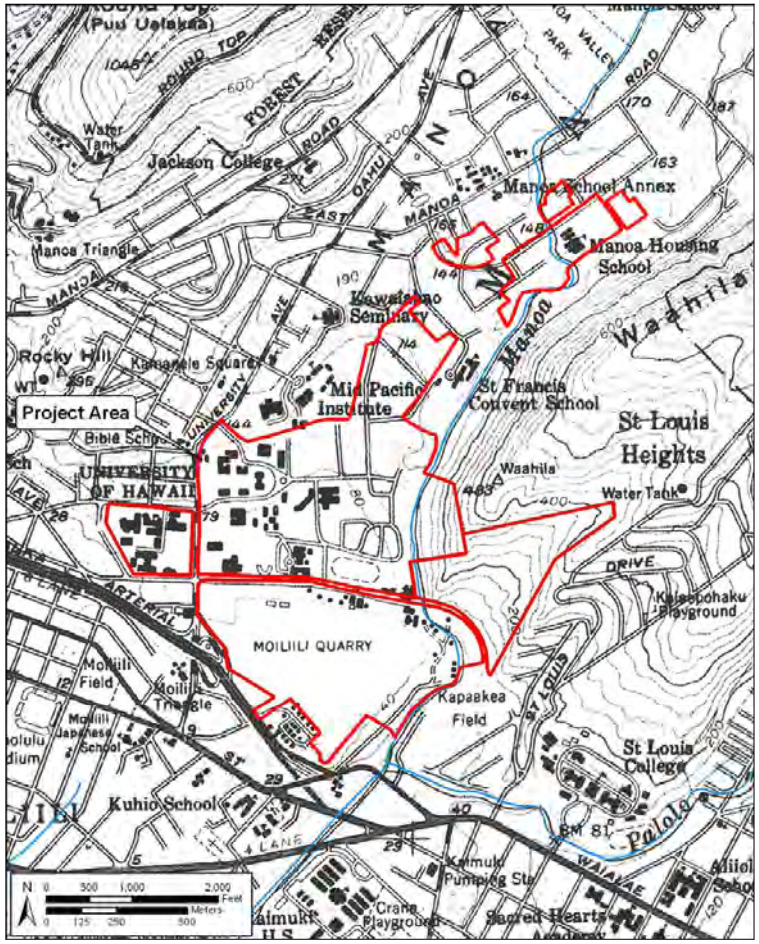

Figure 30. 1953 U. S. Geological Survey map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

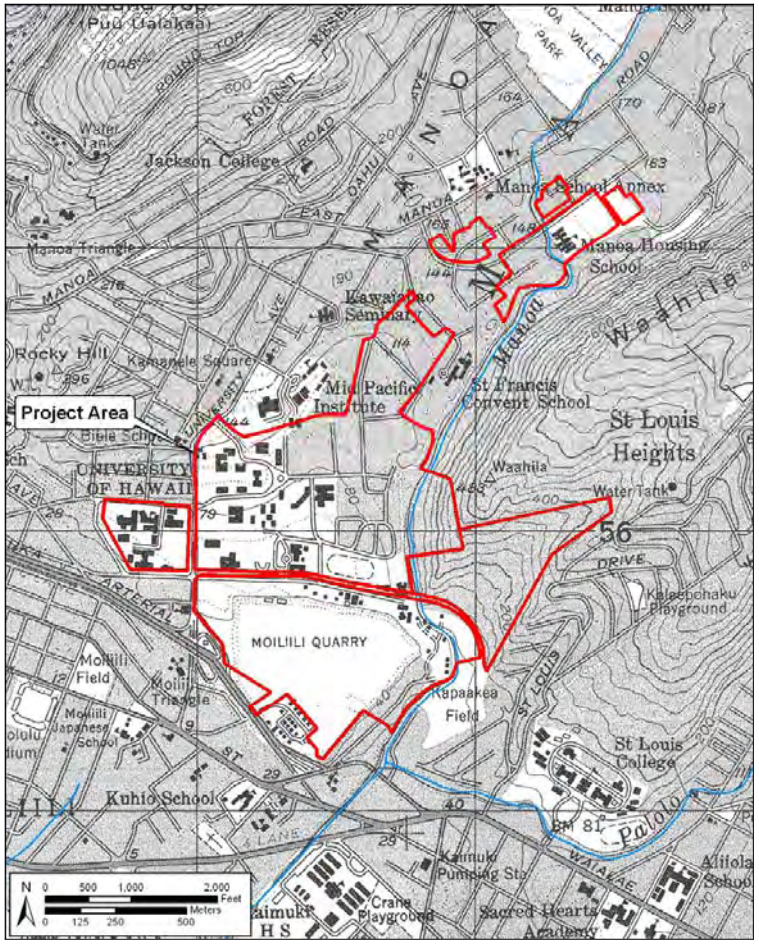

Figure 31. 1956 map showing vicinity of project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

4.5 Prominent Historic Structures

4.5.1 Mānoa Chapel and Cemetery of Kawaiaha‘o Church

In 1832, the missionaries Hiram Bingham, Abraham Blatchely, Levi Chamberlain, and Elisha Loomis hiked into Mānoa Valley to look at two parcels of agricultural land that had been appropriated for the use of the Mission by Kalanimōkū, the Prime Minister of the Hawaiian Kingdom. One plot was on the western side of ‘Ualaka‘a in West Mānoa; the other was an acre and a half of low taro ground with thirty to forty taro patches in East Mānoa; this land was probably at the site that later became the Mānoa Chapel and the Mānoa Hawaiian Cemetery. At Ka‘ahumanu’s residence in Puka‘ōma‘oma‘o, there was a “kind of village of forty of fifty huts, the houses of the chiefs, a schoolhouse and a chapel” (Diary of Elisha Loomis, cited in Bouslog et al. 1994:153). The cemetery, which may have predated the chapel, is said to have been established by Ka‘ahumanu for a Christian cemetery.

In 1846, Reverend Richard Armstrong wrote: “In the beautiful valley of Mānoa, there is an encouraging state of things . . . . A substantial stone meeting house has been erected under the direction of Bro. William Harrison Rice, intended also for a school house.” This stone church may have been built on land once owned by John ‘Ī‘ī, who had early bought fee simple land near the present junction of the upper ends of Mānoa and East Mānoa Roads. In a letter from Armstrong to the Honolulu Mission in May of 1848:

> Brother Rice has had charge of the meeting in Manoa Valley and I hope he will present an account of his labors there to the Mission. A substantial stone meeting house has been erected there under the direction of Brother Rice, intended also as a school house, and an adobe building for the same purpose at Waikiki. . . . While erecting the houses we feared they would prove too large, but during the present year they have been filled with attentive worshippers on Sabbath afternoons and, frequently, during the week. (Gulick 1918:235)

This building was destroyed in 1876 by a severe storm, but a wooden structure with some stone work was quickly rebuilt to replace the chapel. In 1914, the lot was granted to Kawaiaha‘o Church, which managed it as an *‘āpana*, or branch church. In the 1930s, a third church was built to replace the termite-eaten second church. This church, called Luakini Hou O Mānoa (The New Church of Mānoa) was dedicated in 1935. This building was a wooden structure over a lava rock foundation. The stones for this foundation may have come from Hipawai Heiau, which may have been destroyed around 1819 when Queen Ka‘ahumanu broke the old *kapu*. As membership began to fail, the remaining congregation began to meet at a center on Mānoa Road instead. The old chapel was used as a baby clinic, a community center, and then as a theater. The theater proved popular, so the old building was razed and the Mānoa Valley Theater was completed in 1987. The church also has a small cemetery; the earliest grave can be dated to 1903 (Williams 1980:1).

4.5.2 Punahou School (Originally O‘ahu College)

As previously noted, the Punahou lands once belonged to the High Chief Boki and his wife Liliha. They were given to Hiram Bingham in 1849 until Chief Boki’s return. When Boki did not return, Bingham retained possession. He built a small adobe and thatch house on the property as early as 1831, where he worked on a Hawaiian translation of the bible. It was near this time that

many walls were built on the property, to keep out roaming cattle, and two large stones were placed along what is now known as Punahou Street. One of these stones is still at the main gate of the school. In 1837, the idea of a school to educate the children of the missionaries was proposed in a letter (Foster 1991:17-21). The original building for the school was built in 1841 (Figure 32), and the first fifteen students began to study in the structure in 1842.

4.5.3 Sacred Heart Church at Punahou

In 1823, Kamehameha II, his wife, and entourage sailed to London. With this party was a Frenchman, named Jean Rives, a close friend of the king, and his servant, a young Hawaiian boy named Kanui. After the king and queen died in London, Rives left the party and traveled to France where he visited the Sacred Hearts Fathers in Paris. Rives left Kanui at the church and urged the fathers to send missionaries to Hawai‘i to convert the natives to Catholicism. The fathers sent three brothers in 1827, and Kanui, now known as Father Maigret, returned home in 1837.

There is some evidence that Kanui may have had a grass-thatched chapel somewhere in Mānoa Valley, but most of the converts probably traveled to the Catholic Mission on Fort Street in downtown Honolulu. Kanui died in 1842, and many of his converts may have reverted to the dominant Congregational Church. The American missionary Richard Armstrong visited the area in 1846 and noted:

> . . . in the beautiful valley of Manoa, there is an encouraging state of things. Meetings are full and interesting and some 18 papists have returned to the “old paths.” (Armstrong 1846)

In 1883, Father Clement Evrand decided to establish a permanent church in Mānoa, a wooden structure built on Wilder Avenue. In 1910, a new Gothic-styled stone church was planned on land on Wilder Avenue across from the Punahou campus. The Sacred Heart Church was completed on 1914, with stained glass windows shipped from France. In 1923, a parish hall was completed, on 1927 a parochial school was built, and in 1953 a new high school was built on Punahou School (Bouslog et al. 1994:32-33).

4.5.4 Wai‘oli Tea Room of the Salvation Army

In 1909, the Salvation Army purchased 28 acres in Mānoa on lands in Ka‘aipū once owned by Kauikeaouli, Kamehameha III. On this land the Salvation Army built a home to shelter and educate needy children. In 1922, they built the Wai‘oli (meaning “happy water”) Tea Room and a bakery, so that the girls could learn “cooking, baking, and the arts of gracious living.” “High Tea” was served at Wai‘oli and later luncheons. The tearoom rapidly became a focal point of the community. In 1929, a grass hut once occupied by the famed writer Robert Louis Stevenson during his visits to the islands (in 1889 and 1893) was moved from its original location at ‘Āinahau, the Waikīkī home of Princess Kai‘ulani and her parents, to the Wai‘oli Tea Room property (Bouslog et al. 1994:32).

Figure 32. 1866 Photograph of Punahou School, Photograph attributed to Charles Burgess (photograph from Foster 1991:32)

4.5.5 Chinese Cemetery

The society called Lin Yee Chung was organized in 1851. The purpose was to buy burial land, to conduct Chinese funeral rites, and to arrange for the return bodies to China for final burial, if requested. In 1852, a group purchased the first lot of land in Mānoa from a Hawaiian called Moehonua. In 1854, they bought Land Grant #101, but disputes with the lot boundary delayed construction of the cemetery until 1896 (Figure 33).

In 1852, a man name Lum Ching, a practioner of the astronomy/geology study called “kum yee hok”, or geomancy (the art of divination by means of lines and figures), visited Mānoa Valley. When he climbed Akāka Peak, his instruments (including an astronomy-based compass and a light-reflecting mirror), told him he was at an:

> . . . extraordinary spot. It is the pulse of the watchful dragon of the valley. People from all directions will come from across the seas and gather here to pay homage. Birds, too, will come to sing and roost. It is a haven suitable for the living as well as the dead. The Chinese people must buy this area and keep it as sacred ground. (Thom 1985:5)

Figure 33. Entrance to Line Yee Chung Chinese Cemetery in Mānoa (photograph from Bouslog et al. 1994)

4.5.6 Lyon Arboretum

In 1919, the Hawaiian Sugar Planters’ Association (HSPA) purchased the 124-acre Haukulu ‘Ili, which had once been owned by Charles Kana‘ina, father of King William Lunalilo. It was later owned by Fred Harrison, who built a country home and stable. Dr. Harold L. Lyon was the plant pathologist for the HSPA and head of the Department of Botany and Forestation for the Territory of Hawai‘i. He leased 325 adjoining acres of land from the Territory and the Bishop Estate to use as a reforestation area and as an experimental station for the growing of sugar cane varieties. The HSPA gave the 124-acre arboretum to the University of Hawai‘i in 1953 for the purpose of research, education, and public service (Bouslog et al. 1994:200-201).

Near the Lyon Arboretum, above ‘Aihualama Stream, is a cul-de-sac known as “The Pen,” which became famous during the overthrow of the Queen Lili‘uokalani and the Hawaiian monarchy. In 1893, the Provisional Government was declared by several businessmen; and in 1894, they established the Republic of Hawai‘i. Revolutionists who wished to restore the monarchy soon began to stockpile weapons. One of these was Robert W. Wilcox, a former member of the government. He and his associates planned to form an army large enough to overthrow the illegal government, capture ‘Iolani Palace, and restore Lili‘uokalani to her throne.

The new government found out that the Royalists had a cache of weapons at the house of H.F. Bertelmann at Waikīkī Beach, and they sent a squad of government police to secure the weapons

and arrest the rebels. Some of the Royalists escaped to Diamond Head where they held out for several days, but finally running low on ammunition and food they retreated into Pālolo Valley, and then finally climbed through a pass into Mānoa Valley, ending at “The Pen.” Many of the rebels surrendered, and others scattered towards Pauoa Valley and on to Honolulu. Eventually all of the rebels surrendered or were rounded up.

4.6 Mō‘ili‘ili Quarry

A major feature of the lower campus is the quarry that was operated by the Honolulu Construction and Draying Company, Ltd. (HC & D; now Ameron HC & D). A quarry was established there as early as 1889 (Kobayashi 1983:169) to exploit the thick dense deposit of epheline-meililite “blue rock” basalt. HC & D leased the Bishop Estate land from W. C. Cummings starting on June 1, 1910 and enlarged operations by buying out the neighboring Mō‘ili‘ili Quarry in 1914. Although Portuguese masons worked the rock into building blocks, curbing material and tombstones, most was used for road construction base course and general aggregate. Mō‘ili‘ili residents kept track of the time by the regularity of the blasting schedule. Quarry operations ended on November 15, 1949, but the crusher continued to process rock from a Pālolo Valley quarry until 1951, when Ameron HC & D moved operations to Kapa‘a in Kailua. After extensive negotitation over price, a final order of condemnation for the approximately 95 acres of Bishop Estate land was finalized in 1953 and the University took over the area.

4.7 Early Years of the University of Hawai‘i at Mānoa

The University of Hawai‘i at Mānoa developed out of the 1862 U.S. Federal Morrill Act funding for “land grant” colleges. In 1907, “an act to establish the College of Agriculture and Mechanic Arts of the Territory of Hawai‘i” was passed by the Hawai‘i’s Territorial Legislature and was signed into law by governor George Carter on March 25th. The regents chose the present campus loxcation in lower Mānoa on June 19, 1907. Regular classes began in September 1908 with ten students and thirteen faculty members at a temporary Young Street facility near Thomas Square. In 1911, the name of the school was changed to the “College of Hawai‘i” and in the following year the college moved to the present Mānoa location.

The future campus was a relatively dry and scruffy place: “The early Mānoa campus was covered with a tangle of *kiawe* trees (algarroba), wild lantana and *panini* cactus” (Kobayashi 1983:7). It appears the first structures built were a poultry shed and a dairy barn. The indications are clear that there were many stone walls and almost certainly other archaeological sites in the core area of the future campus:

> The area that was to become the university farm (located on what is now the area east of Hawai‘i Hall) was made up of small fields, from one-tenth to one-forth of an acre, each surrounded by loose rock walls. Each area had been farmed by individual Chinese and Hawaiian tenants. All of the rock had to be removed. There was also much rock both on the ground and buried in the soil. It took ten years to clear 22 acres. The late Dr. Frederick Krauss estimated that 5,000 cubic yards of stone were removed from the stone walls alone…The rock was piled in an area just east of Hawai‘i Hall and covered almost an acre, with rock piled five feet high. The rock was sold to builders and contractors for ten cents a wagon load. (Kobayashi 1983:7)

The reference to “5,000 cubic yards” sounds like a lot of archaeological sites! The accounts cited above indicate fairly intensive agricultural use of the area just east of (the present) Hawai‘i Hall. Residential use is suggested in an account that: “ On May 15, 1911, the Regents discussed what to do about seven groups of Hawaiian squatters, including one group that tilled the land, on the College’s Puahia lot” (Kobayashi 1983:7). It appears that all seven groups were resident in the immediate vicinity of the campus but that only one group was involved in farming on campus. They were evidently evicted the same year.

An eyewitness account from Arthur L. Dean documenting conditions after June 1914 noted:

> Immediately in front of [the present] Hawaii Hall was a strip of lawn perhaps 75 feet wide. The wooden building moved up from Young Street, stained a dull brown, was the only other building on what is now the Campus. Dirt roads, which were impassable in wet weather, straggled through the grounds and disappeared among the trees and bushes in the direction of the farm. A neighboring dairyman paid a small monthly rate for the privilege of running his cows through the lands and they wandered about at all hours and places. (Kobayashi 1983:7)

Development of the campus was restricted by a lack of funding in the early years. An early donation of $1,500 for Alexander and Baldwin in 1915 allowed the college:

> To clear and grade a large area of wild campus land approximately bounded by what is now University Avenue, Campus Road [running east-west on the seaward side of Hawai‘i Hall], the Campus Center Building, and the parking lots behind Sinclair Library, converting it into the first Cooke Field…(Kobayashi 1983:7)

That the grading of this relatively small area cost $1500 1915 dollars suggests that, like the first portion of the campus to be cleared to the northeast, this area also included “much rock.” While the first conceptions of a campus plan in 1909 were for major campus buildings to define an elongated east-west esplanade extending east from Hawai‘i Hall, by 1915 the campus had started to take on a more ad-hoc style with the H-shaped Young Engineering Quadrangle starting to be developed to the southeast (four of the five structures remain, the southwestern one having been torn down for the building of the present Campus Center) (Figure 34).

The College of Hawai‘i was started with a clear focus on studies in agriculture and engineering to address local needs. In 1920, with the formal establishment of the University of Hawai‘i, the vision changed to a much broader curriculum reaching out to countries of Asia and the Pacific.

In 1922, the construction of the third permanent building on campus, Gartley Hall, began the “old quad” that was subsequently expanded by construction of George Hall in 1925 and Dean Hall in 1929. The old gymnasium was built in 1928/29 (just northwest of the present Bachman Hall) and remained until 1959 when it was razed following the construction of Klum Gym. The depression years significantly slowed development. In 1930, the Normal School (today’s “Wist

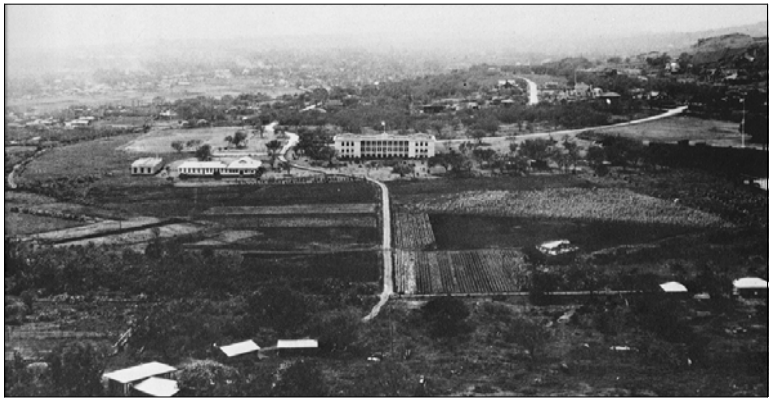

Figure 34 View of the campus in 1917 from Wa‘ahila Ridge (Adapted from Kobayashi 1983:23) showing the two permanent buildings, Hawaii Hall (1912) is at center, the beginnings of the Young Engineering quad (still 4/5 intact by the present Campus Center) is at left of the relocated wooden building moved up from Young Street

Hall”) was opened on the west side of present University Avenue. In 1931, with the merging of the Normal School with the Universty’s School of Education (forming what was then Teachers College and what is now the College of Education), this western land became part of the University campus. The 1930s were also the time of the construction of many of the campus’ most iconic structures, including Founders Gate (1933), Varney Circle Fountain (1934), Andrews Outdoor Theater (1935), George Hall (1936), Crawford Hall and Hemenway Hall (both 1938), and Miller Hall (1939) (Figures 35 through 38).

WWII brought such impacts to campus life as Hawai‘i Hall becoming the U.S. Armed Forces Institute and the construction of fourteen wooden barracks up near the present Spaulding Hall. The army took over the gym, soldiers ate at the Hemingway Hall cafeteria, and bomb shelters were built. A portion of the campus was designated as a temporary military cemetery but fortunately no graves were ever dug (Kobayashi 1983:80).

The Bachman Hall administration building, designed by Honolulu architect Vladimir Ossipoff, and built in 1949, was the first permanent post-war building. A construction boom has been on-going more or less continuously ever since. The core area of the campus was expanded in 1968, when approximately 30 acres were obtained near the Mānoa Library and Mānoa Marketplace; this land was developed in 1975 for the present Astronomy Institute at 2680 Woodlawn Drive.

Figure 35. 1926 aerial photograph showing seaward end of present University Avenue ending at Metcalf St. (extreme left), George Hall (1925) inland of Gartley Hall (1922; center), with Hawai‘i Hall (1912) at right and the Cooke Field Track (vicinity of present Sinclair Library) in the fore. The future Bachman Hall area is still in farm plots.

Figure 36. 1929 aerial photograph showing the western half of the present campus still in fields but University Avenue has now been extended seaward (extreme left, middle) and there has been significant clearing seaward of the Cooke Field track associated with construction of the original Gym (1928) just NW of the present Bachman Hall.

Figure 37. 1939 aerial photograph showing the campus dominated by the old quad (lower right) of Hawai‘i (1912), Gartley (1922) George (1925) and Dean (1929) and the new Crawford Hall (1938). The brand new Hemenway Hall (1939) is just seaward and old Gilmore Hall (1935-1973) with its two wings anchors the east end of campus at left

Figure 38. In this 1949 aerial photograph the campus is dominated by the central Hemenway Hall (1938), the old Gym and the on-going construction for Bachman Hall are near University and Dole streets, the University Farms still dominate the eastern campus

Section 5 Archaeological Research

5.1 Overview

In general, the vast majority of archaeological sites once located in the Mānoa Valley have been destroyed by modern development, including the construction of the university campus in the lower valley and residential / commercial centers elsewhere. The campus is located in what would have been the prime wet taro-growing area of the entire valley, and many *lo‘i* (stone terraces) and *‘auwai* (irrigation ditches) were located here; this agricultural heartland of the valley (i.e., the present-day campus) also would have been home to many small stone enclosures, terraces and platforms used by *maka‘āinana* (commoners) as house sites. The valley also was home to numerous *heiau*, some of which have been preserved into modern times, and burials (see below).

5.2 Heiau of Mānoa

The first recording of information regarding archaeological sites of Mānoa was by Thomas G. Thrum in his informal study of Hawaiian *heiau*. It was presented in a number of short articles in his *Hawaiian Annual* between 1892 and 1909. Thrum (1907a, b) briefly described five *heiau* in Mānoa. In the early 1930s, McAllister (1933) reprinted this information in his *Archaeology of O‘ahu*. McAllister could relocate only one of these *heiau*, Kūkaō‘ō Heiau, which he mapped and described in more detail.

Emma Nakuina (1907:24) also describes a *heiau*, named Kauala‘a, and a sub-*heiau*, named Kauwalomalie, on the site of the Mid-Pacific Institute near Wailele Spring (possibly in the *‘ili* of Kauwala‘a). These *heiau* were not listed by Thrum in his report on O‘ahu *heiau*, but may be mentioned in a different article by Thrum (1892:112), which lists forts built by the high *ali‘i* Kuali‘i, who built “a system of heiaus, extending from Mauoki, Puahia-luna and lalo, Kumuohia, Kaualaa, Wailele, and one or two other points between Kaualaa and Kukao‘o.”

The possible locations of these six *heiau*, and place names associated with them mentioned in their descriptions, are shown in Figure 39. This figure is a modern O‘ahu street map, with an overlay of the outline of the 1822 E.D. Baldwin map of Manoa Valley (see Figure 8). The overlay was created by lining up several major peaks (Round Top, Makani, and Wa‘ahila) plotted on both maps; however, since this is a comparison of one map created in the nineteenth century and a more exact map created in the twentieth century, the correlation between the two maps may not be exact.

5.2.1 Kūkaō‘ō Heiau

According to legend, six *heiau* on the island of O‘ahu were built by the *menehune*, but only one, Kūkaō‘ō Heiau, was built for their own use (Luomala 1951:20). The *menehune* were said to have built a fort and a temple at Kūkaō‘ō, a place above (inland of) the hill called Pu‘u Pueo (Westervelt 1963a:131). They were driven away from their fort by the high chief Kuali‘i during his reign (sometime in the 1700s). Kuali‘i rebuilt it after his seizure of the fort.

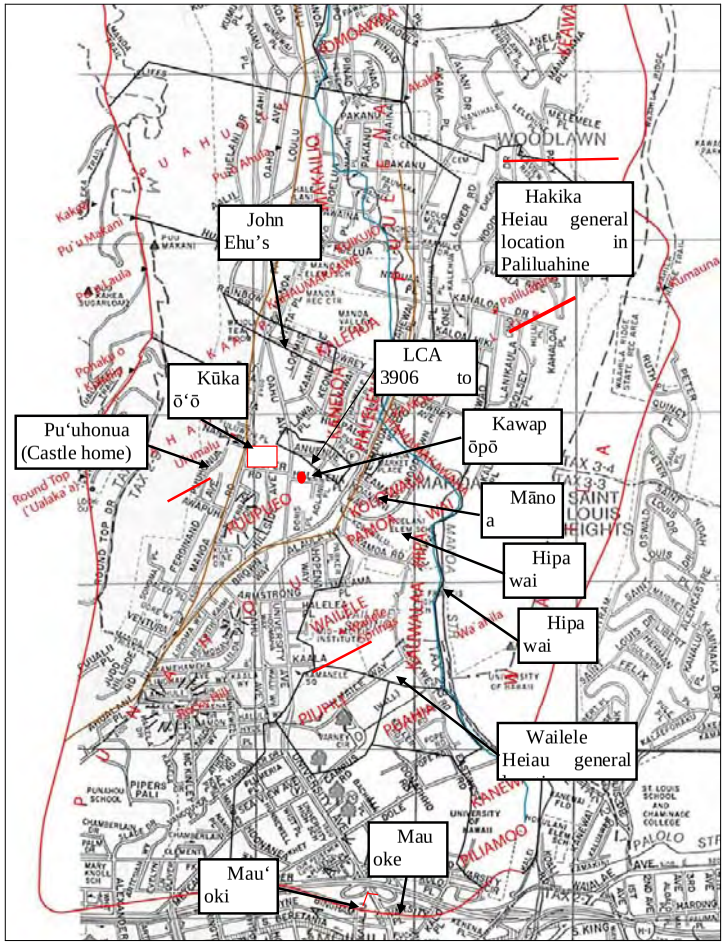

Figure 39. Overlay of 1822 E.D. Baldwin map of Mānoa Valley on modern street map, showing possible *heiau* locations

In 1892, Thrum described this still-standing *heiau* of Kūkaō‘ō on the hill called ‘Ulumalu:

> A few hundred feet from the house, on a vast rock pile, still stands a walled enclosure known as the heiau of Kukaoo, now overgrown with lantana and night blooming cereus. This old heathen temple dates back many hundred years. Its erection is credited to the Menehune’s—or class of pigmies—but was rebuilt during the reign of Kualii [circa A.D. 1700s], who wrested it from them after a hard fought battle. The Menehune‘s fort was on the rock hill, Ulumalu, on the opposite side of the road, just above Kukaoo. Previous to the battle, they had control of all upper Manoa. (Thrum 1892:112)

McAllister located Kūkaō‘ō Heiau during his inventory of O‘ahu in the early 1930s. He described it as a “small heiau 50 by 40 feet,” built on a natural elevation about 30 feet high. “There remain[s] a small inclosure and two terraces to the west” (McAllister 1933:79). He located the *heiau* on the premises of the residence of C. M. Cooke, Jr.

This *heiau*, which is still standing and located at 2859 Mānoa Road, has been recorded during several subsequent archaeological surveys (Kennedy 1991; Cleghorn and Anderson 1992; Tomonari-Tuggle 1998). Various portions of the *heiau* have been recorded in TMK 1-2-019: 035, 036, and 043, in a large area between Mānoa and O‘ahu Roads and *mauka* of Cooper Road. In addition, a burial has also been recorded from 2859 Mānoa Road (Jourdane 1994).

Although there is no confusion over the present-day location of the *heiau*, there is some disagreement regarding the number of structures, the name of the surrounding area, and the name of the hill on which the *heiau* and/or fort was built. In Thrum’s 1892 account of Mānoa Valley, he described Mānoa Road as if he was traveling from the *makai* boundary to the upper valley. He states that Kūkaō‘ō Heiau was built on a rock pile, and the *menehune* fort was built “on the opposite side of the road on the rock hill, Ulumalu, just above Kukaoo.” This suggests there were actually two structures on ‘Ulumalu hill: a *heiau* on the east side of Mānoa Road and a *menehune* fort on the west side of Mānoa Road.

In the legend of Pueo Ali‘i, the king of the owls, Westervelt states that Pueo Ali‘i “was thought to be a chief leading his army along the hillside below Pu‘uhonua Temple.” In a footnote on the same page of his book, he states “This place is now the site of the Castle home” (Westervelt 1963a:131). William and George Castle built a large mansion in Mānoa in 1898 for their ailing mother Mary Tenney Castle, the widow of Samuel Northup Castle, one of the group of the eighth missionary party to Hawai‘i. They called the house Pu‘uhonua, which means “place of refuge.” It was built in a land area called Kaulumalu (Ka ‘Ulumalu) on a hill called ‘Ulumalu, at the place that would later be the end of Ferdinand Street. George Castle remembered that near the house was a “sacrificial stone and some ruins of the *heiau* to Kū‘ula and above on the hillside the Pōhaku Kū‘ula, a rock on which the watchman stood to command a view of the entire valley from mountain to sea” (Bouslog et al. 1994:88).

A hill labeled “Ulumalu” was plotted on the 1882 Baldwin map of Mānoa Valley on the west side of Mānoa Road. This map also shows that the hill was part of Grant 4166 to Mrs. Mary Castle. A *pōhaku* called Pōhaku o Kūkalia is also plotted on the 1882 Baldwin map of Mānoa Valley (see Figure 8) just *mauka* (northwest) of the hill labeled ‘Ulumalu. This may be the “sacrificial stone” that George Castle called Pōhaku Kū‘ula. The question remains if there was a fort also on ‘Ulumalu hill, or if the *heiau* ruins Castle is referring to is actually Kūkaō‘ō Heiau, on the east side of Mānoa Road. As mentioned previously, Westervelt refers to a structure called

Pu‘uhonua Temple at the Castle residence. However, the presence of such a “temple” at the Castle residence would be inconsistent with George Castle’s reminiscences, since he refers to a sacrificial *heiau* dedicated to the war god Kū, not a *heiau* dedicated to “refuge.”

Joseph Kennedy (1991) concluded that there was only one structure, that acted as both a *heiau* and fort, and that it was located on the east side of Mānoa Road (location of Kūkaō‘ō Heiau). He believed that the surrounding area was called Kūkaō‘ō and the hill that the *heiau* was built on was called ‘Ulumalu (east side of Mānoa Road). The resolution to at least some of this confusion may have been addressed in a 1982 article on the Castle home. In this article, the author states that the location for the house was chosen in 1898 on the western side of the valley.

> This is the *alii* (or noble’s) side of Manoa, rich in legend and folklore, known to Hawaiians as Kaulumalu (Breadfruit shade). . . . One of the Castle sons, George (1851-1932) recalled “there being a beautiful grove of breadfruit and ohia trees where native birds congregated in great numbers.” The man who planted the grove was very old and I was a boy. Sand [volcanic cinders] came down . . . and choked the trees. . . .
>
> Another son, William (1849-1935), gave the name Puuhonua to the property. *Pu‘u*—hill or protuberance, and *honua*—of earth, but also meaning a place set apart for refuge and safety. . . .
>
> The 8.16 acres had been purchased at auction on May 12, 1898, for $6,250. A government survey station on the site had already been given a name from the past, *Ulumalu*. (Robb and Vicars 1992:173-174)

These passages suggest that the specific association of the place name ‘Ulumalu with the hill on which the Castle home (west of Mānoa Road) was built may only date from the late nineteenth century; therefore, a hill on the east side of Mānoa road may well be the original (older) Pu‘u ‘Ulumalu. It seems to have been a mistake for Westervelt to call the Castle home “Pu‘uhonua Temple” or to associate it with Kūkaō‘ō Heiau, which was a sacrificial *heiau* dedicated to the war god Kū, and not a “place of refuge.” The name Pu‘uhonua was probably given to the house to represent that the place was a refuge for the Castle family (Stokes 1941:2). McAllister (1933:79) also showed some skepticism to the Westervelt reference for Pu‘uhonua Temple stating, “I doubt that this was a heiau.”

The *heiau* is also mentioned in Land Commission records as “LCA 3906 to K. Neki, *Heiau* of Kūkaō‘ō, fence; house in” (see Table 1). On the 1882 Baldwin map, there is a property labeled “Gr. 638 Haalilio, see LCA 3906 W Neki.” Land Commission documents reveal the following information regarding this award:

> No. 3906, Neki, Honolulu, January 17, 1848
>
> N.R. 187-188v4
>
> To the Land Commissioners, Greetings and thanks: I, Neki hereby state my claims /at/ the land fence, mauka in Manoa, at the heiau of Kukaoo on the side below the heiau.
>
> These two fences of which I tell you were from my makuas - they expended a great deal of revenue in making these fences, and I also did, and they are mine at this time - no one else has a right to them. That is my explanation to you.

> I am, with thanks.
>
> NEKI
>
> To the Land Commissioners - House lot, also. Greetings to you and thanks: I, Neki, hereby state my claim for a house lot which is mauka in Manoa in the Land of Kaloiiki. I have two house lots at this time. That is my explanation to you.
>
> Aloha,
>
> NEKI
>
> N.T. 378v10
>
> No. 3906, Neki (from page 306), 1 September 1854
>
> Maki, sworn, I have seen his claim in Kaloiiki in Manoa of two lots with enclosures and in one piece.
>
> Mauka, Mahune’s land
> Waialae, Kaahaloa, Kalanikahua’s land
> Makai, T. Tute’s land
> Ewa, Mr. Marshall’s land.
>
> This land was given to Neki by J. Haalilio when Kaahumanu was yet alive before 1832. No objections.
>
> Kahanaumaikai, sworn, I have seen this place since 1842 to the present time. I have done farming under Neki and that place is for Neki. Mahi's statements above are true.
>
> Kana, sworn, I have known in the same way as they have stated since 1845 to the present time.
>
> [Award 3906; R.P. 6502; Kolowalu Manoa Kona; 1 ap.; 7.25 Acs]

On the overlay map (see Figure 39), this LCA seems to be in the general location over Anuenue Street rather than between Mānoa and O‘ahu Roads (where Kūkaō‘ō Heiau is standing). From the description, Neki says that his lot is “on the side below the heiau,” so it is possible that the *heiau* was not in this actual lot; rather the lot was *makai* of the *heiau*.

5.2.2 Kawapōpō Heiau

> Upper Manoa, on premises formerly of Haalilio; a small *heiau* said to have been torn down prior to 1850 (Thrum 1907a:45].

McAllister (1933:80) could not relocate this *heiau*.

In 1975, Margaret Luscomb (1975) conducted an inspection of the Maretzki property on 2626 Anuenue Street. This property was a portion of Grant 638 to Hana Haalilio and K. Neki (LCA 3906), Royal Patent 6502, signed by Lunalilo. The Native Testimony for this award was presented above in the discussion of Kūkaō‘ō Heiau. Luscomb recorded a raised platform, 7 by

6.5 m on the property. Since this structure was on Ha‘alilio’s land, Luscomb concluded that this platform might be Kawapōpō Heiau. In the description of his land, Neki says it was below Kūkaō‘ō Heiau; there is no mention of the name Kawapōpō or of a second *heiau*.

One problem with assigning this structure as Kawapōpō Heiau is that Ha‘alilio was granted other lands in Mānoa, before the *Māhele*, and the location given by Thrum may refer to these other lands. Thrum described the location of some of these lands as *mauka* of John Ehu’s homestead:

> The site of the various houses that once sheltered Haalilio and his retinue is pointed out just above the old Ehu homestead, known later as the ‘Charley Long’ premises and, till very recently, part and parcel of Montana’s Kaipu Diary. Rev. H. Bingham, of early Hawaiian Mission fame, is also referred to by old timers as having had a residence adjoining the Haalilio premises, though his history makes no mention thereof. (Thrum 1892:114)

On the 1882 Baldwin map, two properties (Grants 15 and 54) are shown in the *‘ili* of Ka‘aipu awarded to John Ehu (see Figure 39). If Thrum is referring to land owned by Ha‘alilio that is above John Ehu’s homestead, Kawapōpō Heiau may have been located much farther *mauka* of the structure recorded by Luscomb in LCA 3906 to Neki. This would suggest that the structure recorded by Luscomb may be part of Kūkaō‘ō Heiau instead. Because of Thrum’s imprecise location and the fact that McAllister could not relocate Kawapōpō Heiau, it is impossible at this time to determine whether Luscomb correctly identified the structure on the Metzinger property as Kawapōpō Heiau.

5.2.3 Hakika Heiau

> Paliluahine, east side of valley.-A round heiau of not large size. Foundations now barely traceable. (Thrum 1907a:45)

McAllister (1933:80) could not relocate this *heiau*, but according to Thrum’s description, it was on the east side of the valley, in the area called Paliluahine (near the modern-day suburb of Woodlawn). On the 1882 Baldwin map (see Figure 39), there is a peak labeled Paliluahine; therefore, the *heiau* was probably in this general location, but the specific location is not known.

5.2.4 Hipawai Heiau

Thrum described Hipawai Heiau as:

> Makai of Church, Manoa.-Of large size and pookanaka class, partly destroyed many years ago, then used as a place of burial. Remaining walls subsequently torn down. (Thrum 1907a: 45)

This *heiau* was possibly described in 1823 by Levi Chamberlain, when he and other missionaries came to inspect a lot of three acres given to them by the Hawaiian government. The official report of the Sandwich Island Mission described the structure as:

> On one side of this secluded valley they visited an old *heiau* or place of worship of Kamehameha‘s time, consisting now simply of a stone wall enclosing a small area about 20 feet square. (cited in Bouslog et al. 1994:12)

In his own journal for June 6th, 1823, Levi Chamberlain described in more detail “the ruins of a moreai [heiau]” as:

> It was a regular wall built of loose stones about twenty four feet square from three to four feet high on the inside & from two and an [sic] half to three feet in thickness. On the north the outer side of the wall was much higher owing to a declivity at the foot of which were a few *kou* trees. The tall grass within and around was evidence that it is a long time since it had been frequented for the purpose of superstitious ceremonies. It is probably fifty years since it was erected. (cited in Bouslog et al. 1994:11-12)

The Mānoa Church was built in 1846 as an *‘āpana* (branch) of the Kawaihao‘o Church. A newspaper article says that Hipawai Heiau was torn down in 1819 and some of the stones were used to build the rock foundation of the Mānoa Congregational Church, a building that replaced the Mānoa Church in 1935. Some stones may also have been used in the Mānoa Hawaiian Cemetery. A new church was built in 1968 on nearby Huapala Street, and the old building, on 2833 E. Mānoa Road, was used to house the Mānoa Valley Theater (Williams 1980:1).

Hipawai is also the name of a cave.

> There is a large underground cavern with much of the water of Manoa passing through it under the area of Woodlawn Drive where the new (1975) astronomy building of the University is. People went down into the cavern in former times. (Mary Pūku‘i, cited in Sterling and Summers 1978:287)

The former location of the 1846 Mānoa Church is plotted on the 1882 Baldwin map (see Figure 39). The present day location of the astronomy building of the University of Hawai‘i, and thus the possible location of Hipawai Cave, is shown on the base map of the same figure.

Hipawai Heiau was reported as *makai* of Mānoa Church. In 1968, Francis Ching recorded a rock mound, two to three feet high, 30-40 feet long, and 18 feet wide, with some remaining facing on the *makai* side. A platform was also present on the *makai* side. This *heiau* was located on the Magoon property on land donated to the University of Hawai‘i. Ching identified this structure as a possible *heiau*, but did not suggest a name for the structure. Ching also stated “I was also told that there was another site similar to the one discovered a little further makai” (Ching 1968:1).

In 1988, a field check was conducted at the St. Francis High School campus (TMK 1-2-9-04:01), which is *makai* and adjacent to the northeastern corner of the campus (Kawachi 1988a). Carol Kawachi recorded several walls and terraces in this area, but the place was heavily vegetated. An inventory of the features was not made, and no map was drawn. Kawachi also reported on a 1908-1909 military map that showed a *heiau* in the general area. She then suggested that this *heiau* could be the same as the one recorded by Ching on the Magoon property, but since Ching did not give the TMK of the parcel he investigated, it was difficult to determine the exact location of this structure. According to a Land Court Map of 1926, Magoon once owned property in several locations, including upstream of the St. Francis campus.

The exact 1908-1909 military map referred to by Kawachi could not be determined, but a 1908-1913 Corps of Engineers map (Figure 40) does show an L-shaped structure *mauka* and upstream of the St. Francis campus. This map was made before the construction of the high school, which was founded in 1924 by the Franciscan Sisters of the Third Order. Although this

structure is not labeled as a *heiau*, it may be the structure recorded by Ching, and may be Hipawai Heiau. A further confirmation of this attribution can be found on the 1822 Baldwin map (see Figure 39); the area where this L-shaped structure would be on this map (*mauka* of St. Francis High School) is in the *‘ili* named Hipawai (literally, water foolishness). In fact, the street just *mauka* of the high school is called Hipawai Place, which was “named for an O‘ahu land section” (Budnick 1989:43).

5.2.5 Mau‘oki Heiau (Kamō‘ili‘ili Heiau)

Mau‘oki was a *heiau* of the *po‘okanaka* type (large *heiau* for the paramount chief of the district or island), as discussed by Samuel Kamakau:

> There were many heiaus and *luakini* heiaus in Honolulu in the ancient days. . . . Of *heiau po‘okanaka* there were Pakaka and Kaheiki in Honolulu, and Mau‘oki, Kupalaha and Le‘ahi [Papa‘ena‘ena] at Waikiki. Mau‘oki was a *luakini heiau* built by the Menehune, a numerous race of men often spoken of in the traditions of *ka po‘e kahiko*. Kahanoniualewa [Kahano-a-Newa] is said to have brought them here; his arms were the bridge. Mau‘oki was made of stone from Kawiwi in Wai‘anae, and there were so many Menehene that each brought one stone, and Mau‘oki was completed. *Ka po‘e kahiko* called these people Menehene; it is said the came from the east. (Kamakau, *Ka Nūpepa Kū‘oko‘a* March 3, 1870; translation in Kamakau 1991c:144)

The association of the *heiau* with the high chiefs in O‘ahu is illustrated in the story of the birth of Kiha-a Pi‘ilani. Lā‘ie-lohehoe was an *ali‘i* born at Helumoa and raised at Kaluaokau in Waikīkī. She was betrothed to Pi‘ilani, the son of the *mō‘ī* (island-wide chief) of Maui and moved to his Pi‘ilani’s father’s residence at Lāhainā in Maui for her wedding. They had four children; for the birth of her fourth child, a son, she returned to O‘ahu. Samuel Kamakau reported that Kiha-a-Pi‘ilani, the son of Lā‘ie-lohehoe and Pi‘ilani of Maui, was taken to Mau‘oki Heiau after his birth at ‘Āpuakēhau in Waikīkī.

> No Kihapiilani. Ua laweia oai e ke kahuna e hanai i ka moku. O Mauoki hoi ka heiau i ku i ka moku ma ka olelo a ke kahuna. Ua hanai ia oia a nui, a ua ao ia i ke koa me na oihana, kakaolelo, me ke akamai hoi i ka oihana hana. (Kamakau, Ka Nūpepa Kū‘oko‘a, August 26, 1865)

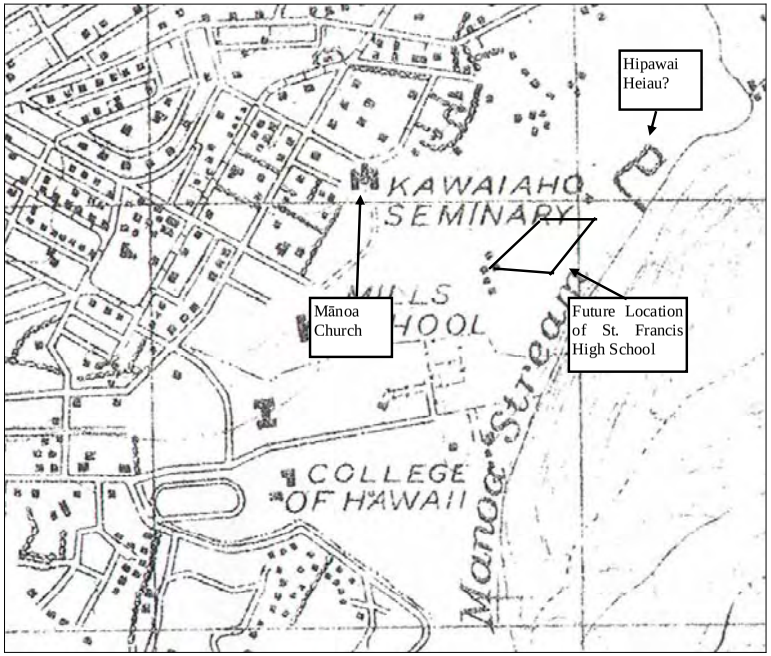

Figure 40. 1908-1913 Corps of Engineers Fire Control map, showing L-shaped structure, possibly Hipawai Heiau, on land later *mauka* of the St. Francis High School Campus

> Kiha-a-Pi‘ilani was taken by the *kahuna* and raised at the *heiau* of Mau‘oki at Kamō‘ili‘ili [Mō‘ili‘ili]. He was raised there until he was grown and taught to be a warrior and an orator; he was skilled in those professions. (Kamakau 1991c: 50)

The *heiau* was described by Thrum (1907a:44) as:

> It is said to have been of traditional Menehune construction with stones brought one by one from Kawiwi, Waianae. It was a heiau of good size, walled on three sides and open to the west that stood at the foot of the slope dividing the Manoa and Palolo valleys, Kamoiliili.

Thrum also referred to this *heiau* as the Kamō‘ili‘ili Heiau.

> Kamoiliili. Heiau and luakini [sacrificial heiau]; erected according to tradition by Menehunes with stones from Kawiwi Waianae. Torn down about 1883 by the Minister of Interior for street work. (Thrum 1907a:44)

According to Thrum, the *heiau* was in Mō‘ili‘ili, at the border of the *ahupua’a* of Mānoa and Pālolo. According to C. S. Stewart (Sterling and Summers 1978:279), Mau‘oki Heiau was located possibly at the junction of Wai‘alae Avenue and Third Street, which would place the *heiau* just south of Chaminade University in the *ahupua‘a* of Pālolo. McAllister also located the *heiau* (Site 62) in Pālolo Ahupua‘a, just *mauka* of Site 61, the Mō‘ili‘ili petroglyphs.

Dr. Richard Bordner, who was familiar with the Chaminade University area, said he believed a large agricultural *heiau* was once just north of an area of petroglyphs along Pālolo Stream. This *heiau* was on a relatively flat area on the west edge of Pālolo Stream near where there is presently a 22-caliber rifle range. Dr. Bordner’s account of the relationship of these petroglyphs and a *heiau* are consistent with McAllister’s (1933:57) description of Mau‘oki Heiau (McAllister’s Site 62), which was just *mauka* or north of the Mō‘ili‘ili petroglyphs (McAllister’s Site 61). According to Dr. Bordner, until relatively recently, there were still some large boulders in the immediate vicinity that may be remnants of this *heiau* (Hammatt et al. 2002b: 23). A search for this *heiau* was made during the recent Ala Wai Watershed survey, but no *heiau* or cluster of boulders was found. In a recent conversation with Dr. Bordner, he stated that he believed that the remains of the *heiau*, and the petroglyphs, have been destroyed.

All of these reports have placed Mau‘oki Heiau within the current boundaries of Pālolo Ahupua‘a, near Chaminade University. McAllister (1933) located the *heiau* just north of the petroglyphs, which seem to be definitely near Pālolo Stream; however, McAllister never personally saw the *heiau*, since it had been destroyed in 1883.

On an 1883 survey map (Figure 41) by S. E. Bishop (traced by E. Kealoha in 1958), a structure labeled “heiau” is shown near a feature labeled “Mauoke Spring,” both of which are *mauka* of “Moiliili Road” and King Street (along the present day alignment of Wai‘alae Avenue) in the *‘ili* of Pa‘akea. In a comparison of this map with the 1882 S.E. Bishop map of Mānoa Valley (see Figure 8), this location is south of the *‘ili* of Pilipili and west of the *‘ili* of Kānewai (the present day athletic field for the University of Hawai‘i at Mānoa). If the pictured *heiau* is Mau‘oki Heiau (as suggested by its proximity to “Mauoke Spring”), then Mau‘oki Heiau was actually once located much farther west than Chaminade University, near the *makai* border of Mānoa Ahupua‘a (south of the University of Hawai‘i) rather than near the *makai* border of Pālolo Ahupua‘a (south of Chaminade University).

This location seems to be near the Mō‘ili‘ili Quarry, but the correlation of the 1882 map and the modern map is probably not exact. This also means that the agricultural *heiau* noted by Dr. Bordner near the Mō‘ili‘ili petroglyphs may be a different *heiau* than the *luakini* (sacrificial) *heiau* of Mau‘oki. It is also possible that Mauoke spring was another name for Kumulae Spring, an ancient legendary pool that is associated with the extensive karst caves of Mō‘ili‘ili.

5.3 Early Archaeological Surveys of Mānoa Valley

In J. Gilbert McAllister’s island wide archaeological survey (1933), he recorded five sites in the vicinity of Mānoa including Site 61 petroglyphs, Mō‘ili‘ili, Site 62 Mau‘oki Heiau, Site 63 Hipawai Heiau, Site 64 Kūkaō‘ō Heiau, and Site 65, which seems to refer to the whole valley (Figure 42).

Under McAllister’s Site 65, “Mānoa Valley,” he discusses “Pu‘uhonua Heiau,” the sweet potato fields of Pu‘u Ualaka‘a, Thrum’s sacred stone, a cave on the east side of Mānoa Valley, which Westervelt (1904:2) associates with Kamehameha the Great, and the Kawapōpō and Hakika Heiau. Little new information is presented regarding the other sites.

Until 1900, Punahou School had a small collection of Hawaiian artifacts in a glass cabinet in the Old School Hall. Some of these artifacts are shown in a circa 1900 photograph (Figure 43). In the foreground of the photograph is a carved wooden figure that may be the wooden figure found by Punahou students on Rocky Hill. Foster says this was found “on Rocky Hill” (Foster 1991:35) in one section and “in a cave on Rocky Hill, a vestige of the *heiau* that once stood in that area” (Foster 1991:128).

> Samuel Armstrong mentions exploring its caves for wooden idols and ghosts, and Thomas Gulick tells in detail how the boys, climbing the slope, once came upon a cavern between the cliffs and, by excavating, penetrated to a point where they required torches to see their way. There they discovered a little idol. It must have come from the small *heiau* that once stood on Rocky Hill. Probably it and a large wooden idol brought to Punahou from a taro patch at Waialua had both been hidden at the time the edict had gone forth to destroy all the idols [Alexander and Dodge 1941:122].

Other early site designations in Mānoa included the Bishop Museum’s designation of the former home of Queen Ka‘ahumanu, “Pukaomaomao,” in upper Mānoa as Site 405 and the designation of a complex of agricultural terraces in extreme northern Mānoa Valley (State Site #50-80-14-3953).

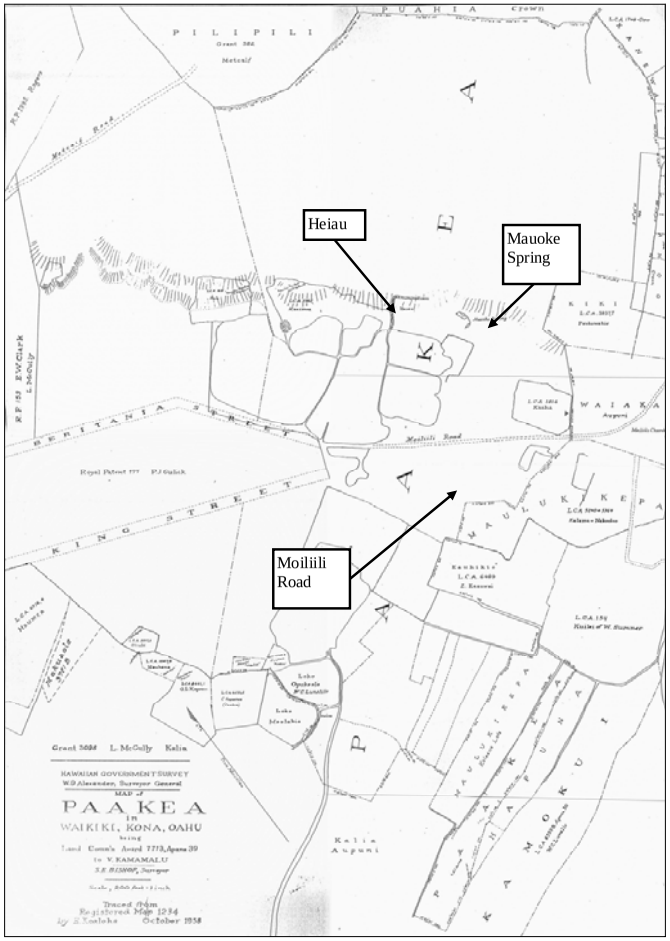

Figure 41. 1883 S.E. Bishop map of Pa‘akea, showing location of a *heiau* near Mauoke Spring

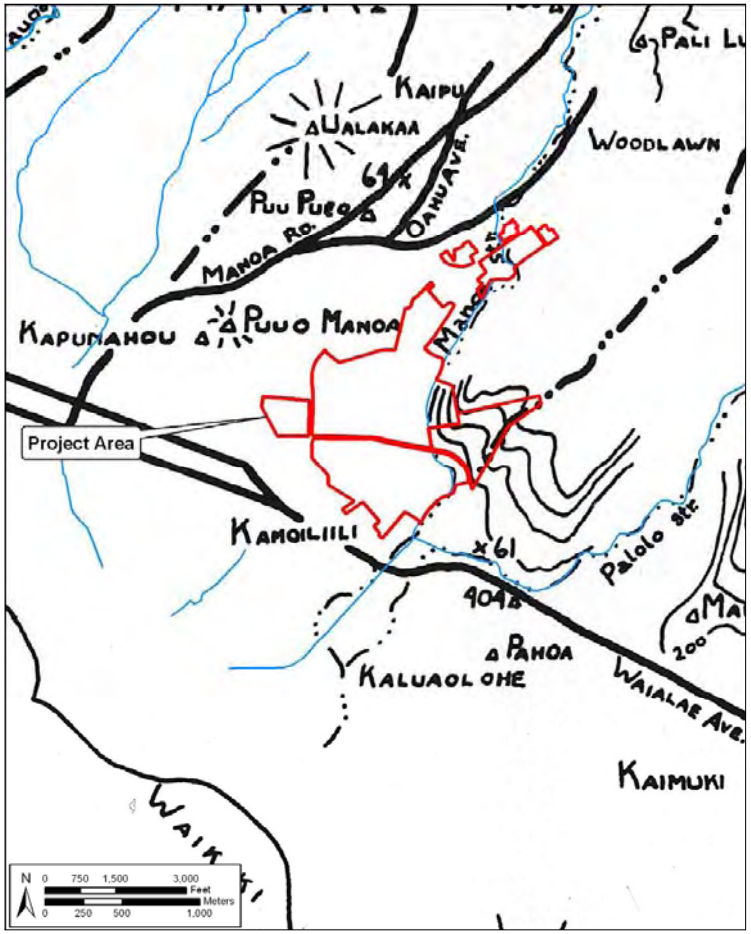

Figure 42. Project area (in red) in relationship to archaeological sites identified in Sites of O‘ahu (Sterling and Summers 1978)

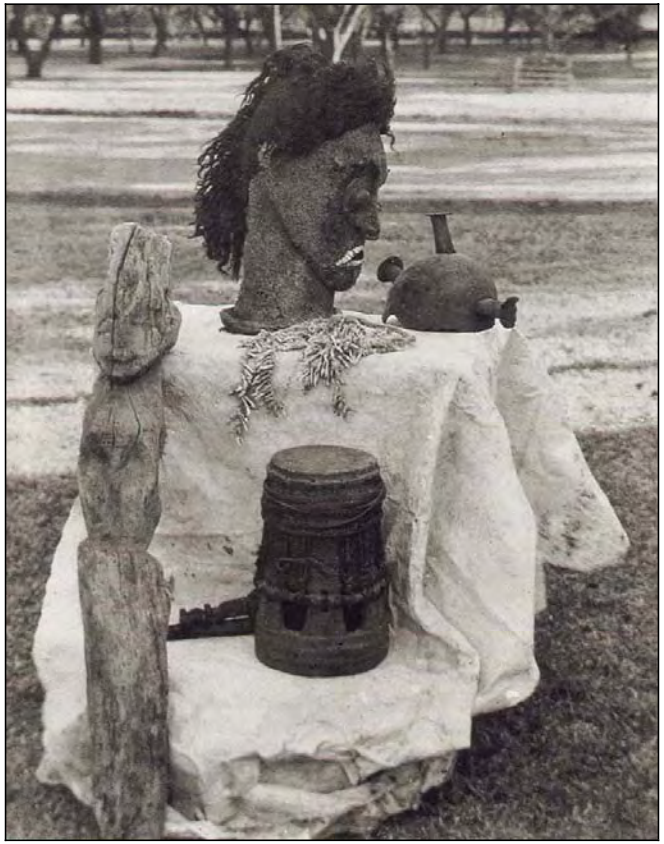

Figure 43. Circa 1900 photograph of artifacts displayed at Punahou College including the wooden idol (left foreground) possibly found in a cavern in Rocky Hill

5.4 Post 1960 Surveys of Mānoa Valley

Between 1963 and 1990 there were at least thirteen other archaeological studies in the Mānoa area, which are summarized in Table 2 and plotted in Figures 44 and 45. Of particular interest is the recovery of a total of 25 presumed prehistoric burials from six other areas (Sites 3743, 4038, 4134, 4191, 4266 and the Koana Cave Site). The oldest report of burials in the Mānoa area of which we are aware concerns the discovery of human bones in a cave site located approximately 50 m *mauka* of the Dole Street burial site (4266). This cave is almost certainly the “cave called Koana” on a 1916 Podmore map (Figure 46). A neighboring resident informed us that she had taken human skeletal remains discovered in the cave to the B.P. Bishop Museum (she thought it was in 1953), and that subsequently archaeologists from the Museum had visited the cave and indicated that they felt the site had little potential. The Bishop Museum has no record of such a visit; however, they have an accession of an adult female crania (osteological catalogue #2863) dated 7/10/1964 from St. Louis Heights, O‘ahu giving a person with the same last name (different first initial) as the source. Typically a Museum archaeologist would have investigated such a discovery. A habitation or burial function of the cave is suggested by one possible translation of *ko‘ana* – “to stay or settle in one place, as people” (Pūku‘i and Elbert 1986:157).

The five burial sites (3743, 4038, 4134, 4191 and 4266) were all interpreted as “prehistoric or early historic” (Bath and Smith 1988; Bath and Kawachi 1989; Bath and Kawachi 1990; Hammatt and Shidleler 1991; Smith and Kawachi 1989). With one exception (the Dole Street burials), there were no associated cultural materials with any of these remains, nor was there any chronological dating. The Dole Street burials were associated with three formal artifacts of traditional design and with cultural layers dated to the fifteenth century A.D. (Hammatt and Shideler 1991).

Three of the archaeological studies bear upon *heiau* at Mānoa. Luscomb (1975) may have correctly dentified the remains of Kawapōpō Heiau. Ching (1968) and Kawachi (1988a) both discuss possible identifications of a *heiau* on what appears to be two different properties located on the west side of Mānoa Stream just north of University of Hawai‘i at Mānoa. It seems highly probable that Hipawai Heiau, where human sacrifices were offered, was in the immediate vicinity of these two study areas, but whether either report indeed describes remains of this temple is not altogether clear. There appears to have been no discussion of the other two known Mānoa Heiau: Kūkaō‘ō Heiau (2859 Mānoa Rd.) and Hakika Heiau (near Paliluahine-Chinese Cemetery hill) since McAllister (1933). Other archaeological reports discuss minor agricultural sites or report no sites at all.

Archaeological data recovery was conducted at the Kāpapa Lo‘i ‘o Kānewai (a.k.a. Kānewai Cultural Garden) in association with construction of the University of Hawai‘i Center for Hawaiian Studies building (Liston and Burtchard 1996). The project area was located adjacent to the east bank of Mānoa Stream, immediately *makai* of the Dole St. bridge. The Kāpapa Lo‘i ‘o Kānewai, designated Site 50-80-14-4498, consisted of a 1.7-acre parcel including active cultivation of taro *lo‘i* and native Hawaiian plants. The area had been restored in the early 1980s by a group including community members, University students, and alumni. It was also noted by the Hawaiian Botanical Society that the garden was home to 69 varieties of taro, including 60

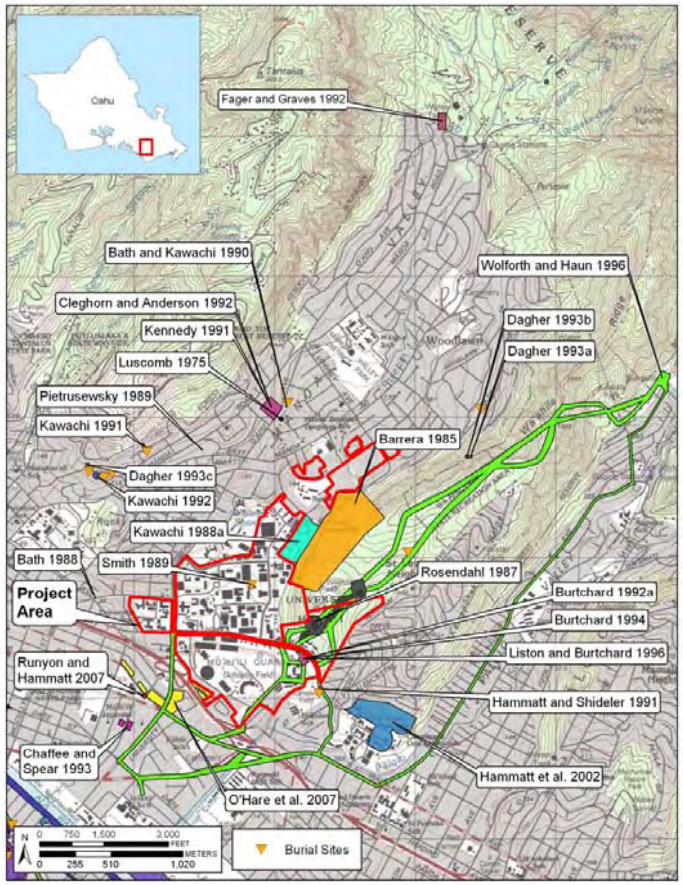

Figure 44. Previous archaeological studies in the vicinity of the project area

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

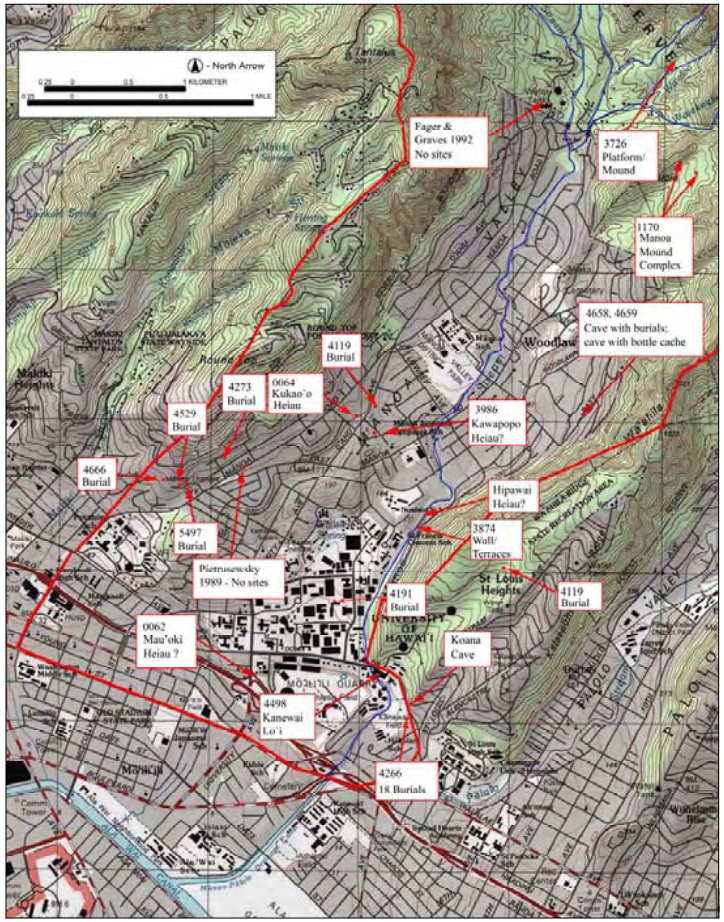

Figure 45. Previously identified archaeological sites in Mānoa Ahupua'a (project areas with no identified sites are denoted by author and year of report)

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

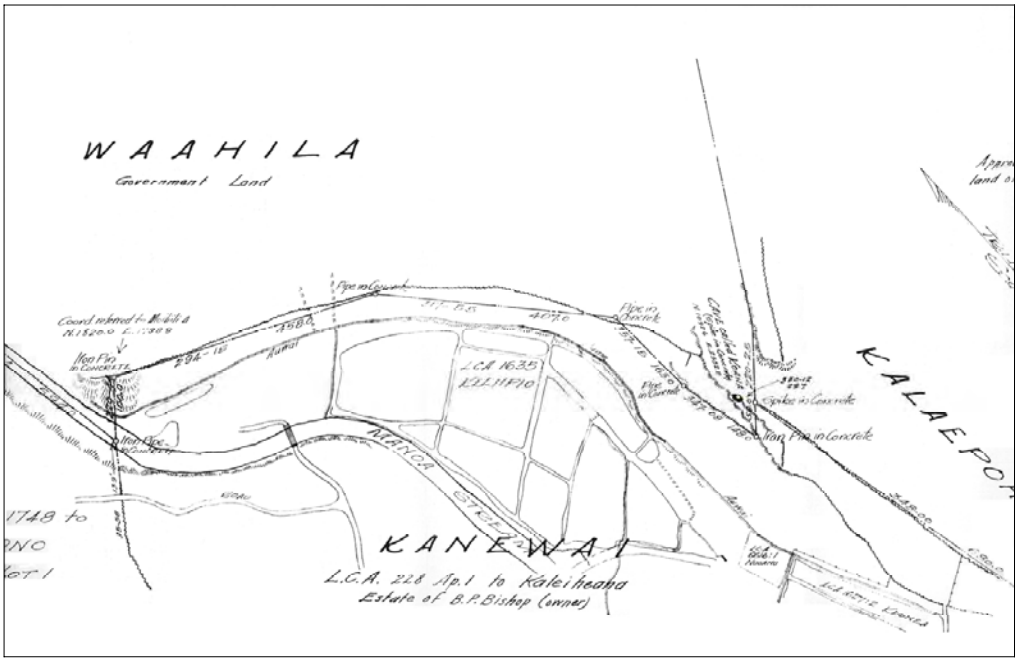

Figure 46. Podmore map (1916 or 1917) of the boundary between the *‘ili* of Wa‘ahila and Kānewai showing an *‘auwai* and a “cave called Koana”

Table 2. Previous Archaeological Investigations in Mānoa Ahupua‘a

Reference	Type of Investigation	Site 50-80-14-	Findings
Thrum 1907a, b McAllister 1933	Heiau Study Island-wide Study	0063	Briefly describes Hipawai Heiau, reportedly destroyed at the time Reprints Thrum’s description
Thrum 1907a,b McAllister 1933 Kennedy 1991a Cleghorn & Anderson 1992 Jourdane 1994a Tomonari-Tuggle 1998a	Heiau Study Island-wide Survey Arch. Investigation Inventory Survey Burial Report Historical Research	0064	Thrum briefly describes Kūkaō‘ō Heiau (rebuilt around 1700) McAllister repeats Thrum’s description and adds new information Investigation of Kūkaō‘ō Heiau Inventory Survey of Kūkaō‘ō Heiau and Preservation Plan Inadvertent discovery of human skeletal remains at 2859 Mānoa Rd Historical background pertaining to Kūkaō‘ō Heiau
McAllister 1933	Island-wide Survey	0065	Designates Mānoa Valley as Site 65.
Smith 1988a	Site Description	1170	Description of previously identified Mānoa mound complex site
Smith 1988b	Site Description, Reconnaissance	3726	Inspection of Pu‘u Pia trail alignment. Description of a new site with a platform and mound.
Bath & Smith 1988	Burial Removal	3743	Burial removal from 2034 Round Top Drive
Ching 1968 Kawachi 1988b	Reconnaissance Survey Field Check	3874	Survey of sites on the Magoon Property given to the Univ. of Hawai‘i. Site (3874) probably located near St. Francis High School grounds; possibly a pre-contact agricultural *heiau*. Field check of walls and terrace facings; St. Francis High School grounds may be location of a *heiau* shown on 1909/10 military map
Soehren 1963	Field Notes	3953	Notes in B.P.B.M. files on agricultural terraces
Thrum 1907a, b Luscomb 1975	Heiau Study Inspection Report	 3986	Kawapōpō Heiau Examination of site at 2626 ‘Ānuenue St., probably Kawapōpō Heiau
Bath et al. 1988	Burial Removal	4038	Burial removal from 2030 Wilder Ave. at Circle K convenience store.
Bath & Kawachi 1990	Burial Report	4119	Inadvertent discovery of human skeletal remains on O‘ahu Avenue
Bath et al. 1989	Burial Removal	4134	Burial removal from 2030 A Makiki St. (site 50-80-14-4134)
Smith & Kawachi 1989 Douglas 1990	Burial Report	4191	Burial Removal Near Keller Hall on the campus
Hammatt et al. 1991	Burial Report	4266	18 human skeletal remains found on Dole Street, C14 dating, perhaps a village cemetery; includes osteological analysis.

Reference	Type of Investigation	Site 50-80-14-	Findings
Kawachi & Douglas 1991	Burial Report	4273	Burial found at Lower Manoa, 2414 Sonoma St; includes osteological analysis.
Burtchard 1992a Burtchard 1992b	Data Recovery Testing	4498	Letter to Tom Dye regarding test trenches at Kapapa *lo'i* Kānewai. Letter report on trenching conducted to mitigate adverse effects of Hawaiian Studies Institute construction at Kapapa *lo'i* Kānewai.
Burtchard 1994 Lisiton & Burtchard 1995 Tomonari-Tuggle 1998b	Data Recovery Site Description, Historic Literature Historical Research, Arch. Assessment		Paleoenvironmental samples, stratigraphic profiles at Manoa stream. Prehistoric irrigation system that supported agriculture between A.D.1443-1681 at Kapapa *lo'i*, Kānewai Recommends subsurface testing or archaeological monitoring at Kānewai for the National Marine Fisheries Service Laboratory
Pietrusewsky 1992c Kawachi 1992b	Burial Report	4529	Inadvertent discovery of human remains at 1908 Judd Hillside Road
Dagher 1993a	Burial Report	4658	Inadvertent discovery of cave containing multiple burials in Manoa Valley.
Dagher 1993b	Site description	4659	Historic bottle cache found in Manoa Valley Cave
Dagher 1993c	Burial Report	4666	Discovery of human skeletal remains at 2048B Ualaka'a Street
Jourdane 1997	Burial Report	5497	Inadvertent discovery of skeletal remains at Wo/Sullivan House construction, 1908 Judd-Hillside Road. Skeletal remains are of undetermined age and ethnicity
Bishop Museum (Bowen?) 1964	Field notes		Visited Koana cave in response to discovery of human remains. No report.
Barrera 1985	Survey and Testing		No sites reported in project area within the Manoa Hillside Subdivision.
Rosendahl 1987	Reconnaissance Survey		No sites found in the Wa'ahila Reservoir Project Area; no further archaeological work necessary.
Pietrusewsky 1989	Burial Report		Cremated dog and cat remains found at 2462 Manoa Rd, no site number assigned to burial.
Fager & Graves 1992	Inventory Survey		No sites found at prospective well site project area
Grune 1992	Archaeological Synthesis		Synthesis of sites in Mānoa Valley
Dixon 1993	Reconnaissance Report		Absence of cultural remains at proposed Board of Water Supply well within Manoa Valley Park, recommended an archeological monitor be present during construction.
Speer & Chaffee 1993	Archaeological Assessment		No sites located at 2 Vancouver Drive lots; Vacant lots, some evidence of 1900s house foundations and walkways on surface.
Hammatt & Chiogioji 1998a	Archaeological Assessment		No sites found on a 2.4 Long portion of the H-1 Highway from the Punahou Street Overpass to Vineyard Blvd. Off-Ramp

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

native Hawaiian cultivars (Fenstemacher 1989). Controversy arose when construction plans would have allowed encroachment into the garden area. Final plans limited disturbance to the recently restored southeastern portion of the garden area. The data recovery work was later conducted in a portion of the *lo'i* area that would be impacted by construction. Backhoe testing revealed evidence of a prehistoric irrigation system and pondfield agriculture. Radiocarbon dating of recovered samples indicated a period of prehistoric usage (A.D. 1443-1681), abandonment, and later reconstruction in the early historic period (Liston and Burtchard 1996).

5.5 Division of Mānoa Valley

Mānoa Valley was once divided into two sections, one for the *ali'i* and their retainers and one for the commoners. The *ali'i* lived on the high, cooler western slopes; the commoners lived on the warmer eastern slopes and on the valley floor where they tended their irrigated taro fields (Bouslog et al. 1994 12). Mary Kawena Pūku'i (in Sterling and Summer 1978:283) has stated:

> In Mānoa valley a low hill at the head of the valley and Rocky hill above Punahou are said by a kinswoman of mine to have marked the division between the chiefs and the commoners in that valley. The chiefs lived on the west half, the commoners on the east. The chief's excrement was buried secretly in the commoners' ground by the keepers…The imaginary line from Puu-o Mānoa to Ka-pali luahine marks the division of Mānoa; on the left called Mānoa-alii, and on the right, Mānoa-Kanaka.

Pu'u Mānoa is best known as Rocky Hill on the Punahou Campus. It seems that Kapaliluahine - the *mauka* reference point - is the small green hill in back of the Chinese cemetery (as illustrated by Sterling and Summers 1978).

Such a cognitive division of the valley suggests that the commoners - the vast majority of the populace - would have been buried on the east side of the valley. It also seems probable that the remains of the aristocracy would be buried on the east side as well, in as much as both corpses and excrement would have shared certain cultural values of dangerousness and defilement. It may well be that the division of the valley into Mānoa – Ali'i and Mānoa-Kanaka was drawn because the west side of the valley was generally higher and less swampy than the east side. It may have been drawn with regards to the experience of sunlight. The Mānoa Ali'i of the valley would have the experience of the rising morning sun which was associated with values of ascendancy, tumescence, vigor and fertility, while the decline of the sun which illuminates the Mānoa-Kanaka side would have been associated with values of decay, senescence, and death.

The four known sites of prehistoric burials in Mānoa proper (Bath and Smith 1988; Smith and Kawachi 1989; the Koana Cave site; and the Dole Street site) all fall in Mānoa-Kanaka, as defined by Pūku'i.

Perhaps significantly two prehistoric burials have been reported just to the west of Mānoa Valley (Bath and Smith 1988; Bath 1989), standing in relation to Makiki Valley much as the Kānewai burials relate to Mānoa Valley. This suggests a possible pattern of prehistoric burial practices that may have been widespread - interring the dead near the east border of south facing valley mouths.

TMKs [1] 2-8-015:001; 2-8-023:003; 2-9-004:005; 2-9-023:001 & 026; 2-8-029:001; 2-9-026:001 & 037; 2-9-027:054; 3-3-056:001 & 004

Section 6 Community Consultation

Throughout the course of this CIA, an effort was made to contact and consult with Hawaiian cultural organizations, government agencies, and individuals who might have knowledge of and/or concerns about traditional cultural practices specifically related to the project area. This effort was made by letter, e-mail, telephone and in person. In most cases, letters and emails were sent along with a map and aerial photograph of the project area with the following text:

> At the request of Group 70 Inc., Cultural Surveys Hawai‘i Inc. (CSH) is conducting a cultural impact assessment (CIA) for the 2007 update to the Long Range Development Plan (LRDP) for the University of Hawai‘i, Mānoa Campus. The proposed project area occupies 304 acres of land in lower Mānoa Valley, bounded by the Mānoa, St. Louis Heights, Mō‘ili‘ili and McCully communities and is identified as Tax Map Key: (1) 2-8-15,23,24,29;various.
>
> Group 70 Inc. proposes that the purpose for the updated LRDP is to reflect current and upcoming educational priorities. Future buildings and projects that are on the Capital Improvements Program and/or are anticipated for development within the next 5-10 years are projected into the Plan. Please see attached USGS maps and aerial views of the project area.
>
> The purpose of this cultural study is to assess potential impacts to cultural practices as a result of the University of Hawai‘i’s proposed development within the Mānoa area. We are seeking your *kōkua* and guidance regarding the following aspects of our study:

- **General history and present and past land use of the project area.**
- **Knowledge of cultural sites which may be impacted by future development of the project area - for example, historic sites, archaeological sites, and burials.**
- **Knowledge of traditional gathering practices in the project area, both past and ongoing.**
- **Cultural associations of the project area, such as legends and traditional uses.**
- **Referrals of *kūpuna* or elders and *kama‘āina* who might be willing to share their cultural knowledge of the project area and the surrounding ahupua‘a lands.**
- **Any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the project area.**

Several attempts were made to contact individuals, organizations, and agencies apposite to the CIA for Mānoa. The results of the community consultation process are presented in Table 3 below. Summaries of more extensive interviews are presented in Section 7.

Table 3. Community Consultation

Name	Affiliation, Background	Comments
Ah Mai, Karen	--	Karen was referred by Paul Holtrop. CSH called on May 22 and July 3, 2008. After speaking briefly with Karen on July 3 CSH emailed a letter and corresponding figures.
Andrade, Carlos	Professor, Kamakūokalani Center for Hawaiian Studies	In an email sent to CSH on May 27, 2008, Mr. Andrade recommended that CSH speak with Ka Papa Lo‘i o Kānewai director Makahiapo Cashman, current staff member, Alapaki Luke, Uncle Maka, and possibly former director, Pōmaika‘i Crozier.
Cashman, Makahiapo	Director, Ka Papa Lo‘i o Kānewai	See interview summary in Section 7.
Cooke, Sam and Mary	Mānoa Heritage Center	CSH sent a letter on February 14, 2008. A second letter with project information was sent on May 28, 2008. The Cookes declined to respond.
Freitas, Konia	Faculty, Kamakakūokalani Center for Hawaiian Studies and member of Hui Mālama I Nā Kūpuna o Hawai‘i Nei	See interview summary in Section 7.
Harrington, Al	Mānoa *kama‘āina*	See interview summary in Section 7.
Holtrop, Paul	Mānoa Neighborhood Board, Sub-district 3 Chair	CSH sent a letter on February 14, 2008, and left a phone message on May 22, 2008. Mr. Holtrop returned the message that day and referred CSH to Karen Ah Mai.
Hughes, Clair	Kūpuna and long time resident of Mānoa	See interview summary in Section 7.
Kame‘eleihiwa, Lilikalā	Professor at Kamakakūokalani Center for Hawaiian Studies	CSH sent letter on February 14, 2008. CSH spoke to Kame‘eleihiwa at Kamakakū on May 29, 2008 and scheduled an interview for June 4, 2008. Kame‘eleihiwa could not make it to the interview. A follow up email was sent by CSH on June 5, 2008. No response.
Kikiloi, Scott Kekuewa	*Kama‘āina* and resident of Mānoa	See interview summary in Section 7.
Lucas, Paul Nāhoa	A founding member of Ho‘okahe Wai Ho‘oulu ‘Āina and an attorney at Kamehameha Schools	See interview summary in Section 7.
McGregor, Davianna	Professor, Ethnic Studies at UH Mānoa	See interview summary in Section 7.

Name	Affiliation, Background	Comments
Nāmu‘o, Clyde	Office of Hawaiian Affairs, Administrator	See comments below (and see Figure 47).
Osorio, Jon	Professor at Kamakakūokalani Center for Hawaiian Studies	See interview summary in Section 7.
Paik, Kaleo	Cultural Specialist State Historic Preservation Division	Ms. Paik responded to CSH's January 18, 2008 letter of invitation to comment via an email sent to CSH on April 6, 2008. The full text of the email is reproduced following this table (below). Ms. Paik recommended that CSH speak with Dr. Clair Hughes.
Vaughn, Palani	Mānoa Kama‘āina	See interview summary in Section 7.
White, Kahi	Professor at KCC, Hawaiian Studies & Mānoa *kama`āina*	Interview results are pending, and will be included in future drafts of this report, if available
Wilson, Scott	Mālama o Mānoa President	Mr. Wilson responded to CSH with an email response dated March 30, 2008. The full text of the email is reproduced following this table (below). Mr. Wilson noted that Mālama o Mānoa recommended that CSH speak with faculty from UH Mānoa's Hawaiian Studies and Anthropology Departments'.

6.1 Office of Hawaiian Affairs (OHA) Response

OHA's response letter (see Figure 47) contained three main comments:

(1) A recommendation that CSH conduct "…a thorough review of all archaeological and cultural reports related to the larger area which will be subject to the cultural impact assessment."

(2) A caution that as-yet undiscovered cultural sites may still be located within the project area in subsurface deposits, despite the long history of ground disturbance and development.

(3) A request for the opportunity to review the completed CIA.

6.2 State Historic Preservation Division (SHPD) Response

Ms. Linda Kaleo Paik, Cultural Specialist, SHPD, kindly contributed the following response by email (see Table 3, above, for details):

> My *mana‘o* for the UH Mānoa Long Range Development Plan: I would not like to see development encroach upon the valley walls. Already so much of the upper valley and front of the ridgelines have been developed. A university should incorporate the beauty of its surroundings and make sure the buildings and planning for the entire campus conforms to a large degree with the environment or natural beauty of the area. The campus changes in geography and climate within a relatively short distance. There is no uniformilty at present to the entire campus with the exception of several clusters of buildings. I do not believe Mānoa can handle too much more growth in student population without impacting the nearby community and the very environment of the campus itself. There are parking issues, facility maintenance issues and lack of funding to upkeep the demands of such a large institution. There are also historic properties in the area that have and are being impacted by the student population whether it be traversing areas with a larger number of foot traffic or parking along side streets with little or no room and using pedestrian areas to park. Though these may not translate to cultural issues, they contribute to the overall well being of the environment in Mānoa.

6.3 Mālama o Mānoa

Mr. Scott Wilson, President of Mālama o Mānoa, contributed the following response by email:

> I'd love to help with your project, but I am no expert on the history of the Manoa ahupua'a. I am an architect by training and know only the basics about

Manoa valley and the ahupua'a it is part of. (I have lived in the valley only 10 years and before that St. Louis Heights for 20 years).

Our community group (Malama o Manoa) is geared to preserving and enhancing the social and physical assets we presently have in the valley, so we don't get into the natural history or the early Hawaiian history of the valley that much. We have our hands full just trying to prevent the valley from turning into another Kahala full of McMansions.

I would suggest consulting the book Manoa: the Story of a Valley, which was published in the 80's. That book may list some resources for further research. Also, have you spoken with faculty members in the Department of Hawaiian studies or the Department of Anthroplogy (Archaeology division) at the UH? I would think they could direct you to scholars who have studied the land tenure systems of pre-contact Hawaiian society.

PHONE (808) 594-1888 FAX (808) 594-1865

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

April 24, 2008 HRD08-3517

Aggie Stevens-Gleason
Cultural Surveys Hawai'i, Inc.
P.O. Box 1114
Kailua, Hawai'i 96734

Re: Cultural Impact Assessment
University of Hawai'i at Mānoa
Long Range Development Plan

Dear Ms. Stevens-Gleason:

The Office of Hawaiian Affairs (OHA) is in receipt of your letter initiating consultation ahead of a cultural impact assessment for the 2007 update of the University of Hawai'i at Mānoa Long Range Development Plan. Based on the information contained within your letter, it is our understanding that the project area consists of 304 acres in lower Mānoa Valley.

The maps included with your letter indicate that the majority of the project area is previously developed. OHA recommends that your firm conduct a thorough review of all archaeological and cultural reports related to the larger area which will be subject to the cultural impact assessment. Despite the previous development within the project area, cultural sites may still exist subsurface and if identified, will warrant appropriate mitigation measures pursuant to applicable laws.

Thank you for initiating consultation at this early stage. We look forward to the opportunity to review the completed cultural impact assessment. Should you have any questions, please contact Keola Lindsey, Lead Advocate-Culture at (808) 594-1904 or keolal@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

Figure 47. Office of Hawaiian Affairs response letter dated April 24, 2008

Section 7 Summaries of Kama‘āina “Talk Story” Interviews

A total of ten *kama‘āina* (born in Hawai‘i) and/or *kūpuna* (elders) with knowledge of the Mānoa area participated in “talk story” sessions for this CIA. The approach of CSH to cultural impact studies affords community contacts an opportunity to review transcriptions and/or interview notes and to make any corrections, deletions or additions to the substance of their testimony.

CSH employs snowball sampling, an informed consent process and semi-structured interviews (cf. Bernard 2005). A total of 18 individuals and / or institutions were contacted for this CIA (see Table 3, above); two did not respond or chose not to particpate; two (OHA and SHPD) responded in writing (see Sections 6.1 and 6.2, above); several people provided referrals to other individuals; and nine participated in formal “talk story” interviews. Presented below are brief backgrounds of participants “talk-story” sessions and their comments and concerns about the proposed project area. At the time of this writing, one of the “talk story” participants (Ms. Kahi Wight) was unavailable to review and approve the interview transcripts, for reasons unrelated to its content; thus, there are currently nine interview summaries presented below, with one possible additional (Wight) for future drafts of this report.

7.1 Al Harrington

While meeting with Palani Vaughn in Mānoa, CSH had the opportunity to speak with Al Harrington a kama‘āina of Mānoa. Mr. Harrington was originally born in Sāmoa but moved to Hawai‘i as a young child. He spent his childhood in Mānoa, and like Mr. Vaughn, remembers swimming in a water hole near the present site of Noelani Elementary. In 1954 Mr. Harrington graduated from Punahou High School. After residing on the U.S. continent for sometime he returned to Mānoa where he now resides.

Mr. Harrington’s main concern is that “markers” be used to delineate *wahi pana.* These “markers” would ensure that storied places and the wisdom that is incorporated in those stories be remembered generation after generation. In addition, the naming of streets and buildings should reflect names historically associated with the area.

7.2 Konia Freitas

CSH conducted an interview with Konia Freitas at Kānewai Lo‘i on May 30, 2008. Ms. Freitas is a faculty member at Kamakakūokalani Center for Hawaiian Studies and a member of Hui Mālama I Nā Kūpuna o Hawai‘i Nei. As a planner, she assisted Ka Papa Loi o Kānewai develop their Long Range Plan in 2007.

Freitas pointed out that burials have been found at Keller Hall and Dole Street, and believes that more burials will be found. UH is in a position to take proactive steps regarding the treatment of burials. Discussion of what should happen when human remains and burial goods are found should happen on the front end of the planning process. Procedures should be developed before any construction begins. UH is also in the position to develop progressive curation measures for any artifacts that may be found during construction.

Freitas also remarked that the current design of the campus is fragmented and disconnected from a sense of place. In thinking about the UHM Long Range Development Plan, there should be emphasis placed on integrating a meaningful sense of place into planned projects beyond just vernacular. Planners should ask “how can each project in the UHM LRDP honor what was in Mānoa before?” There are many *mo‘olelo* (oral histories), *wahipana* (legendary or storied places), and *akua* (gods) associated with the area. “How can a building reflect the character of a deity, for example, as opposed to just naming the building?” It would also be important to incorporate plants into the landscape that can be utilized for gathering practices and are associated with the place.

7.3 Davianna McGregor

CSH met with Dr. McGregor for two talkstory sessions. The first meeting was on April 23, 2008, and the second on May 8, 2008. Dr. McGregor is a professor in the Ethnic Studies Department at UH Mānoa. Dr. McGregor had the following concerns about the proposed project:

> The specifics of the Long Range Development Plan need to be clearly stated. For examples, how is “expansion” of buildings and building “replacement” defined? One main concern voiced by those contacted was whether a Cultural Impact Assessment of Mānoa Valley completed at this present date be applicable for development in Mānoa proposed for least the next twenty years.
>
> The discovery of burials is very probable. There has been multiple burials discovered on the UH Mānoa campus already. Keller Hall is the location of one repatriation site. It is unmarked and is located on the NE side of the building. There used to be ginger planted on top of it, but there is nothing there anymore that distinguishes the site.
>
> Are the trees on the campus going to be protected? Find out when the trees were planted and by whom. Many of these trees are rare and they have significance to particular sites and people (i.e. They were planted to commemorate someone or in memory of someone). Some of these trees have a function more than just to beautify the campus.
>
> Much of the proposed project area is already developed, although there is the possibility that cultural sites still exist in the area and could be impacted by development. If impacted, appropriate mitigation should take place. Also, a thorough review of previous archaeological and cultural reports related to the area should be undertaken. There is knowledge of a habitation heiau with possible human remains located a few meters from, if not within, the boundaries of the proposed project area. Hipawai Heiau is also situated within Mānoa, possibly within the boundaries of the proposed project area.

7.4 Jon Osorio

On June 4, 2008, CSH met with Dr. Jon Osorio, professor at UH Mānoa's Kamakakūokalani Center for Hawaiian Studies to discuss the UHM Long Range Development Plan. He shared his knowledge of the area and *mana‘o* about the project. In reference to the overall project, Dr. Osorio mentioned that burials are likely to be found, and that UH should be proactive in doing assessments before any disturbance takes place. In other words, the University "should take the steps necessary to avoid an inadvertent find."

Dr. Osorio also had specific comments regarding the proposed Wa‘ahila Faculty Housing expansion, and the Hawai‘inuiākea School of Hawaiian Knowledge.

7.4.1 Wa‘ahila Faculty Housing

Dr. Osorio offered the following comments:

(1) The faculty housing is built on the *kula* (dry-land) area.

(2) The trails behind the housing have are being degraded and are currently being accessed for recreation (i.e., bike riding and hiking). Trash from recreational users and debris from housing along St. Louis heights (e.g., golf balls) is found along the trail.

(3) Native medicinal plants are found along these trails.

(4) There are one or possibly two *heiau* sites located behind the current faculty housing at Wa‘ahila. Access to these sites is currently unrestricted. Dr. Osorio has observed bikers using the area as a launch point.

(5) A plan should be developed concerning the use and protection of resources along lower Wa‘ahila ridge.

(6) The School of Hawaiian Knowledge would like to be contacted should any action be considered on the hillside above Wa‘ahila faculty housing.

It is worth stating at this point that a recent archaeological field inspection by CSH of the Wa‘ahila ridge area behind and above the faculty housing shows extensive evidence of tents and other living shelters and associated materials and debris (a.k.a. "homeless" or "houseless" people).

7.4.2 Hawai‘inuiākea School of Hawaiian Knowledge

> According to Dr. Osorio, it is an important cultural statement that any building being built by the University be sensitive to the environment. Facilities should take advantage of the wind and sun and consume less non-renewable forms of energy.

7.5 Makahiapo Cashman

Mr. Makahiapo Cashman is currently the Director of Ka Papa Lo‘i o Kānewai. Ka Papa Lo‘i o Kānewai is an important cultural site within the project area. It welcomes approximately

15,000 visitors a year and acts as a repository for different varieties of *kalo*; it is considered by many to be a contemporary *pu‘uhonua* (place of refuge or safety). It is also one of the three departments within UHM's Hawai‘inuiākea School of Hawaiian Knowledge.

Mr. Cashman's involvement with Kānewai began in the mid 1980s as a Hawaiian language student. Since that time he has maintained his relationship with Kānewai, as a volunteer, *limahana* (worker), and now as Director of the newly-formed center, under the Hawai‘inuiākea School of Hawaiian Knowledge. Mr. Cashman kindly met with CSH staff on two occasions during the assessment process to discuss the history and importance of the *lo‘i* and to offer his *mana‘o* (concerns or ideas) about the proposed project. The following exerpts are most relevant to the subject CIA.

7.5.1 Hawaiian Language

In the mid 1980s, Mr. Cashman began coming down to Kānewai as a student in Larry Kimura's Hawaiian language class for Hui Kama‘ilio on Friday nights. Mr. Cashman remembers Hawaiian language always being a big part of the *lo‘i*. The *lo‘i* was once under Hui Aloha ‘Āina Tuahine, the Univeristy's Hawaiian Langauage club, because many of the members of Ho‘okahe Wai Ho‘oulu ‘Āina, were Hawaiian language students. As Mr. Cahsman remembers:

> This was very much Hawaiian language before. Yep, well because Hawaiian Studies eventually went off and became their own center it was easy, and close, the proximity was close, made sense to be with Hawaiian Studies. I think Lili [Professor Kame‘eleihiwa] would have a better grasp of why we went under Hawaiian Studies. Because even Hawaiian Language, they weren't their own center. They were still under Pacific Languages and only recently they broke away so. But it was very much Hawaiian language. Hawaiian language was always a major part of the *lo‘i*, the students and the faculty too.

7.5.2 Kūpuna of Kānewai

Mr. Cashman also recalls the many revered *kūpuna* who have been connected to Kānewai throughout the years. Māui *kupuna*, Harry Mitchell, who was involved in the struggle to end the bombing on Kaho‘olawe, was extremely influential in the re-opening of the Kānewai Lo‘i. Uncle Maka is now the *kupuna* at Kānewai who remains *pili* to Kaho‘olawe. Over the years Kānewai has been a meeting place for many organizations including the Protect Kaho‘olawe ‘Ohana.

Eddie Ka‘anana, another highly-respected *kupuna* who was born and raised in Miloli‘i, also played a major role at Kānewai. According to Mr. Cashman,

> You know a lot of it was his Hawaiian language. He always came down, always gave *mana‘o*. He was real instrumental in helping us with the *hale* [traditional house located in the center of the Kānewai Lo‘i], working in the *lo‘i*, how we act in the *lo‘i*, just act with each other. And always around, ya he was major here. He was major here. Not only here, all over. And he took on that *kuleana* [responsibility] and he's so *‘olu‘olu* [kind]. Always talking story. You know but still he wanted stuff certain ways too, you know. That things should be this way and done that way. Always respectful.

Mr. Cashman also recalls the times master navigator and teacher Mau Pialug spent at Kānewai:

> So Papa Mau used to come plenty too. He used to just hang out… ‘come pick me up’… so we used to go up, pick him up, we just hang out, the kids come. Ya, and then the school started coming. The charter schools started coming ‘cause they knew he was here. So he would go over the star compass with kids. People pull out their kids from school. Ya like…whoa, whoa, bring the kids down, Papa Mau is teaching!’ Even me, I call up my wife… ‘go pick up the two girls, bring ‘em down,’ ya just hang out down here for now. Ya, like hello? It’s a no brainer. Ya, that’s my two daughters in there too [referring to picture], Pili and Ulu. And then we used to take him doctor, dentist, you know, all that kine stuff when he comes down.

According to Mr. Cashman, Papa Mau also commented that the large albizia tree near the bamboo patch [note, this tree is scheduled to be removed for a streambank-protection project funded by the Federal Emergency Management Agency] was big enough to be used for a canoe, and suggested that should they oneday cut it down, he would come back.

7.5.3 The Hale

Mr. Cashman spoke specifically about the role of the central *hale* structure:

> And that’s what I really think the *hale* does. The *hale* shows the amount of people that come down, because it takes so many people to do it. So that was one of the things, when Charlie [Kupa, former coordinator at Kānewai lo‘i] went, he told Pō, make sure you put up another *hale*.

7.5.4 Kānewai as a Pu‘uhonua

From the time the gardens were reopened in 1980, Kānewai has been a *pu‘uhonua* (place of refuge and safety) for plants, people and culture:

> It’s a comfortable place. It’s a *pu‘uhonua*; for us, for the people, for the plants. So gives us a chance to be ourselves, practice our culture, our language. That’s what Kānewai is, connecting with the place but then again, you’re connecting with the people. Ya that’s even more important too ya. They both are important.

7.6 Scott Kekuewa Kikiloi

On June 9, 2008, CSH met with Kekuewa Kikiloi, a *kama‘āina* and current resident of Mānoa. Although originally from He‘eia (near Kāne‘ohe) in Ko‘olauloa, Kikiloi has lived in Mānoa for most of his life. His grandparents moved to the valley in the 1950s and he lived with them on occasion throughout his childhood. He currently resides in Mānoa.

7.6.1 Trails

Over the years Kikiloi has spent time hiking the valley and researching *mo‘olelo* and *wahipana*. When asked about the traditional use(s) of the trails accessed during contemporary times he responded:

> There’s only one way to go usually along ridgelines. But in terms of the middle of Mānoa…I looked at the old John Papa ‘Ī‘ī book, *Fragments of Hawaiian History*, and they have a map of Mānoa in there, where the trails actually correspond to the main roads in Mānoa. So Woodlawn, East Mānoa and Mānoa were the three trails. Makes sense, I think a lot of the trails in Hawai‘i are now roads, main roads.

7.6.2 Gathering

Kikiloi gathers non-native bamboo in the area but explains:

> Overall I don’t know, there’s not too many resources left in Mānoa because at one point, I think in the turn of the century, in the 1900s, a lot of it was deforested from the ranching. So when that guy Lyon, who the Lyon Arboretum is named after, he came and replanted the watershed in non-native plants just to restore the watershed. But I think since that time there isn’t really a lot of native plants in Mānoa. I mean you can go hiking and you won’t find too much stuff. Only on the ridgelines. Yeah I can’t even think of one native plant in the valley actually, except this *hō‘i‘o* fern, somebody planted a whole bunch of it at the head of the trail so that people could gather up. That’s about it I think.

7.6.3 Streams

When asked about stream resources in the valley, Kikiloi comments on the changes have been observed:

> I think overall the stream has diminished a lot, even since I was a kid. There was a lot more water in it. And my mom said even more when she was a kid. But it’s all fed by the tributary streams that go up the valley. I think there was about seven of them. The first one being ‘Aihualama where Lyon Arboretum is. That one still flows and it feeds the *lo‘i* that Hālau Kū Mana takes care of. Waihī, I think that’s Mānoa Falls, Waihī. That one still flows. Waihī Iki flows sometimes. I haven’t seen Lua‘alaea or Nāniu‘apo flow. And I haven’t hiked all the way in there. There’s actually a trail that goes back there but I always go to the Waiakeakua side. Waiakeakua still flows.

Despite changes in the stream, Kikiloi continues to gather water for *‘awa* (also known as kava, *Piper methysticum*) ceremonies. Oral tradition describes how certain springs in Mānoa are connected with the gods Kāne and Kānaloa who are credited for bringing *‘awa*:

> So in terms of water resources, that place is still really important because it’s tied to the story of Kāne and Kanaloa. Much like Kānewai and Punahou. All these places that they went to are sacred spots for water. At least for me and my friends that do *‘awa* ceremony we get our water from Waiakeakua sping. ‘Cause it’s the only really clean spring.

Kikiloi expanded on why Mānoa waters sources are so valued for their use in *‘awa* ceremonies:

> You always want to try to go to springs or heads of water where it originates from. You know places that Kāne and Kanaloa went to are ideal places because they're the ones that brought the *‘awa*. So their water source and their *‘awa* are the best. And there isn't too many places mentioned in the stories where they went specifically, place names linked to the travelings of Kāne and Kanaloa. But Mānoa has a lot.

Other springs that Mr. Kikiloi pointed out to CSH are Wailele, located on the Mid Pacific Institute campus, and Ka Punahou located on the Punahou campus (see Figures 48 and 49).

Figure 48. Wailele Spring.

Figure 49. Punahou Spring.

7.6.4 Wahipana

Although recognizing that the valley seems to have changed significantly since photographs were taken of *lo‘i* covering entire valley floors, Kikiloi has still been able to identify *wahipana* through out Mānoa area. Many of these cultural properties are connected to the story of Kahalopuna (see Section 3.3.17):

> I think overall it's always important to reference that story ‘cause that's the story of the valley pretty much. The cultural landscape is based off the names and characters that were in the story, historical figures. There's important place names. I think of the story of ‘Akāka, which is the hill area by the Chinese cemetery. If you go up that hill, that ridge line that stretches up to Wa‘ahila, that's called Nālehua. The ridgeline that stretches back to Mount Olympus, Wa‘aloa, is called Pali Tuahine. The names of the wind and the rains of the valley- Ka Ua Tuahine [the Tuahine Rain], Makani o Kahaukani [the Kahaukani wind] are the names of the parents of Kahalaopuna. I mean its kinda neat to me because like the rain and the wind are the parents of her, she's the rainbow right, and the *ua* Tuahine is the rain that comes straight back through the valley kind of like in a slow kind of motion, real kind of fine misty kind of rain that creeps down the valley. You can see it come down and it's blown by the Haukani wind. And when it's the right conditions and those things happen then you see the rainbow yeah. So it's like a story for one, but it's also the natural phenomenon that occurs daily.

> In Wailele, which is the Mid Pac School area, there's the stone called Ka U‘i o Mānoa. Which is a reference to Kahalaopuna, the beauty of Mānoa. And that stone is still there, right next to the football field. I have a picture of it in *‘Ōiwi*. I took a picture next to it. And then I wrote a story about Haukani because it's the name of the wind, but it's also the name of a tree that used to be back in valley. Kind of a super natural tree.

In previous years Kikiloi has observed Ka U‘i o Mānoa being used as a grafitti rock (Figure 50). Reflecting on this activity, he notes:

> They used to use it as the graffiti rock. And I just find it ironic that they're graffiting the beauty of Mānoa- the rock that's representative of the story of the valley.

Figure 50. Ka U‘i o Mānoa.

There is another *pōhaku* near Lyon Arboretium that Kikiloi believes may be connected to the story of Kahalaopuna:

> So I checked it out and then it kind of occurred to me in the story of Kahalaopuna, in the Nakuina version, he was talking about how, you know she's buried at different places when she dies and the only place in Mānoa where she's buried is ‘Aihualama actually. And up there next to a big rock is the burial place they said.

> So there is a small little platform next to this really big rock which is weird, standing out in the middle of nowhere.

7.6.5 Concerns Regarding the Proposed Project

In reference to the Long Range Development Plan, Kikiloi commented that he:

> Would like to see some consideration of the style and the feel of the buildings that are constructed; whether they create a Hawaiian sense of place or ones that are consistent with the architecture of the valley. And then also the incorporation of native plants through out the campus. I mean there's a lot of different types of botanical specimens all over the place, but there needs to be more Hawaiian plants.

7.7 Nāhoa Lucas

Nāhoa Lucas is one of the founding members of Ho‘okahe Wai Ho‘oulu ‘Āina and an attorney at Kamehameha Schools. In 1980 as a student at UHM, Lucas, along with Keoni Fairbanks, found the remnants of an old *‘auwai* near the student dormitories in the *‘ili* of Kānewai. As discussed in Section 3.6, the *‘ili* of Kānewai was given to Kaleiheana by Kamehameha I after the battle of Nu‘uanu in 1795. When Kaleiheana died the land was deeded back to the descendants of Kamehameha and finally became part of the Bernice Pauahi Bishop Estate. In 1945, the land was deeded to the University of Hawai‘i, which evicted several farmers who were still growing taro. Ho‘okahe Wai Ho‘oulu ‘Āina was formed to preserve and protect Kānewai Lo‘i. Excerpts from CSH's interview with Mr. Lucas, divided into several thematic categories, are provided below. Nāhoa Lucas' testimony is abbreviated as "NL." Questions and comments by Cultural Surveys Hawai‘i are abbreviated as "CSH." The following exerpts are most relevant to the subject CIA.

7.7.1 Kānewai

> **NL:** This is called Kānewai Waikīkī, as opposed to Kānewai Kahala. What was called Kānewai Kahala is what we call Kahala today. So that was the *makai* portion of it, and this was the *mauka* portion of it. But if you look at some of the old land histories, the native testimony of John Papa ‘Ī‘ī, when he files a claim for Kānewai he says there's actually several other *leles* [typically a discontinuous but related unit of land]. So not only Kahala and this area, but Helumoa, which is [where the] Royal Hawaiian Center is, where the Royal Hawaiian Hotel is, that was also an *‘ili* and Pahoa is another *‘ili* in between this and Helumoa. And he [‘Ī‘ī] said there were others that were in the back of Mānoa valley.

7.7.2 On Opening Kānewai

> **NL:** We were walking around. We went to Kaho‘olawe in 1980 and were very excited about…that was after the bombing had stopped. They [the military] were allowing accesses. The island was still not cleared [of unexploded ordnance]. You still had to go with EOD from the Navy…un-exploded ordinance man. And so we went and we met Uncle Harry Mitchell from Keanae. His son, Kimo Mitchell, was with George Helm. And so he would be taking young Hawaiians over. And

he noticed there was a lot of interest in rediscovering who we are. And at the time we were excited about Kaho‘olawe, things Hawaiian. And then we started talking about taro because he came from Keanae, a big taro community. And eventually one thing led to another and so we went…actually as part of the Hawaiian language club, we went to Keanae, Māui.

And I can't remember if this was before we found it [Kānewai] or after, but we took a tour of this area and we were talking to him in Hawaiian and stuff like that. But we came back and Keoni and I were roommates in the dorm. We were at Noelani. And we'd always drive by this area and we just knew that anything next to the stream was probably *lo‘i*. And so one day we just jumped down here and started walking up the stream and then we saw the *‘auwai* there running along the base of this cliff going all the way up…we followed it up and there was a *po‘owai* [upstream head of the irrigation ditch]. And so from there we started to dig it out. We dug out the *po‘owai* and it was covered with roots and everything. We just kept coming back on Saturdays and actually the water flowed down. And in areas where it was broken, the walls were broken, we fixed it up and repair[ed] it, and we brought it all the way down to the Dole Street Bridge. And right when it got to Dole Street Bridge there was a remnant of a huge rusted pipe that I guess the farmer had put in. So we couldn't get it past that, so then what we did was we looked around, we became very resourceful, and we found these pipes that some of our friends had. One guy worked for…was it Gas Pro…Kilgos or something. He brought these huge, used PVC pipe, and we put it down there and we locked them in.

By that time Uncle Harry had come over [to Kānewai]. So we kept moving the water down. And that whole area that is now the *lo‘i* was all California Grass [*Brachiaria mutica*], covered in California Grass, and the house had fallen down. It was just a mess over there. So with the Ethnic Studies help, we just kept moving the grass, kept pushing it back and rolled back the California Grass. And there was a *kuāuna* [border of a taro patch]. You know the Okinawan farmer had basically redesigned the patches ‘cause when he was there he wasn't raising it for *kalo*, he was raising it for *lū‘au* leaf. So he just had little concrete walkways that the water would just flow. So he wasn't caring about holding the water in. So we followed some of that. Others we modified, but we took out all that rock and then put in one after one. Each time we'd open up one, Uncle Harry would be there and we'd give it a blessing. We'd give it a name. Each of those patches has a name.

CSH: Yeah, how did you guys name it?

NL: For different events or different things that would happen. And we got that all written down somewhere. But, eventually we kept going, kept going, kept going until we came down to the halfway point where the tool shed is. And along

the way other people would come down and see what we're doing and say "oh this is cool." And we'd always work on Saturday. Try to make it a Saturday.

CSH: So they still have First Saturday…

NL: And they still have First Saturdays. And at the end of getting together, we'd have lunch, we'd have a meal. We'd cook food or people would bring up food. And eventually when we got *kalo* we'd cook it. Then the *imu* [underground oven] started. So it just kept getting bigger and bigger.

CSH: Did you guys have funding from the school or was it all on your own?

NL: It started off with people just bringing tools from home. You know, taking your mother's rake and your dad's shovel. Eventually getting money from donations…like the Hawaiian Language Club would donate some money for tools…you know rent a 'weed eater.' Then we saw how much interest there was and people were really starting to get into it. And they'd come down and we'd have big groups and we'd have 50 people show up and say, "okay, what do we do?" And we'd go, "oh, we don't know."

So we had to get organized, and then eventually we just tried to look for…well we tried to make it into the University system. And so for the most part the faculty knew what we were doing 'cause they would come down. We'd invite the classes to come down. And so we really built this ground swell of community support. Groups would come down and have a great time and they would go, "what is this project connected with?" And we say, "oh its UH." "What groups?" "Oh, Hawaiian Studies." And so our director back then, who was Abraham Pi‘ianaia, he said "oh, this is a great project but let us know what your doing 'cause you know we're getting all these calls and I don't know what to tell them." And so it was fun. It was a lot of fun.

7.7.3 Land Use

CSH: So from where the *lo‘i* are now to down where Kānewai Street is, was all *lo‘i*?

NL: Right. Because the *‘auwai* ran along the base of this cliff here. So if you look at the present day Wa‘ahila, when it comes down…where Dole Street is, is pretty much the base of the mountain, yeah. So that's where the *‘auwai* followed. The *‘auwai* basically followed Dole Street all the way to Kānewai, and then it irrigated all of that area. So Kānewai field, Hōkūlani, all of those areas…these were all *lo‘i*. You can see them all here. And then the road, Kalei Road came up here. This is another *‘auwai*. When Kamehameha Schools had it, they had leased it out to

various farmers. They grew taro and then rice and then over the years it became truck farms. So there’s a lot of truck farming up in here where the circle dorms are.

7.7.4 Fresh Water Resources

NL: This area has been, like all urban areas, pretty depleted. So there may be an occasional *‘o‘opu* [general name for different varieties of goby fish], but we haven’t seen it during our times there. One time, though, this huge *‘o‘opu* washed down stream. It was a dead one but it was a big one. It was stuck at the *po‘owai*. And it was kind of amazing because, you know, you see all kinds of things floating down stream, ducks, chickens, all kinds of things. But that was something interesting. I’m sure probably the upper regions of Mānoa there still lives *‘o‘opu, ‘opae kuahiwi* [a kind of shrimp, *Atyoida bisulcata*], all those. The others may have seen some of those but we haven’t. Mostly its crayfish, dojo, all of the common ones…guppies.

CSH: Not stuff that you would gather or eat?

NL: No, but the plan was always to try to reintroduce that and restore it. We wanted to have Hawaiian ducks, we wanted to have all that stuff but a lot of times you have to just worry about maintaining. we’ve had ducks, not native Hawaiian ducks, but we’ve had.

7.7.5 Kānewai Spring

NL: The legend of Kānewai spring. Well, the earliest map that I can find is of…actually from Kamehameha Schools…it’s the very first map that was done by Princess Ruth Ke‘elikolani. This was in 1883, I think either before she died or right when she died they were trying to inventory all of her lands. …she owned Kānewai because it was originally through a series of different things… this says Kaleiheana but they had it out with Kaleiheana’s heirs and finally it was given to Victoria Kamāmalu because she had filed a claim for this land along with Kaleiheana. So there were competing claims. Anyway, Kamāmalu ended up getting this. So when she died it eventually went to her half-sister, Princess Ruth. So they did this inventory and on that map…let’s see the only place I’ve been able to find it. This says it. So this is maybe from the 1883-84 map. You can see Kānewai Stream over here. And that’s the only place there’s something that actually puts this feature on it.

CSH: Do you remember seeing it though when you guys were clearing out?

NL: No. Not it the sense of if you were looking for a bubbly Board of Water Supply, in front of their office, kind of spring. It wasn’t a *kikīwai* [spouting water]. It wasn’t a *pūnākikī* [spouting spring]. When we surveyed this area in maybe 1980-81 they had just built, I think, the storm drains for Dole Street, and they had put on either side, or one side next to it…they had dug it up. They had already filled a portion of this, where Keli‘ipio’s award is, they had taken that. This whole land was still low, all the way to the Kānewai field. It was still low but it was overgrown. The part up here was in California Grass and then as it gone down further over here it was in *Koa Haole* [*Leucaena leucocephala*]. And so we walked around this because it was a very small land-fill. And then as the Dole Street…as they dug it so they could lay the pipes down, they started to fill in here and the fill got bigger and bigger. But we would walk around this small area, this small field area, and it was still low inside here. And this whole area was wet, was very wet. We were walking along…it was very *pulu* [moist] and there was water on the ground. So maybe this was Kānewai.

CSH: So this is where what is today?

NL: Center for Hawaiian Studies, the parking lot area.

7.7.6 The Holowai

NL: The plan was always to have…right where this area is…we called this the *holowai* [water course]. And the *holowai* was… before they filled in that area that they were going to have it for operation Kua‘ana, student services center. I don’t know what they have it now…some more classrooms…but the building kind of comes into there. The original plan was to follow this line. Because this line was still there. The fill had gone and had just stopped right over here. And this was like a little collection area. It would never go dry. It was always full of water. And so people were saying that was Kānewai. That wasn’t Kānewai Spring. But it was an area that we wanted to connect the *‘auwai* down to, then have the remaining area go out. So now the water doesn’t…the *‘auwai* gets smaller and smaller and smaller, then trickles through here and goes out there. But that was the original plan to have these as our border.

7.8 Claire Hughes

On May 29, 2008, CSH met with Dr. Claire Hughes, a long-time resident of Mānoa Valley, to discuss her knowledge of the valley and the project area.

7.8.1 Background

Dr. Hughes shared with CSH her personal connection to Mānoa:

> I have lived in Mānoa since 1970. I came to the University to get my Master's degree in 1966. I loved walking to and from my car, which was parked on the streets of Mānoa.
>
> Then, as a child in 1940's, I remember coming to Mānoa to my visit at my aunt's home (we lived on Kaua‘i, so it was adventure to visit Mānoa). Her mother -in-law was Mrs. (Ella ?) Harris, who we called Kuku (not, Tutu). Kuku had farmed taro in the area and produced poi for many years. My aunt and her family lived at the *makai* end of Loomis Street. Kuku lived nearby in a two-story home on O‘ahu Avenue. Kuku's house had a poi mill downstairs, although she was no longer making *poi*. We would visit Kuku, who sang and spoke to us in Hawaiian. She was wonderful. She was very old, but could walk up and down those many steps from her front door. We loved to go and see her, cuz she would sing a song about Honolulu to my older brother (that is his Hawaiian name). She always greeted us little ones with lots of aloha.

7.8.2 Destruction of Cultural Sites

Dr. Hughes was concerned about the continued destruction of cultural sites in Mānoa. She spoke about Pu‘uhonua Heiau, the site of the Castle home (see Section 5.2.1 Kūkaō‘ō Heiau for discussion), and the use of *wahipana* connected with Kahalaopuna as examples:

> One of example is the *pu‘uhonua*, excuse me, the *pu‘uhonua* I was just mentioning, there is one that's on that map of O‘ahu. The map shows the *pu‘uhonua*.... it's up against the slopes of Ualaka‘a [also known as Round Top], on Pu`uhonua Street.
>
> Anyway I've walked up there to see if anything remains of it. Its on, it's on the map [Sites of O‘ahu map] with one of the indications-numbers. I walked up there and there's just homes. And there are lots of homes. And, in the last big rain that we had… Remember we when we had the 40 days and 40 nights of rain? Well, people (homeowners) that had altered hill back of their lots a little bit. And so the rains brought the earth down through their homes and down across that road into other homes on the other side of the street [Pu‘uhonua Street] down the hill side, and then down across couple more homes at the end of my street. Homes were badly affected by mud. The mudslide went all the way down to Mānoa Road. The rainwater just came all the way down with mud and rubble. So anyway you cannot see it, the *pu‘uhonua*. You have no idea when you look around up there, where that place was. So it's been obliterated. They've put up yards and yards of additional rock after that rain. So people have destroyed even further what ever was there.
>
> And I think, I'm not an engineer, but I certainly think they are front loading that hillside a lot. The weight of that stone will only serve to bring more of the hillside down [with the next big rain] because, there's no way they can build the rock walls appropriately [retaining walls] to hold it all back. They're just putting

> stone on like this because there's no easement on the roadside its very narrow. So, my concern is that we're allowed destruction of the *pu‘uhonua* to happen. In addition, there are many tales/mo`olelo about the mountain at the end of this valley, about it being the grandmother of the Mānoa maiden. You know the story about her? So Joe Pao, the developer came up here years ago and built a whole bunch of houses and, in the process he bulldozed down half of that mountainside.

7.8.3 Mo‘o

Through out the interview Dr. Hughes made reference to the different *mo‘olelo* connected to Mānoa. The story of Kahalopuna was of particular significance; however, she also spoke about the famous and well-known *mo‘olelo* of Pele and Hi‘iaka and its connection with lower Mānoa:

> **Cause** you know right over here where they made the freeway overpass [Lunalilo]? That's the back of the *mo‘o*, Kamō‘ili‘ili, who was slain by Hi‘iaka. There is a statue of that *mo‘o* on the grounds of the elementary school [Kūhiō] right over there.
>
> So the school knows about it [the *mo‘o*]. But in order to make the freeway they cut right through the back of the *mo‘o*. And then there's supposed to be an opening in the mountain, a tunnel [where there is water] that comes in here [Kānewai Park}.

7.8.4 Hōlua Sledding at Pūowaina

Dr. Hughes was also disappointed that the *hōlua* sled paths at Pūowaina [Punchbowl] are no longer identifiable because of development:

> So did you know that on the slopes of Punchbowl there were sledding areas? I went up there one day and I said oh this is about where one slide is supposed to be. I guess you could go down on a Hawaiian sled about thirty feet and then slam in to the side of that fifteen-story building. So many apartment houses have been developed up there. So you know the sledding paths are destroyed.

7.8.5 Graveyards

Although Dr. Hughes noted that there are a number of sites that have already been destroyed, she believes that there continue to be places that should be protected:

> Far back in the story, the projecting spear of Akaaka shows in the head of Mānoa valley. Well that was the one site they let be destroyed for houses. The point is we've already lost these [*pu‘uhonua* and hillside]. There are some other sites I think that we need to discover/research a little bit more about and retain them if they are significant. Some sites are more modern actually. I think this little graveyard down here is one. I attended meetings before they worked on cleaning it up. And you know in the old days Hawaiians didn't have money to put up granite headstones, so they just put rocks, circling graves of their family

members. And everybody knew which rock circles were theirs, parents and grandparents, etc. And so when they wanted to clean up the graveyard, Families came out and said you have to be very careful how you move the rocks, as they feared the volunteer crews could just go in there and tear stuff out and then destroy the stone markers for the families. So the clean up crew was very good, I must say. You can look in there now, I've gone to the service station next door recently and its really visible compared to the old days. So, it's being maintained. It's been at least a year maybe… if not, a year and a half, two years.

It was just awful before. They have built a theater on the other side of it. One of the stories was that they built the theater over part of the graves. And the theater people were very adamant that they had not covered anything. And I guess they proved it that night in the discussion. They quieted down the fears of the woman who complained. Maybe they were able to show her some markers, I guess. But they have a concession stand that's built there. People wondered who's place the concession stand is standing on? And Kawaiha‘o Church is the one who has the records of who was buried there. So their lawyer was involved in discussions preceding the clean up. I have an aunt who was buried there. So I called up my cousin to tell him I was going to represent the family. But I didn't have much to contribute except to tell them that the rock walls over there are not like other rock walls. There very easily damaged because there not made with reinforcing innards like most rock walls. They are piled up stones with cement put over. So there are no reinforcing rods, so you can't pile rubbish on top of the cement wall.

7.8.6 Natural Environment

When asked about other cemeteries in the valley, Dr. Hughes spoke about land use and the natural environment:

Actually I don't know where they would have been buried. Cause this part of the valley was all taro. If you are familiar with this supermarket parking lot, they can't keep it smooth because there's so much water underneath. I mean they just resurfaced it and the area by the stream is all gone already. Big pukas. Big pukas are all along that area. So you know that our soil for taro requires a lot of underground water, and there's lots, apparently. There's a story in this about being an underground river in that area [Sites of O‘ahu].

And that's why UH sustained so much damage [in the October storm]. It's the natural path for the runoff from the stream...the surface stream but also the under ground one. So there's stories in Sites of O`ahu (here) about that. So that... you know, I've read that thing in and out about Mānoa, but I brought this (The Legends and Myths of Hawai`i) for you to see, and that the story about the princess of Mānoa is told by one of the by a highest of authorities [referring to Kalākaua]. His story is much more detailed than any other you're going to read about the Manoa...what does he call it?...Kahalaopuna, the princess of Mānoa, .

And then did you know that up there is Kauhi's body. Did you know that? [Referring to ridgeline across from Mānoa market place].

His *ōpū* is over here and his toes are down here. So the project that Hawaiian Electric was going to do, to put those huge, gigantic, enormous, immense poles across Wa‘ahila ridge. It would have put the poles across Kauhi's profile.

7.8.7 Trails

Dr. Hughes remembered hearing about a cave at Wa'ahila, which connected Mānoa to Pālolo. Although never actually seeing it herself, she has frequented the Wa‘ahila trails:

Oh that's a beautiful hike. I love it. I did it many, many times.

It requires a lot of athleticism because there's some places where you have to climb up where there's no foothold to go up. You have to really be able to pull yourself up and down. So I'm too old to do it now. But I loved it. I loved that hike. It was really one that was very exciting. So that's another area over there that I think we should maintain. And make sure nobody puts another theater over there.

Dr. Hughes also remembered hearing about an old horse path around Pūowaina [Punchbowl:

My mother who remembers coming up there as a young girl, she said the upper road that goes around Punchbowl was a horse path. Wide enough so two horses could pass by each other, and that's all. And then down below, right above the cemetery [‘Auwaiolimu Street], between the Chinese and the other cemetery, was a cart path. Meaning, that two carts could barely pass each other- horse drawn carts. So, now we have a four-lane highway there. If you wanted to you could make four lanes there. So yes, they did put the easement probably over some of the graves. So I think that's a bad thing. I think that's really bad. Yeah, so from that perspective, I think we all have a responsibility to call out historical sites and things that we know are of value and make sure that, even if it isn't named on any site maps, if it looks like something we should be saving, we should be saving it.

7.8.8 Aesthetics

The visual impacts of the proposed project were also a concern for Dr. Hughes:

And besides, that's the only open area [green space, referring back to the Manoa cemetery] your gonna find anywhere, [development surrounds it]. Who knows if their gonna put up 70 foot high buildings all over the place. Like the new Safeway sign? The Safeway changed their sign. They made it more than twice as large as it was. And look how far it's visible. It only goes one block. So why would we need that sign to be bigger? We have to really be aware that of this kind of development, like the big sign there. How far away do you need the signs to be read from less than a block away? When you go out to sea off the Kona coast you

can see Home Depot and all the “big box store” signs from two or three miles out at sea.

7.8.9 Preservation of the Atmosphere

Dr. Hughes was also concerned about the increasing air traffic that can be heard through out the valley:

> I have great concerns that Mānoa has become a freeway for airplanes now. The large planes used to fly very high and were unobtrusive. Now that they’re saving gasoline, they’re flying very low and they make so much noise. You know when they shift down to make an approach for landing, you hear them shifting down and that whining sound is very loud.
>
> I notice it a lot more. They’re lower. And you don’t have to tell me they’re saving gas by being lower. I know it, yes. And, up until 10:30, 11 o’clock at night, you hear them shift down.
>
> No you can’t feel it but they’re very close, you can tell by the roar. And one night when the weather was *kona*, at 3:30 in the morning, a huge plane took off from the airport. It was scary because they took off very low and slowly. Previously, they used to take off in a very steep climb and the noise would be above us. Now they take off and stay very low, so you hear their engines echoing and echoing. I thought it was going to crash on Diamond Head. It was frightening. So I’m upset about that. That’s not preserving our atmosphere, let alone avoiding the noise nuisance and potential crashes.

7.8.10 Puka‘ōma‘o

During the interview Dr. Hughes described a number of cultural sites found in Mānoa. One was Puka‘ōma‘o:

> Another important site is Ka‘ahumanu’s home, Puka‘ōma‘o. It is over near Wai‘oli Tea Room. It was a large grass house where she came in her last hours of life. There is a beautiful description of this in the Sitse of O‘ahu. Ka‘ahumanu died there. That house or area should be restored and saved.

7.8.11 Cultural Sites On Mid Pacific Institute

A number of the *wahipana* that Dr. Hughes mentioned were located on, or near the campus of Mid Pacific Institute:

> There are several sites on the grounds of Mid-Pacific Institute that need to be recognized and preserved. I believe that the school knows where some of the sites are and have been respectful in preserving their existence. However I don’t think that the Hawaiian public knows about them nor has the history of them been written. These sites belong to the collective history of Hawai`i.
>
> There is an area in the park that I believe is a *heiau*. I was told that a UH course for teachers identified it as Pu‘u Pueo, although it is not a marked site. It is very

> small and faces destruction. It is in Kamanele Park. The Board of Water Supply contractor, Heron, is using the area for their dumping ground and equipment base area for about 4 or 5 years. And, it is an eyesore now. The large banyan and African Tulip trees threaten the rock formation there. It was previously used by homeless types, who put an old sofa and other things to sit on.
>
> I hope that there will be some research into the sites in this area and preservation of them.

7.8.12 References

> I would also like to recommend that you contact Dennis Kawaharada, who has written a couple of books that tell of Mānoa sites. I have two books of his and some of the research that he has done and is on available on a website. “Storied Landscapes – Hawaiian Literature and Place” and “Ancient O‘ahu” are two of books that he has written.

7.9 Palani Vaughn

Palani Vaughn is a noted composer and musician as well as historian and *kama‘āina* of Mānoa for 57 years. CSH met with Mr. Vaughn on July 28, 2008 to talk-story about his experience and knowledge of the valley. Mr. Vaughn also shared his concerns and recommendations concerning the project. The following are excerpts from an email response to questions CSH sent regarding Mr. Vaughns knowledge of the Mānoa Valley area.

7.9.1 General Comments

> I firmly believe in preserving and protecting legendary and historic sites, or *wahi pana*, of Mānoa Valley, particularly because of it was treasured by the ancient ones through the reign of Kamehameha I, during his residency here following his conquest and unification of the kingdom. Particularly in light of the increased development and modernization of our *‘āina*.
>
> I say this, particularly, in light of the UH Mānoa’s plans to develop land areas that fall under it purview. It seems to me that these historic *wahi pana* sites and the rich legendary and cultural assets of Mānoa Valley and this valley’s place in the evolving political history of the Kingdom of Hawai‘i during the post-Kamehameha-the-Great Era is of immense educational value to the university and to the general educational systems, both public and private, but of particular importance to our native-Hawaiian population, who would hopefully enjoy the intangible benefits of renewed national pride through re-identifying with their Hawaiian history, legends and culture.

7.9.2 Wahipana

> **Heiau ‘O Kūka‘ō’ō** is situated near the center of the valley. There is another heiau located nearby but I haven’t had much time to research its exact location and history. Unfortunately, this *heiau* is situated on land that was owned by the Sam Cooke family, whose home overlooks and adjoins this *heiau*.

In 1993, the land was developed into a new residential area. The process of developing the area, I personally deplore, because DLNR, apparently allowed the *heiau* mound to be cut into around which a retaining wall was built at its' base. One home is only three-feet away from the retaining wall of the *heiau*. This is just the kind of disrespect for our Hawaiian culture that current and future re-development of Mānoa Valley threatens (more comments re- DLNR's negligence).

I, personally, take my 2 granddaughters to visit Kū Ka ‘ō‘ō Heiau and to other historic sites to educate them about the above Mānoa *wahi pana* sites and to respect these sites.

“Ka Punahou” Spring, on the Punahou School grounds which Mānoa legend tells us that it was created by the Hawaiian god Kāne, although another legend exists.

“Pu‘u o Mānoa”, called “Rocky Hill”, on the campus of Punahou School, situated behind the school's tennis courts

“Puka ‘Ōma‘oma‘o” site in upper Mānoa on the ‘Ewa- side of the valley, known as **Mānoa Ali‘i**, where only Ali‘i” could reside---the other side was Mānoa Kānaka. Puka ‘Ōma‘oma‘o, which translated as, “The House of Green Shuttered Windows”, was the chosen residence of former Queen Ka‘ahumanu, who, following the demise of King Kamehameha I, had become the self-appointed *Kuhina Nui*, or Premier, of the Kingdom of Hawai'i who shared the rule with both of the sons of Kamehameha-the-Great, namely Liholiho and Kauikeaouli. Ka‘ahumanu selected her house-site because it gave her a commanding view of “Waikīkī” and “Leahi”, now called “Diamond Head”, so that she could see anby ships sailing to and from Honolulu, and she could also see anyone walking up the Mānoa trail to her home, and as a high-ground residence, it afforded Ka‘ahumanu both privacy and security from attack, because she had, indeed, experienced rebellion among certain powerful chiefs in what was referred to as the *Pahi Kaua War*, led by chief Boki's widow Kuini Liliha and Princess Bernice Pauahi Bishop's father Abner Pākī.

Puka Ōma‘oma‘o is where the legendary *ali‘i wahine* Ka‘ahumanu passed away in the presence of King Kamehameha III and all of the other important chiefs of the kingdom. It is said that Ka‘ahumanu's bed and the walls of the room were bedecked with fresh-scented *maile* and *‘awapuhi*. Kamehameha's yellow featherd cloak lay beside the bed draped over a setee, symbol of her station as *Kuhina Nui* (Together with Kamehameha I's feathered war helmet).

Mānoa legend tells us that there is a **Cave network and fresh-water Spring** situated underground in and around the Mō‘ili‘ili area, the healing waters in which, Kahalaopuna, “The Rainbow Maiden” daughter of Mānoa's wind, Kahaukani and Mānoa's rain, Ka Ua Tuahine, was immersed to resuscitate her from a death-state. There are, purportedly, other underground water springs according to other accounts.

Perhaps these healing waters, if we are to believe in the claims of the Kahalaopuna legend, could be of possible importance to UH Mānoa if it chose to research the claims of the legend in the future. An account that speaks of a **Cave and Natural Tunnel** that connects Mānoa Valley with Pālolo Valley. Apparently, it was used by Kamehameha and his warriors.

Ka Wai-a-Ke-Akua-‘o-Kāne pool and stream, were also created, according to Manoa legend, by the god Kane. This water was revered and protected by King Kamehameha-the-Great, who placed the prostrating *kapu* upon the water as it was conveyed by his runners to his court.

There is also the legend of an ancient ***Mo‘o***, or “lizard”, whose petrified severed remains are said to be in the grounds now occupied by the Hawai‘i Humane Society, across from Kūhiō Elementary School, according to Pele legend.

“Kamanele Park” dedicated by our beloved deposed Queen, Lili‘uokalani.

Location of the last home of Hawaiian scholar and preservationist, **Kawena Pūku‘i**, who attended school on Mānoa in her youth, where the Mid-Pacific Institute is today.

7.9.3 Burials

I am not familiar with any burials, but I would bet that there are many---I would presume that such burials could be in and around the Puka ‘Ōma‘oma‘o. I would also guess that there may be burials within the underground cave-network in and around Mō‘ili‘ili mentioned above. Or, even at and around “Kū Ka ‘Ō‘ō”, although DLNR would have or should have conducted an archaeological survey.

7.9.4 Hula

My daughter, Allison-Ka‘ilihiwa, is an accomplished and award-winning hula dancer, and is now a practicing *kumuhula* whose *hālau* is named, “Hālau Hula Ka-lehua-Tuahine”. Her *hālau* excelled in the newest hula competition recently created, called the “Mokihana Hula Festival” on the Island of Kaua‘i and are now defending 2007 champions currently preparing to defend their *kāne* title this year's competition. She also led her *halau* to multiple title wins in the “2007 Invitational World Hula Competition” at the Waikīkī Shell in Honolulu.

She feels a deep affection for Mānoa, having lived there all of the 33 years of her life. She has told me that she is committing her life to keeping the flame of *hula* alive in Mānoa and identifies with the spirit guardian of Mānoa Valley, Tuahine, whose name she wove into the name of her *hālau*.

My daughter's *kumuhula*, Mae Klein, was a *haumana* of Māiki Aiu Lake, who was also my dear friend and one of my early cultural mentors.

My daughter's *hālau* is centered on the grounds of St. Francis School, which was also the original "home" for Māiki Aiu Lake's "Hālau Hula ‘O Māiki". So, my daughter feels an identification with the spirit of Māiki Aiu both through me, her father, and through the location of her *hālau* on the historic original site of the legendary *kumuhula* Māiki Aiu of "Hālau Hula ‘O Māiki".

I believe Māiki, who was Catholic may have attended St. Francis.

7.9.5 Trails

As children, we climbed around "Rocky Hill", where there are small caves, or at least there were, then, when I was 12 years old.

Like many others, we often walked the trails leading to the waterfall in the back of Mānoa Valley. There was a large housing area that covered the area which includes Noelani Elementary School and the surrounding buildings, including most of the Mānoa Shopping Center and extended up the valley where the newest housing next too and across the street of where the shopping center is located.

7.9.6 Recommendations

I would suggest that a learning center with a model of the valley in its olden state with *wahi pana* identified and related accounts of history and legend can be contained in recorded information that can be accessed by visitors to the learning center. Perhaps the learning center could or should be located at the Center for Hawaiian Studies on the UH Campus.

I have composed original music centered around the *wahi pana* of Mānoa and historical events and persons who were identified with the valley, which I have plans to record in CD format to help in the preservation of the legacy f history, *wahi pana* and legends connected with Mānoa Valley.

Section 8 Cultural Landscape of the Project Area

Discussions of specific aspects of traditional Hawaiian culture as they may relate to the project area are presented below. This section examines cultural resources and practices identified within or in proximity to the subject project area in the broader context of the encompassing Mānoa landscape.

8.1 Plant Resources

As discussed in Section 3.5, Handy's (1940) description of Mānoa suggests the valley was once home to a substantial Hawaiian population supported by vast taro gardens:

> In upper Manoa the whole of the level land in the valley bottom was developed in broad taro flats. The terraces extended along Manoa Stream as far as there is a suitable land for irrigating…About 100 terraces are still being cultivated [in the 1930s], but these do not constitute more than one tenth of the total area capable of being planted…Bennett…described the upper valley as "checquered with taro patches." (Handy 1940:77)

Presently there are few *lo‘i* that still exist in the project area. However, several participants mentioned seeing old terraces in the forested uplands above the campus. Kekuewa Kikiloi, for example, tried to rehabiltate an old *lo‘i* that he had identified while hiking in the back of the valley. During the converstation he also mentioned efforts being made to map old *lo‘i* in the Mānoa area.

One area of active cultivation within the project area—and the primary exception to the generalization that the traditional practice of *kalo* cultivation has all but disappeared from the campuss—is the Kānewai Cultural Garden, also known as Ka Papa Lo‘i o Kānewai. The abandoned taro *lo‘i* were rediscovered, cleared and restored by Nāhoa Lucas (an interview participant for this study) and other students at the UHM in 1980. Ka Papa Lo‘i o Kānewai serves as a living storehouse of different varieties of taro that are today utilized by farmers through out the islands..

In addition, Professor Jon Osorio describes seeing native plants that can be used for medicinal purposes along the trails behind the Wa‘ahila Faculty Housing.

8.2 Streams and Fresh Water Resources

Mānoa Valley is watered by at least five tributary streams that merge to form the lower Mānoa Stream. The five tributary streams are ‘Aihualama, Waihī, Nāniu‘apo, Lua‘alaea, and Waiakeakua. There are seven waterfalls in the back of Mānoa Valley, named Wai‘ihī‘iki, Wai‘ihī nui, Lua‘aulaia, Nāniu‘apo, Wa‘aloa, Kahuwai‘iki and Waiakeakua.

Several individuals contacted during the community consultation process talked about the diminished stream life resulting from altered stream flow. Because of this, no respondents in the interview mentioned being able to gather stream resources for subsistance purposes. However, at least one participant (Mr. Kikiloi) continues to access the Waiakeakua Pūnāwai for *‘awa* ceremonies; and Ka Papa Lo‘i o Kānewai is dependent on the stream for cold, fresh water, which is necessary for successful *kalo* cultivation.

8.3 Wahipana

Section 3 discusses the many *mo‘olelo* and legendary accounts of Mānoa’s *pūnāwai* (fresh-water springs), which are directly associated with the exploits of two primary Hawaiian gods, Kāne and Kanaloa. These springs include Kānewai, Hualani, Wailele—located near the present day athletic field of the Mid-Pacific Institute and associated with Kūka‘ō‘ō Heiau, Punahou (a.k.a. Kapunahou), Ka‘aipū, Wa‘aloa and Waiakeakua. The valley is also home to many *pu‘u*, peaks, ridges and caves—all with associated *mo‘olelo* and legendary accounts; these include Wa‘ahila Ridge (which defines the eastern border of the valley) and its six peaks [Keanapoi, Pu‘u Pia, Pūkele, Paliluahine (also known as Kapaliluahine or Pali Luahine) Akāka and Kumauna], ‘Ulumalu, Pu‘u Pueo (“Roundtop”) and Pu‘u Mānoa. Mānoa is also associated with a variety of other *mo‘olelo* and legends, including “Pīkoi the Rat Killer,” “Maluae and the Underworld,” and “The Woman Who Died and Came Back to Life;” as well as famous events and people of the early historic era, including Kamehameha I (and his famous dog Poki), Ka‘ahumanu and Boki (Governor of O‘ahu under Kamehameha I and brother of Kalanimoku).

Many of the community members contacted for the report talked about the different places and natural phenomenon associated with *mo‘olelo* discussed in Section 3. In particular, references to the *mo‘olelo* of Kahalaopuna surfaced frequently throughout the community consultation process. Also, places associated with Kāne and Kanaloa continue to be of spiritual and cultural significance to a number of the participants.

8.4 Trails

As discussed in Section 3.7, several place names within Mānoa are located on a map of early nineteenth century trails as described by John Papa ‘Ī‘ī (Figure 14):

> Our description of the trails of the royal town is finished, but we have not yet told of the trails going to lower Waikiki, Kamoiliili, and Manoa. . . . At Kawaiahao a trail passed in front of the stone house of Kaina, late father of Kikaha. The trail went above Kalanipuu’s place, along the stream running down from Poopoo to the sea, close by Kaaihee in Makiki, to Puu o Manoa, then below Puupueo, where a trail branched off to upper Kaaipu and Kahoiwai, and another to go below Kaahulue, to Kapulena [Pu‘ulena] and Kolowalu. (‘Ī‘ī 1959:92)

Kekuewa Kikiloi pointed out that the present streets of Woodlawn, Mānoa and East Mānoa were all trails documented in ‘Ī‘ī’s work. Mr. Kikiloi, Dr. Osorio, and Ms. Clair Hughes all mentioned hiking different trails in Mānoa. Dr. Osorio also identified the use of trails behind the present site of the Wa‘ahila Faculty Housing for recreation (i.e., bike riding and hiking), but stated that much of this activity appears to be degrading the trail areas, which contain native medicinal plants. Dr. Osorio has observed these areas being littered with trash from recreational users and debris from housing along St. Louis heights. In discussions concerning Kānewai, participant, Nāhoa Lucas described Kalei Road as the old road that was used to access what is now Ka Papa Lo‘i o Kānewai prior to the construction of Dole Street. Kalei Road branched off the Old Waialae Road, near the quarry, and extended through what is now the UHM Dorms. There was a bridge that connected Kalei Road to the present site of Ka Papa Lo‘i o Kānewai. Remnants of the bridge can still be seen at Kānewai (see Figure 56). Regarding the topic of trails in Mānoa, Palani Vaughn talked about how, at the age of 12, he and others would climb around “Rocky Hill”

[behind Punahou School, formerly known as Pu‘u o Mānoa], where there were small caves, which may or may not still be there. Palani Vaughn also talked about walking “the trails to the waterfall in the back” of the valley, as did many others prior to much of the development in the lower and central valley (e.g., area of present-day Noelani Elementary School, Mānoa Shopping Center).

Figure 51. Old Kalei Road Bridge.

8.5 Cultural and Historic Properties and Burials

In general, the vast majority of archaeological sites once located in the Mānoa Valley have been destroyed and/or partially or entirely covered over by modern development, including the construction of the university campus in the lower valley and residential / commercial centers elsewhere. The campus is located in what used to be the prime wet-taro-growing area of the entire valley, and many *lo‘i* (stone terraces) and *‘auwai* (irrigation ditches) were located here; this agricultural heartland of the valley (i.e., the present-day campus) was also home to many small stone enclosures, terraces and platforms used by *maka‘āinana* (commoners) as house sites. The valley also was home to numerous *heiau*, some of which have been preserved into modern times, and burials.

Several partipants in this study mentioned the Dole Street and Keller Hall burials and felt that there will most likely be more burials found within the campus. Palani Vaughn believes additional (as-yet undiscovered) burials may be located in around the “Puka Oma‘oma‘o” and “within the underground cave-network in and around Mō‘ili‘ili.” According to Dr. Osorio, he has located at least one (and possibly two) *heiau* in the back of the Wa‘ahila Faculty Housing site..

Several respondants also noted the many cultural sites located on or near Mid Pacific Institute, including Ka U‘i o Mānoa, Wailele Pūnāwai, and possibly Pu‘u Pueo *heiau*.

Ka Papa Lo‘i o Kānewai is perhaps the best-known cultural site on the entire campus, noted for its ongoing and active practice of *kalo* cultivation. From the time the *lo‘i* were reopened in 1980, Kānewai has been a *pu‘uhonua* (place of refuge) for plants, people and culture. The *lo‘i* now serves approximately 15,000 visitors a year and acts as a repository for different varieties of *kalo*. At Kānewai students and community members learn and are able to practice many aspects of *nohona* Hawai‘i (Hawaiian lifestyle). A few examples of activities that occur at Kānewai include *kalo* cultivation, *imu* cooking, implement making, rock wall building, and *hale* construction. Kānewai allows people a space to practice a lifestyle that is difficult to carry out in much of the surrounding urban environment. As Mr. Cashman puts it, Kānewai “gives us a chance to be ourselves, practice our culture, our language.”

In additional to Kānewai, Mānoa has also been the home of other modern initiatives aimed as preserving and perpetuating the traditions of Hawai‘i Nei. For example, Palani Vaughn observed that St. Francis School—located immediately adjacent to the upper campus—was the “original ‘home’ for Māiki Aiu Lake’s ‘Hālau Hula ‘O Māiki.’” Kumu Hula Māiki Aiu was instrumental in reviving interest and knowledge of older, more traditional forms of *hula*.

Section 9 Summary and Recommendations

At the request of Group 70 International, Inc., Cultural Surveys Hawai‘i, Inc. (CSH) prepared this Cultural Impact Assessment (CIA) for the University of Hawai‘i at Mānoa’s Long Range Development Plan (LRDP). The project area consists of the entire approximately 304-acre campus located in Mānoa [Honolulu] Ahupua‘a, Kona District, Hawai‘i [TMK: (1) 2-8-015:001, 2-8-023:003, 2-9-004:005, 2-9-023:001 & 026, 2-8-029:001, 2-9-026:001 & 037, 2-9-027:054, 3-3-056:001 & 004] (see Figures 1-3).

The proposed LRDP focuses on projects that are on the Capital Improvement Program and/or are anticipated for development within the next 5-10 years (see Figure 4). At this time, at least seventeen (17) new buildings or renovation/expansion projects are proposed.

In addition to conducting background research into the traditional and historic importance of the project area, in the context of Mānoa [Waikīkī] Ahupua‘a and Kona District, including results from previous archaeological studies, CSH also made a substantial effort to consult with community members and organizations.

A total of 18 individuals and / or institutions were contacted for this CIA (see Table 3, above); two did not respond or chose not to particpate; two (OHA and SHPD) responded in writing (see Sections 6.1 and 6.2, above); several people provided referrals to other individuals; and ten participated in formal “talk story” interviews. At the time of this writing, one of the “talk story” participants (Ms. Kahi Wight) was unavailable to review and approve the interview transcripts, for reasons unrelated to its content; thus, there are currently nine interview summaries presented below, with one possible additional (Wight) for future drafts of this report.

9.1 Summary of Results

Background research conducted for this project yields the following results:

(1) Given its abundant natural resources—including several tributary streams that feed into the main stream and several *pūnāwai* (fresh-water springs)—Mānoa Valley has been an attractive place to settle and garden for as long as people have lived on O‘ahu (i.e., well over a millennium). Lower Mānoa Valley, within which the campus is located, represents the prime wet-taro-growing area and agricultural heartland of the entire valley.

(2) Mānoa is exceedingly rich in places names, *wahipana* (legendary or storied places) and associated *mo‘olelo* (oral histories), reflecting the valley’s elevated cultural and historical significance to Hawaiians, in particular. Important *mo‘olelo* focus on Mānoa’s many *pūnāwai*, which are directly associated with the exploits of two primary Hawaiian gods, Kāne and Kanaloa. These springs include Kānewai (location of the current Kānewai Cultural Garden), Hualani, Wailele—located near the present day athletic field of the Mid-Pacific Institute and associated with Kūka‘ō‘ō Heiau, Punahou (a.k.a. Kapunahou), Ka‘aipū, Wa‘aloa and Waiakeakua. The valley is also home to many *pu‘u* (hills, mountains), peaks, ridges and caves—all with associated *mo‘olelo*; these include Wa‘ahila Ridge (which defines the eastern border of the valley) and its numerous peaks. Finally, Mānoa is also associated with a variety of other *mo‘olelo*, including “Pīkoi the Rat Killer,”

"Maluae and the Underworld," and "The Woman Who Died and Came Back to Life;" as well as famous events and people of the early historic era, including Kamehameha I, Ka‘ahumanu and Boki.

(3) The archaeology of lower Mānoa is somewhat problematic in that most of the campus was developed before historic preservation awareness and laws were in place; thus many or most surface-level sites and features once present in the project area have been destroyed and / or damaged by being covered with sediments and structures. Before these historic impacts, however, the campus undoubtedly contained a patchwork of gardens, including many *lo‘i* (stone terraces) and *‘auwai* (irrigation ditches), and house sites, including many small stone enclosures, terraces and platforms. Undoubtedly, there are still subsurface cultural deposits within the campus containing signigicant historic and cultural resources.

(4) Burials have been documented near Keller Hall and along Dole Street, immediately adjacent to the Kānewai Cultural Garden and Kamakūokalani Center for Hawaiian Studies. The latter burials, representing the remains of at least 18 individuals, have been interpreted as a traditional Hawaiian cemetery. It is likely that more burials are located in subsurface deposits within the project area.

(5) A recent field inspection of the campus by CSH found a number of possible rock shelters and overhangs in the Wa‘ahila Ridge area. Additional study of these possible archaeological sites would have to be conducted in order to more fully understand their function, chronological age and archaeological significance.

Community consultation conducted for this project yields the following main concerns:

(1) Many participants voiced concern about the possibility of encountering as-yet undiscovered cultural and historic sites, including most importantly, human skeletal remains and burials in subsurface deposits. One participant (Dr. Davianna McGregor) also pointed out that the burial site preserve near Keller Hall, which used to be marked by a ginger plant, is no longer being maintained (i.e., the ginger plant is not there anymore).

(2) A few participants stated that existing undeveloped areas, including ridges and valley slopes, should not be developed or impacted in any way, given the already significant loss of such natural portions of the campus and given the importance of retaining a Hawaiian sense of place and landscape integrity. This concern about preserving the last undeveloped portions of the campus extends specifically to the Wa‘ahila Ridge area.

(3) Many participants voiced concerns about future buildings and projects being more harmoniously designed and integrated into the natural surrounding and themes inherent to the valley. It is important to note that this type of concern is fundamentally a cultural one for Hawaiians, in particular, whose ‘world view’ and deeper philosophical / spiritual beliefs are based on such concepts as *pono* (in this case, "right ways" of doing things) and *lōkahi* ("harmony"),

among other related concepts (e.g., *mālama ‘āina*, or "taking care of the land").

(4) A few participants talked about the importance of understanding and incorporating Hawaiian-language words, phrases and concepts that extends beyond the superficial (e.g., naming buildings).

(5) The current Director of Ka Papa Lo‘i o Kānewai (a.k.a. Kānewai Cultural Garden) shared his personal knowledge of a well-known master navigator and teacher who previously indicated the large albizia tree at Kānewai Lo‘i (which is scheduled to be removed in association with a stream-erosion-prevention project funded by the Federal Emergency Management Agency) could be used to construct a large traditional *wa‘a* (canoe).

(6) Many participants talked about the importance of using native plants in future projects.

(7) The Wa‘ahila Ridge area is an important natural and cultural resource, containing trails, native plants and other significant sites and features (e.g., possible rocksheleter and overhangs).

(8) A few participants provided detailed accounts of well-documented *mo‘olelo, wahi pana* and other cultural sites in Mānoa; in one case, one participant (Palani Vaughn) suggested there is another, alternative legend associated with the origins of the well-known spring (Ka Punahou, widely attributed to Kāne), but he did not elaborate further on this point.

(9) A couple participants called into question the State's (i.e., Department of Land and Natural Resources, Historic Preservation Division) poor record of protecting and preserving important cultural sites in Mānoa, including *heiau* that have been damaged or compromised by recent construction projects.

(10) One participant (Palani Vaughn) suggested the university has not done enough to promote education about the traditions of old Hawai‘i in Mānoa; and that it should build a "learning center" (perhaps located at the Center for Hawaiian Studies) that would integrate *mo‘olelo, wahi pana,* the landscape and other cultural and historical information about Mānoa.

(11) One participant (Dr. Davianna McGregor) pointed out that the Long Range Development Plan (LRDP) is not detailed enough for meaningful review and comment, and that descriptions such as building "expansion" or "replacement" are too vague. There is concern that the LRDP will be used to guide development 20 years from now, which, given the lack of detail, is problematic.

(12) Dr. McGregor also pointed out that there are many significant and commemorative trees on campus that should be systematically catalogued in order to ensure their protection during future development of the campus.

9.2 Recommendations

The following recommendations are based on a synthesis of all the information gathered during preparation of this CIA. Faithful attention to these recommendations, and efforts to

develop appropriate measures to address these concerns, will help mitigate the adverse impacts of the proposed action on Hawaiian cultural beliefs, practices and resources by the project:

(1) Community consultation participants and the wider Mānoa community should be afforded the opportunity to review the subject draft CIA and offer their input for the final verision of this report.
(2) Given the fact that the LRDP presently includes seventeen different projects (i.e., new buildings, building expansions and other infrastructure improvements), and given the lack of specific plans for these projects at the present time, the community (including participants for this study) should be afforded the opportunity to review and comment on each individual project as details become finalized and as more specific potential impacts (both positive and negative) can be assessed.
(3) The University should proactively develop a plan to avoid disturbing as-yet undiscovered burials and other historic and cultural sites and features located in subsurface contexts. Such a plan may include archaeological inventory surveys prior to ground disturbance and / or archaeological monitoring of excavations during construction; specific decisions should be made on a case-by-case basis, in consultation with appropriate government agencies (e.g., SHPD, OHA) and Native Hawaiian organizations and individuals. In particular, every effort should be made to proactively avoid inadvertent finds of human skeletal remains and burials. The burial site preserve near Keller Hall, which used to be marked by a ginger plant, but which is no longer being maintained (i.e., the ginger plant is not there anymore), should be properly cared for (e.g., clear marking should be reestablished).
(4) Planning and design of proposed projects included under the LRDP should incorporate Hawaiian cultural and historical themes and concepts in order to restore and accentuate an authentic Hawaiian sense of place. Minimally, this should include (a) use of native and Polynesian-introduced plants for landscaping, (b) integration of *mo‘olelo,* Hawaiian language and other Hawaiian concepts and ideas that goes far beyond superficial applications of such information (e.g., building names) and (c) preservation and protection of undeveloped spaces and natural resources.
(5) The Wa‘ahila Ridge portion of the campus, one of the only undeveloped places in lower Mānoa Valley, should be carefully preserved and protected from future development, and from modern abuses and damage that have already taken their toll (e.g., soil erosion from “off-road” activities).
(6) Ka Papa Lo‘i o Kānewai, also known as Kānewai Cultural Garden, should be treated with the utmost care and respect; any plans for future improvemens, alterations or development in or adjacent to Kānewai Lo‘i should include comprehensive consultation with its director and with the Kamakakūokalani Center for Hawaiian Studies.
(7) The issue of removing the large albizia tree scheduled for removal in association with the stream-erosion-prevention project should be discussed

with the Director of Ka Papa Lo‘i o Kānewai, who has indicated the tree may be used to make a large traditional *wa‘a* (canoe).
(8) Project proponents should consult with the Outdoor Circle regarding the status of significant and commemorative trees on campus; these trees should be catalogued in order to preserve and protect them.

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