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MAUKA LANDS MASTER PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

TMK 2-4-01:122

Prepared By:

PBR HAWAII

February 2005

UNIVERSITY OF HAWAI'I HILO

MAUKA LANDS MASTER PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

TMK 2-4-01:122

Submitted Pursuant to
Chapter 343, Hawaii Revised Statutes

Prepared for:
State of Hawai'i
University of Hawai'i

Prepared by:

PBR HAWAII

This Final Environmental Impact Statement and all ancillary documents have been prepared under my direction or supervision and the information submitted, to the best of my knowledge, fully addresses document content requirements as set forth in Section 11-200-17, Hawaii Administrative Rules.

Bill H. Chen, Interim Vice-Chancellor
University of Hawai'i at Hilo

February 2005

TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... **VII**

1.0 PROJECT SUMMARY **1**

1.1 PROJECT OVERVIEW 1
1.2 COMPLIANCE WITH CHAPTER 343, HAWAII REVISED STATUTES 2
1.3 IDENTIFICATION OF ACCEPTING AUTHORITY 2
1.4 IDENTIFICATION OF AGENCIES/INDIVIDUALS CONSULTED 2

2.0 DESCRIPTION OF THE ACTION'S TECHNICAL, ECONOMIC, SOCIAL, AND ENVIRONMENTAL CHARACTERISTICS **5**

2.1 BACKGROUND 5
2.2 LOCATION AND DESRIPTION OF THE PROPERTY 5
2.3 HISTORICAL PERSPECTIVE 5
2.4 SURROUNDING LAND USES 7
2.5 PURPOSE AND NEED FOR THE PROJECT / STATEMENT OF OBJECTIVES 7
2.6 PROJECT DESCRIPTION 7
2.6.1 Plazas and Open Spaces *8*
2.6.2 Buildings/Functional Siting *8*
2.6.3 Landscaping *9*
2.6.4 Gateways and Entries *9*
2.6.5 Pedestrian and Bicycle Circulation *10*
2.6.6 Vehicle Circulation and Parking Areas *10*
2.6.7 Service Vehicle Access *11*
2.6.8 Emergency and Fire Vehicle Access *12*
2.7 PHASING OF THE PROJECT 12
2.8 PRELIMINARY PROJECT COST ESTIMATE 12
2.9 USE OF PUBLIC FUNDS OR LANDS 13

3.0 RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA **15**

3.1 STATE OF HAWAI'I 15
3.1.1 Chapter 343, Hawaii Revised Statutes *15*
3.1.2 Chapter 205, Hawaii Revised Statutes *15*
3.2 COUNTY OF HAWAI'I 15
3.2.1 General Plan *15*
3.2.2 County Zoning *16*
3.3 FEDERAL 16
3.3.1 Americans with Disabilities Act (ADA) *16*
3.4 APPROVALS AND PERMITS 17

4.0 PHYSICAL AND BIOLOGICAL ENVIRONMENT **19**

4.1 CLIMATE, TOPOGRAPHY, AND SOILS 19
4.1.1 Climate *19*
4.1.2 Topography *19*
4.1.3 Soils *20*
4.1.4 Effects on Climate, Topography, and Soils *20*
4.2 NATURAL HAZARDS 21
4.2.1 Effects from Natural Hazards *22*
4.3 AQUATIC RESOURCES AND WATER QUALITY 23
4.3.1 Existing Aquatic Resources and Water Quality *23*

4.3.2 Effects on Aquatic Resources and Water Quality 23
4.4 BOTANICAL RESOURCES 24
4.4.1 Existing Botanical Resources 24
4.4.2 Effects on Botanical Resources 26
4.5 MAMMALIAN AND AVIAN SPECIES 26
4.5.1 Existing Mammalian and Avian Species 26
4.5.2 Effects on Mammalian and Avian Species 27
4.6 AIR QUALITY 28
4.6.1 Existing Air Quality 28
4.6.2 Effects on Air Quality 28
4.7 NOISE 30
4.7.1 Existing Acoustical Environment 30
4.7.2 Effects on the Acoustical Environment 30
4.8 ARCHAEOLOGICAL AND CULTURAL RESOURCES 31
4.8.1 Archaeological Resources 31
4.8.2 Effects on Archaeological Resources 32
4.8.3 Traditional and Cultural Practices 32
4.8.4 Effects on Traditional and Cultural Practices 35
4.9 VISUAL RESOURCES 36
4.9.1 Existing Visual Resources 36
4.9.2 Effects on Visual Resources 36
4.10 HYDROGEOLOGICAL RESOURCES 38
4.10.1 Existing Hydrogeological Resources 38
4.10.2 Effects on Hydrogeological Resources 38
4.11 CUMULATIVEAND SECONDARY IMPACTS ON THE PHYSICAL AND BIOLOGICAL ENVIRONMENT 39
4.11.1 Climate, Topography, and Soils 40
4.11.2 Natural Hazards 40
4.11.3 Aquatic Resources and Water Quality 40
4.11.4 Botanical Resources 41
4.11.5 Mammalian and Avian Species 41
4.11.6 Air Quality 41
4.11.7 Noise 41
4.11.8 Archaeological and Cultural Resources 42
4.11.9 Visual Resources 42
4.11.10 Hydrogeological Resources 42

5.0 ECONOMIC AND SOCIAL FACTORS 43

5.1 BACKGROUND 43
5.2 SOCIAL IMPACTS 43
5.2.1 Population and Housing 43
5.2.2 Effects on Population and Housing 44
5.2.3 Effects on Community Character 44
5.3 ECONOMIC CHARACTERISTICS 45
5.3.1 Existing Economic Character 45
5.3.2 Effects on the Economic Character 45
5.4 CUMULATIVE AND SECONDARY IMPACTS ON THE SOCIAL AND ECONOMIC ENVIRONMENT 48
5.4.1 Population, Housing, and Community Character 48
5.4.2 Economic Character 48

6.0 INFRASTRUCTURE FACILITIES 49

6.1 WATER FACILITIES 49
6.1.1 Existing Water Facilities 49
6.1.2 Effects on Water Facilities 50
6.2 WASTEWATER FACILITIES 52

6.2.1 Existing Wastewater Facilities 52
6.2.2 Effects on Wastewater Facilities 52
6.3 DRAINAGE FACILITIES 54
6.3.1 Existing Drainage Facilities 54
6.3.2 Effects on Drainage Facilities 55
6.4 SOLID WASTE 56
6.4.1 Existing Solid Waste Facilities 56
6.4.2 Effects on Solid Waste Facilities 57
6.5 TRANSPORTATION 58
6.5.1 Existing Roads and Vehicular Traffic 58
6.5.2 Effects on Roads and Vehicular Traffic 60
6.5.3 Walkways and Pedestrian Traffic 66
6.5.4 Bicycle Facilities 66
6.5.5 Barrier-Free Access and Circulation 68
6.5.6 Existing Public Transportation 68
6.5.7 Effects on Public Transportation 68
6.6 CUMULATIVE AND SECONDARY IMPACTS ON INFRASTRUCTURE FACILITIES 68
6.6.1 Water Facilities 68
6.6.2 Wastewater Facilities 68
6.6.3 Drainage Facilities 69
6.6.4 Solid Waste Facilities 69
6.6.5 Transportation Facilities 69

7.0 PUBLIC FACILITIES AND UTILITIES 71

7.1 ELECTRICAL AND COMMUNICATION FACILITIES 71
7.1.1 Existing Electrical Facilities 71
7.1.2 Effects on Electrical Facilities 72
7.1.3 Existing Communication Facilities 74
7.1.4 Effects on Communication Facilities 74
7.2 RECREATIONAL FACILITIES 75
7.2.1 Existing Recreational Facilities 75
7.2.2 Effects on Recreational Facilities 76
7.3 MEDICAL FACILITIES 76
7.3.1 Existing Medical Facilities 76
7.3.2 Effects on Medical Facilities 76
7.4 EDUCATIONAL FACILITIES 77
7.4.1 Existing Educational Facilities 77
7.4.2 Effects on Educational Facilities 78
7.5 POLICE PROTECTION 78
7.5.1 Existing Police Facilities 78
7.5.2 Effects on Police Facilities 78
7.6 FIRE PROTECTION 79
7.6.1 Existing Fire Facilities 79
7.6.2 Effects on Fire Facilities 79
7.7 CUMULATIVE AND SECONDARY IMPACTS ON PUBLIC FACILITIES AND UTILITIES 80
7.7.1 Electrical and Communication Facilities 80
7.7.2 Recreational Facilities 80
7.7.3 Medical Facilities 80
7.7.4 Educational Facilities 81
7.7.5 Police Protection 81
7.7.6 Fire Protection 81

8.0 RELATIONSHIP TO PLANS AND POLICIES 83

8.1 STATE LAND USE DISTRICT 83

8.2 CHAPTER 344, STATE ENVIRONMENTAL POLICY 83
8.3 CHAPTER 205A – COASTAL ZONE MANAGEMENT 86
8.4 COUNTY OF HAWAI'I GENERAL PLAN 88
8.5 HILO COMMUNITY DEVELOPMENT PLAN 99
8.6 COUNTY ZONING DISTRICT 99

9.0 ALTERNATIVES TO THE PROPOSED ACTION 101

9.1 "NO-ACTION" ALTERNATIVE 101
9.2 ALTERNATIVES REQUIRING ACTIONS OF A SIGNIFICANTLY DIFFERENT NATURE WHICH WOULD PROVIDE SIMILAR BENEFITS WITH DIFFERENT ENVIRONMENTAL IMPACTS 101
9.3 ALTERNATIVES RELATED TO DIFFERENT DESIGNS OR DETAILS OF THE PROPOSED ACTIONS WHICH WOULD PRESENT DIFFERENT ENVIRONMENTAL IMPACTS 102
9.4 ALTERNATIVE OF POSTPONING ACTION PENDING FURTHER STUDY 102
9.5 ALTERNATIVE LOCATIONS FOR THE PROPOSED PROJECT 102
9.6 ALTERNATIVES THAT DO NOT MEET THE PROJECT OBJECTIVE 103

10.0 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF HUMANITY'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY 105

11.0 UNAVOIDABLE ENVIRONMENTAL IMPACTS AND RATIONALE FOR PROCEEDING WITH THE PROJECT 107

11.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES 107
11.2 PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED 107
11.3 RATIONALE FOR PROCEEDING WITH THE PROJECT 109
11.4 UNRESOLVED ISSUES 110

12.0 LIST OF PREPARERS 111

13.0 REFERENCES 113

14.0 COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE AND RESPONSES 115

15.0 COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND RESPONSES 117

LIST OF FIGURES

Figure		Follows Page
1	Location Map	2
2	Tax Map Key	2
3	Preliminary Master Plan	2
4	State Land Use District Boundary Map	2
5	General Plan Land Use Pattern Allocation Guide (LUPAG) Map	2
6	Hilo District Zoning Map	2
7	Vicinity Map	6
8	Aerial Topographic Map of Area	20
9	Soil Conservation Service Soil Survey Map	20
10	Land Study Bureau Soil Suitability Ratings Map	20
11	Flood Insurance Rate Map	22
12	Visual Analysis	36
13	Proposed Bicycle Facilities	66

LIST OF APPENDICES

Appendix A	Botanical Survey
Appendix B	Wildlife Survey
Appendix C	Archaeological Inventory Survey
Appendix D	Economic Impact Analysis
Appendix E	Preliminary Engineering Report
Appendix F	Traffic Impact Assessment Report
Appendix G	University of Hawai'i at Hilo University Park Expansion Master Plan (Draft)
Appendix H	Hawai'i Community College Long Range Development Plan (March 1996)

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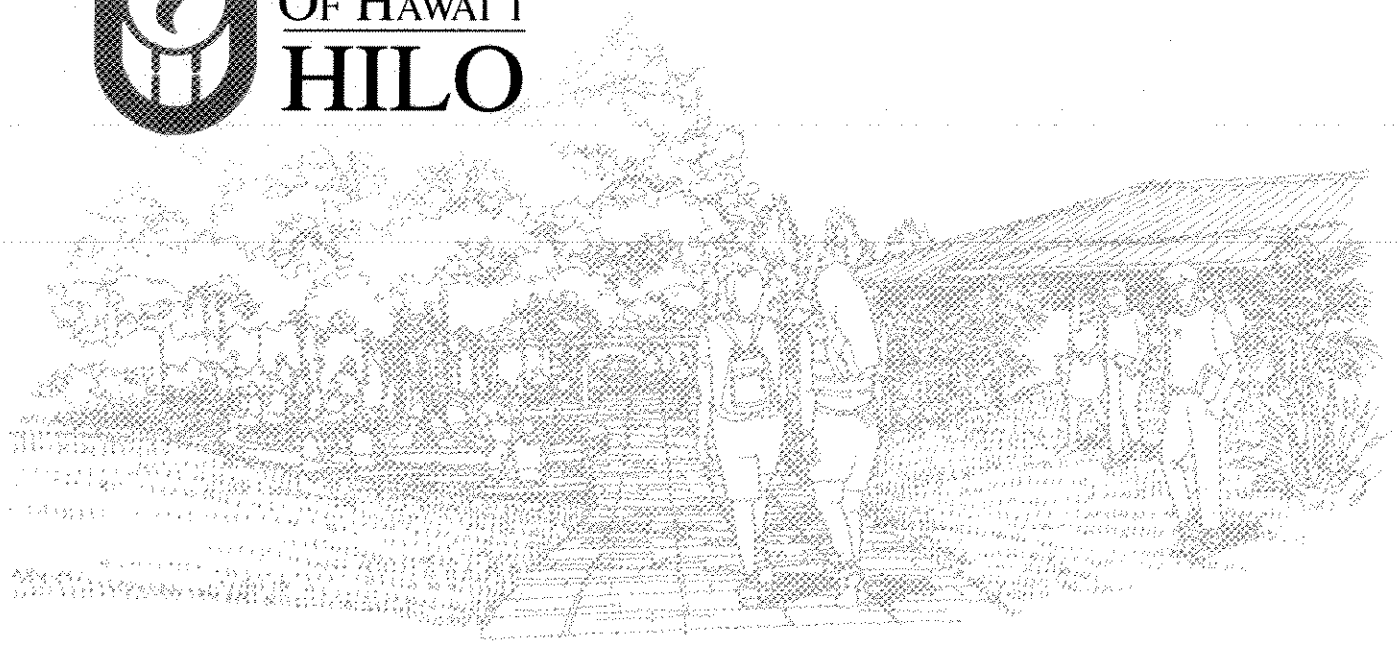
UNIVERSITY OF HAWAI'I
HILO



EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

DESCRIPTION OF THE ACTION

This ~~Draft~~Final Environmental Impact Statement (~~DEIS~~FEIS) has been prepared in support of the proposed University of Hawai'i – Hilo Mauka Lands Master Plan, which involves the expansion of University of Hawai'i – Hilo (UHH) University Park research facilities and the relocation of Hawai'i Community College (Hawai'i CC) to the Komohana Campus. The UHH University Park Expansion and the Hawai'i CC developments will be referred to as "the Project". The Project will be developed on an approximately 267-acre parcel (TMK: 2-4-01:122) (Figures 1 and 2) owned by the State of Hawai'i, mauka of the existing University Park in Hilo. The currently vacant parcel is bordered by Mohouli Street Extension to the north, Komohana Street to the east, the recently constructed and opened Pū'ainakō Street Extension to the south, and the Sunrise Estates Subdivision to the west (Figure 3 and 7). The County Land Use Pattern Allocation Map identifies the site as University Use and Urban Expansion (Figure 5). A State Land Use District Boundary Amendment from Agricultural to Urban (Figure 4) and either a County Use Permit or rezoning will be required. The University Park Expansion will encompass approximately 118 acres and the remainder of the 267-acre parcel will be used to develop the proposed Hawai'i CC Komohana Campus (122 acres) and other University-related functions (28 acres).

The Project reflects a mixture of research, instructional, administrative, and support services and land uses that will replace the currently undeveloped land. At this time, the UHH does not have a detailed plan for the types of research facilities that may move into the proposed University Park Expansion, although they would likely serve research or technology functions that would be compatible with and/or would enhance the UHH and Hawai'i CC. Although most of the major facilities at Hawai'i CC will eventually be consolidated at the proposed Komohana Campus, the Manono Campus will still play an important role in the University of Hawai'i system. There are no plans to "release" Manono Campus to another State agency at this time. The Hawai'i CC Komohana Campus will include space for classrooms as well as academic and institutional support services.

In support of the Project, major infrastructure facilities will be developed by the University of Hawai'i, including access and circulation roadways, pedestrian paths, drainage improvements, distribution lines for potable water, collection lines for wastewater, and communication/utility systems. The Project is planned to be developed after the Final Environmental Impact Statement (~~Final~~ FEIS) is accepted (anticipated in 2005) and will be constructed in approximately nine phases.

This ~~DEIS~~FEIS presents the UHH Mauka Lands Master Plan and describes the improvements proposed to accommodate the infrastructural and support needs of the Project. It also describes the existing natural environment of the Project site and surrounding area, the potential impacts that might result from the Project, and mitigative measures to minimize those adverse impacts that could occur. Comments and responses addressing applicable concerns received from review of the Environmental Impact Statement Preparation Notice (EISPN) and the Draft Environmental Impact Statement (DEIS) are also provided (~~Section 12~~Chapters 14.0 and 15.0).

SIGNIFICANT BENEFICIAL AND ADVERSE IMPACTS

Various goals, policies, standards, and courses of action established by the County of Hawai'i *General Plan* encourage the continued expansion of the University of Hawai'i system. The University of Hawai'i at Hilo and the Hawai'i Community College provide not only college and university-level education to the island's residents, but research opportunities and employment for faculty, staff, and students. The Project is consistent with the *General Plan* and would provide significant economic benefits to the Island of Hawai'i. Residents would improve their quality of life through expanded employment and educational opportunities provided by the University Park Expansion research facilities and the Hawai'i CC Komohana Campus. Construction of the Project would also provide employment opportunities and benefit industries supporting construction or servicing construction workers. As a whole, the County of Hawai'i would experience increased income and tax revenues with development of the Project.

The proposed University Park Expansion and Hawai'i CC will impact the physical resources of the property. Excavation and grading work will occur with the construction of new buildings and necessary infrastructure. Major facility improvements proposed for the Project include the installation of new potable and non-potable water systems, wastewater collection systems, drainage improvements, electrical/communication infrastructure, and related research, instructional, and support buildings. Environmental impacts associated with construction of the Project include noise, soil erosion, fugitive dust and exhaust emissions, and temporary traffic disruption. Other anticipated impacts include increased traffic, solid waste generation, and demand for electricity. Mitigative measures will be implemented to address these impacts, which are not expected to be significant over the 20-year build-out period.

PROPOSED MITIGATIVE MEASURES

Various mitigative measures will be implemented throughout the development of the Project to minimize environmental impacts. All major infrastructure improvements will

incorporate necessary engineering and design methods to ensure that basic infrastructure requirements are met and environmental resources are not damaged.

Drainage/Flood Control/Water Quality/Soil Erosion
In accordance with the Storm Drainage Standards of the County of Hawai'i (October 1970), on-site storm drainage facilities will be sized to control runoff in excess of estimated pre-development quantities. Drywells will be constructed on-site to retain the increased runoff and the overflow will enter the drainage systems in roadways, which consist of catchbasins and pipe drains. Runoff collected will ultimately be discharged directly into two existing drainageways located below the Project site. Drainage improvements and extensive vegetation and numerous cracks in the pāhoehoe lava flows surrounding the Project site will reduce surface runoff and prevent water quality impacts at Waiākea Stream, Waiākea Pond, Wailoa River and the south part of Hilo Bay. The Project will comply with rules and regulation of the National Flood Insurance Program whenever work is required within a flood zone. In addition, the area contributing to the Zone A designation will be greatly reduced with construction and related drainage improvements of the Sunrise Estates Subdivision west and mauka of the Project site. Effective design will minimize soil erosion from excavation and grading work, which will comply with permit provisions of the County and State Department of Health.

Flora and Fauna
No endangered or threatened flora or fauna exist within the Project area. Some native plants will be removed yet can be found elsewhere in 'ōhi'a/uluhe forests in the Puna and Hilo regions. In accordance with Act 73 of the Hawaii Revised Statutes, the landscapes for the buildings and facilities of the State-funded development will incorporate native Hawaiian plants wherever and whenever feasible. Nearby natural and on-site landscaped areas will provide similar habitat for the existing mammalian and avian species (which include alien species that are harmful to native avian and plant communities) that will be displaced by development of the Project.

Air Quality
Short-term impacts to air quality will result from the generation of fugitive dust and the emissions from construction equipment during construction. However, since construction will occur over several years, potential air quality impacts may be a potential problem only intermittently, during periods of major construction. Watering during construction and the use of dust barriers will largely mitigate the generation of fugitive dust and its impact on air quality. Construction activities will comply with the provisions of the Hawaii Administrative Rules, Section 11-30.1-33 on Fugitive Dust, and a dust control management plan will be developed.

Noise
Short-term noise impacts are likely to result from excavation, grading, and construction activities. However, these impacts are expected to be relatively minor as the Project site

is generally bounded on three sides by roadways. Construction equipment will be equipped with mufflers, as required by the Department of Health. Potential long-term noise impacts resulting from on-site equipment would be mitigated by the use of barriers, enclosures, and silencers. Noise generated by additional traffic is not expected to be significant due to the size of the Project.

Archaeological Resources
An archaeological inventory survey identified 19 sites, 17 of which required no further work. Data recovery was recommended for the two other sites associated with military use. No pre-Contact sites were identified as historic agriculture and pasture activities and the Lava Flow of 1881 severely altered the land of the Project site.

Visual Resources
Zoning regulations limit structures to a height of 45 feet. Most buildings and accessory facilities associated with the Project are likely to be single- or 2-story structures similar to those of the existing University Park. To mitigate visual impacts in the immediate Project vicinity, the *UHH Mauka Lands Master Plan (Draft)* (Appendix G) recommends a 50-foot landscape setback buffer along the western edge of the University Park Expansion. The buffer will continue along Mohouli Street Extension and widen to 100 feet along Komohana Street (providing 50 feet for road-widening considerations). The north and west edges of the Hawai'i CC will be augmented with native plant material to create a natural edge that blends into adjacent parcels. In addition, design plans will incorporate existing trees and native plants into the landscaping concept to mitigate visual impacts. Appropriate mitigative measures would also be implemented to prevent potential light pollution effects on the astronomical observatories on Mauna Kea.

Public Services and Utilities
All new major backbone infrastructure will be sized in accordance with Project requirements. Electrical and communication improvements necessary to support the requirements of this Project will be served from existing and proposed utility systems.

Traffic
Major roadway improvements proposed for the Project primarily include internal circulation roadways. Regional improvements developed independent of the Project, but significantly improving access to the UHH Mauka Lands Master Plan, include the Mohouli Street Extension, the Pū'ainakō Street Extension, and the proposed Nowelo Street Extension. All of the major roadways and intersections planned for the Project are expected to operate under their designated capacity, and potential traffic impacts will be mitigated with the implementation of various on- and off-site transportation improvements.

ALTERNATIVES CONSIDERED

In compliance with provisions of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 11-200-17(f), the alternatives to the proposed project are limited to those that would allow the objectives of the Project to be met, while minimizing potential adverse environmental impacts. The "no-action" alternative was rejected as it was not consistent with the stated governmental policies (Hawai'i County *General Plan*, Land Use Pattern Allocation Map) of establishing the property for University Use and as an Urban Expansion area. Under this scenario, the Project site would remain undeveloped and the positive socio-economic benefits associated with the Project would not be available.

Expanding University Park on State land elsewhere in Hilo could provide similar benefits but would be inconvenient for UHH students and faculty, as facilities would be scattered around Hilo. Rebuilding Hawai'i CC at the Manono Campus would probably not be feasible, as the site is significantly smaller than the proposed property mauka of University Park. An on-site parking structure would likely be required to accommodate off-street parking at the Manono Campus. These alternatives were therefore rejected.

The proposed Hawai'i CC Komohana Campus site was selected during the development of the 1996 *Hawai'i Community College Long Range Development Plan* (LRDP) (Appendix H). The southern portion of the property was selected to be the campus site, leaving the northern portion for the University Park Expansion.

The alternative of postponing the Project pending further study was also rejected as the expansion of University Park and relocation of Hawai'i CC onto the property is logical and consistent with stated governmental policies of establishing the property for University Use and Urban Expansion.

Alternatives land uses such as residential, commercial, industrial, agricultural, park, open space, and resort do not meet the Project objectives of expanding University Park and building a permanent campus for Hawai'i CC.

UNRESOLVED ISSUES

Presently, there are no known unresolved issues associated with the Project.

COMPATIBILITY WITH LAND USE PLANS AND POLICIES

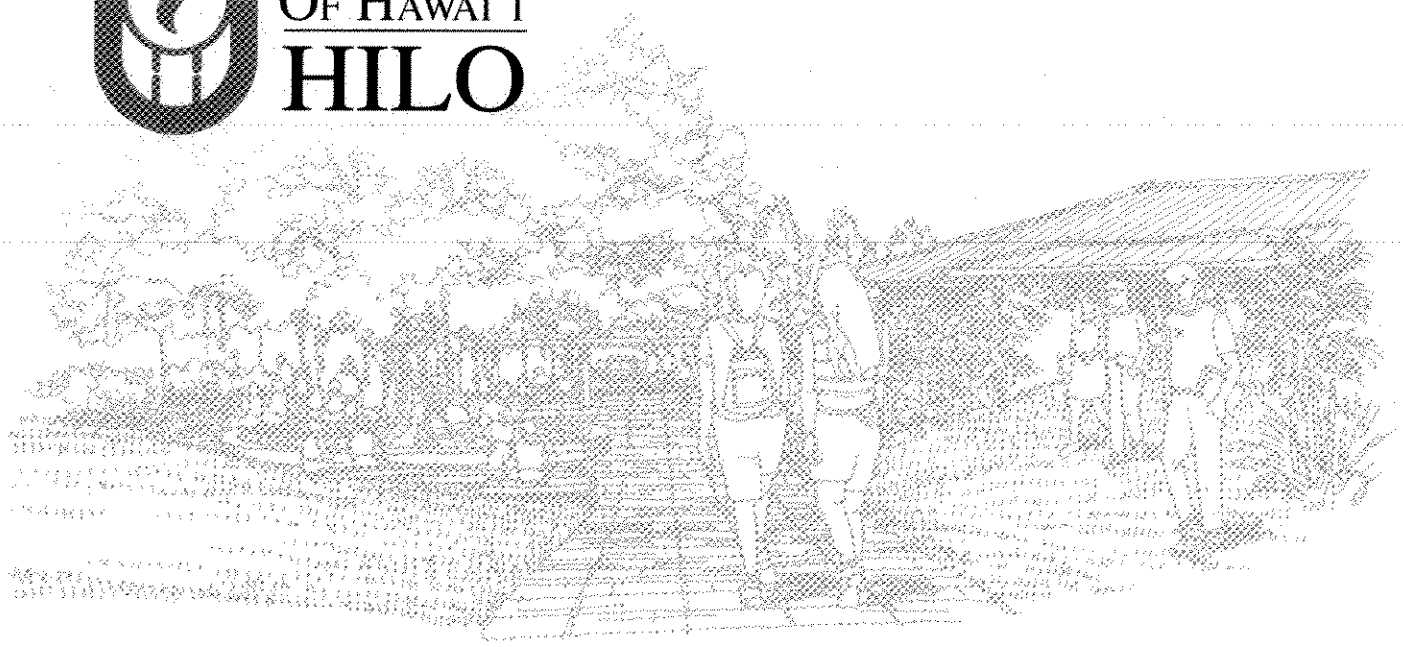
The Land Use Pattern Allocation Map of the County of Hawai'i *General Plan* identifies the property as University Use and Urban Expansion. The Project will conform to the *General Plan* goals, policies, and standards, the State of Hawai'i Land Use District regulations, and the Zoning District standards.

LISTING OF PERMITS OR APPROVALS

The following is a preliminary list of major permits and approvals required for implementation of the UHH Mauka Lands Master Plan.

Permit/Approval	Responsible Agency
Chapter 343, HRS compliance	University of Hawai'i at Hilo Office of Environmental Quality Control
State Land Use District Boundary Amendment	Land Use Commission
Use Permit or Zoning	County of Hawai'i Planning Department
Grading/Building Permits	County of Hawai'i Department of Public Works
NPDES Permit	State Department of Health
Water	County of Hawai'i Department of Water Supply
ADA Accessibility	Disability and Communication Access Board
UIC Permit (for drywalls)	State Department of Health
Approval for Sewer Connection	County of Hawai'i Department of Environmental Management
Approval for Road Connection (to Komohana Street)	County of Hawai'i Department of Public Works
Approval for Road Connection (to Pū'ainakō Street)	State Department of Transportation
Plan Approval	County of Hawai'i Planning Department

UNIVERSITY OF HAWAI'I HILO



1.0 PROJECT SUMMARY

1.0 PROJECT SUMMARY

1.1 PROJECT OVERVIEW

The following summary describes the project location, existing entitlements, and proposed actions:

Project Name:	University of Hawai'i at Hilo Mauka Lands Master Plan
Location:	Hilo, Hawai'i (Figure 1)
Judicial District:	South Hilo
Landowner:	State of Hawai'i
Applicant:	University of Hawai'i at Hilo (UHH)
Tax Map Key:	2-4-01:122 (Figure 2)
Project Area:	267.030 acres
Existing Uses:	Vacant
State or Federal Register:	No historic sites on the State or Federal Register are found on the property.
Proposed Use:	~~Expansion of~~ UHH University (Research) Park and ~~Proposed~~ Hawai'i Community College ~~to~~ Komohana Campus (Figure 3)
Land Use Designations:	State Land Use: Agricultural District (Figure 4) General Plan LUPAG Map: University Use and Urban Expansion (Figure 5) County Zoning: A-1a (Figure 6) SMA: Property is outside of the SMA
Major Permits/ Approvals Required:	Compliance with Chapter 343, *Hawaii Revised Statutes* State Land Use District Boundary Amendment County Use Permit or Rezoning Plan Approval
Accepting Authority:	University of Hawai'i at Hilo for the Governor, State of Hawai'i

1.2 COMPLIANCE WITH CHAPTER 343, HAWAII REVISED STATUTES

Pursuant to ~~Section~~ Chapter 343-5©, *Hawaii Revised Statutes* (HRS), this ~~Draft~~Final Environmental Impact Statement (~~DEIS~~FEIS) will be filed with the Office of Environmental Quality Control (OEQC) and published in *The Environmental Notice*. The impacts of the adjoining United States Department of Agriculture (USDA) Pacific Basin Agricultural Research Center (PBARC) project were addressed in a Final Environmental Assessment (FEA) dated October 2002, and the cumulative impacts of the PBARC project ~~will be~~are addressed in this UH Hilo Mauka Lands Master Plan ~~DEIS~~FEIS.

1.3 IDENTIFICATION OF ACCEPTING AUTHORITY

In accordance with Chapter 343, *Hawaii Revised Statutes* (HRS), and *Hawaii Administrative Rules* (HAR), Title 200, Section 11-200-4, whenever an agency proposes an action, the final authority to accept a statement shall rest with the Governor, or an authorized representative, whenever an action proposes the use of State lands or State funds. Therefore, the ~~Governor~~ University of Hawai'i at Hilo is the Accepting Authority for the ~~Final~~ FEIS.

1.4 IDENTIFICATION OF AGENCIES/INDIVIDUALS CONSULTED

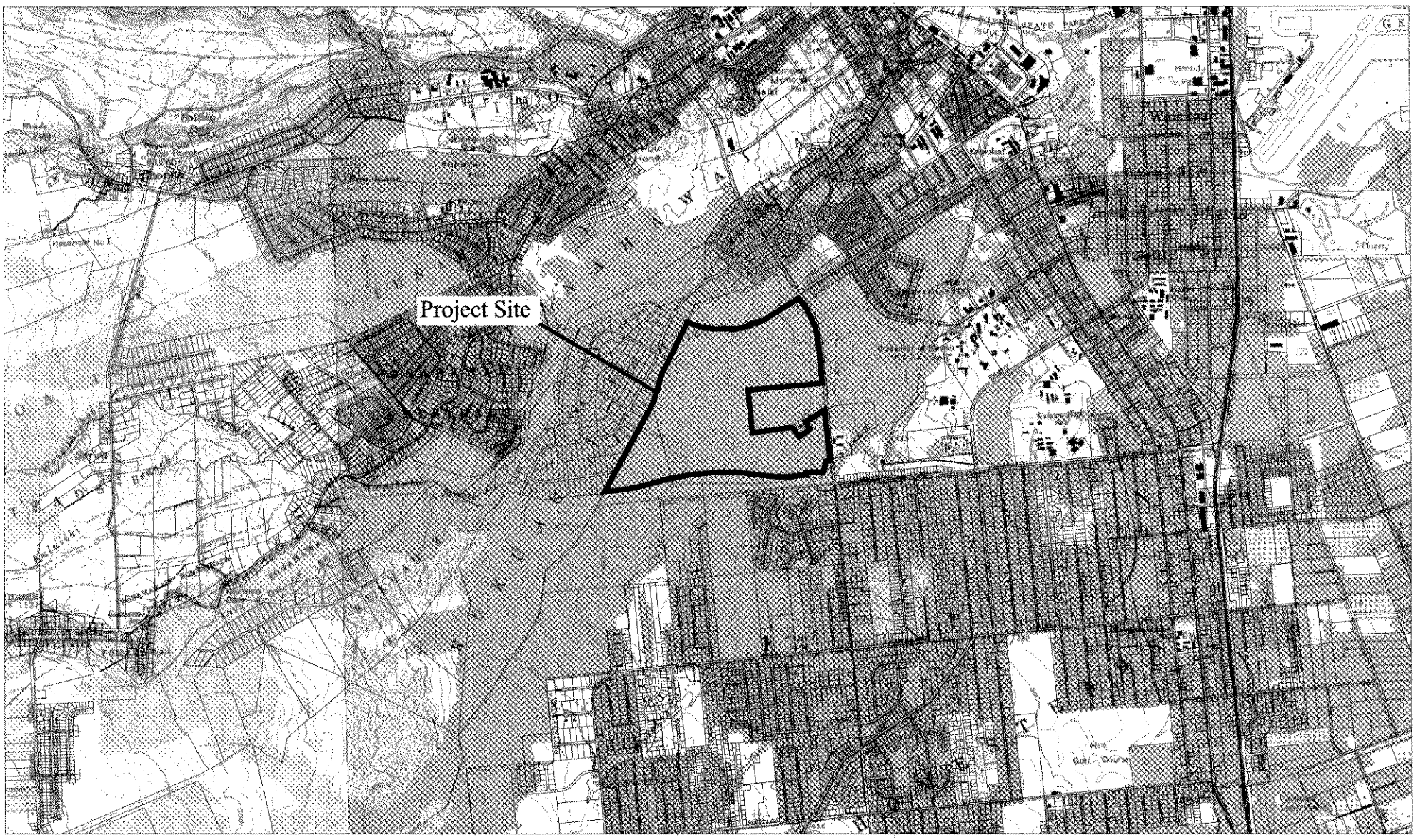
The ~~following~~ agencies (or agency documents) and individuals that were consulted and/or provided information for the preparation of this ~~D~~EIS are listed in Chapters 14.0 and 15.0.

~~Federal~~

- ~~U.S. Army Corps of Engineers~~
- ~~Department of the Interior, Fish and Wildlife Service~~

~~State of Hawai'i~~

- ~~Department of Business Economic Development & Tourism~~
- ~~Department of Business Economic Development & Tourism, Energy, Resources & Technology Division~~
- ~~Department of Business Economic Development & Tourism, Energy, Resources & Technology Division~~
- ~~Department of Health~~
- ~~Department of Health, Noise, Radiation & IAQ Branch~~
- ~~Department of Health, Wastewater Branch~~
- ~~Department of Health, Solid and Hazardous Waste Branch~~
- ~~Department of Land and Natural Resources~~



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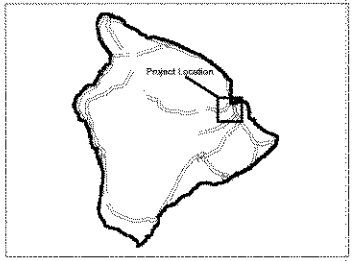
Project Boundary



Source: United States Geologic Survey and Tax Map Key
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Figure 1
Location Map
UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

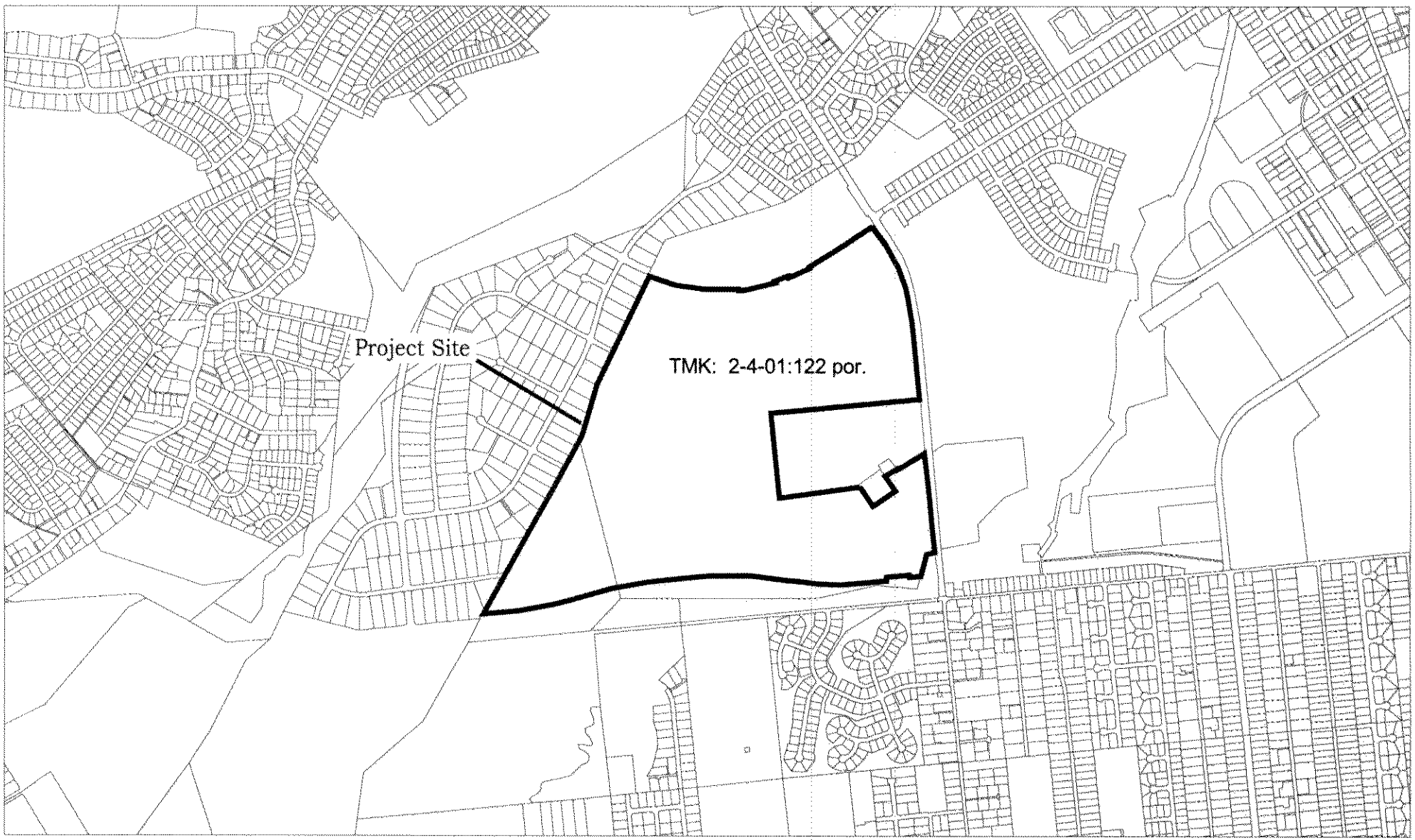
NORTH

1500 0 3000

(FEET)

PBR HAWAII

8/07/03



Legend

Project Boundary

Figure 2
Tax Map Key
UHH Mauka Lands Master Plan
HILO, ISLAND OF HAWAII

NORTH

750 0 1500
(FEET)

PBR HAWAII

8/07/03

Source: Tax Map Key
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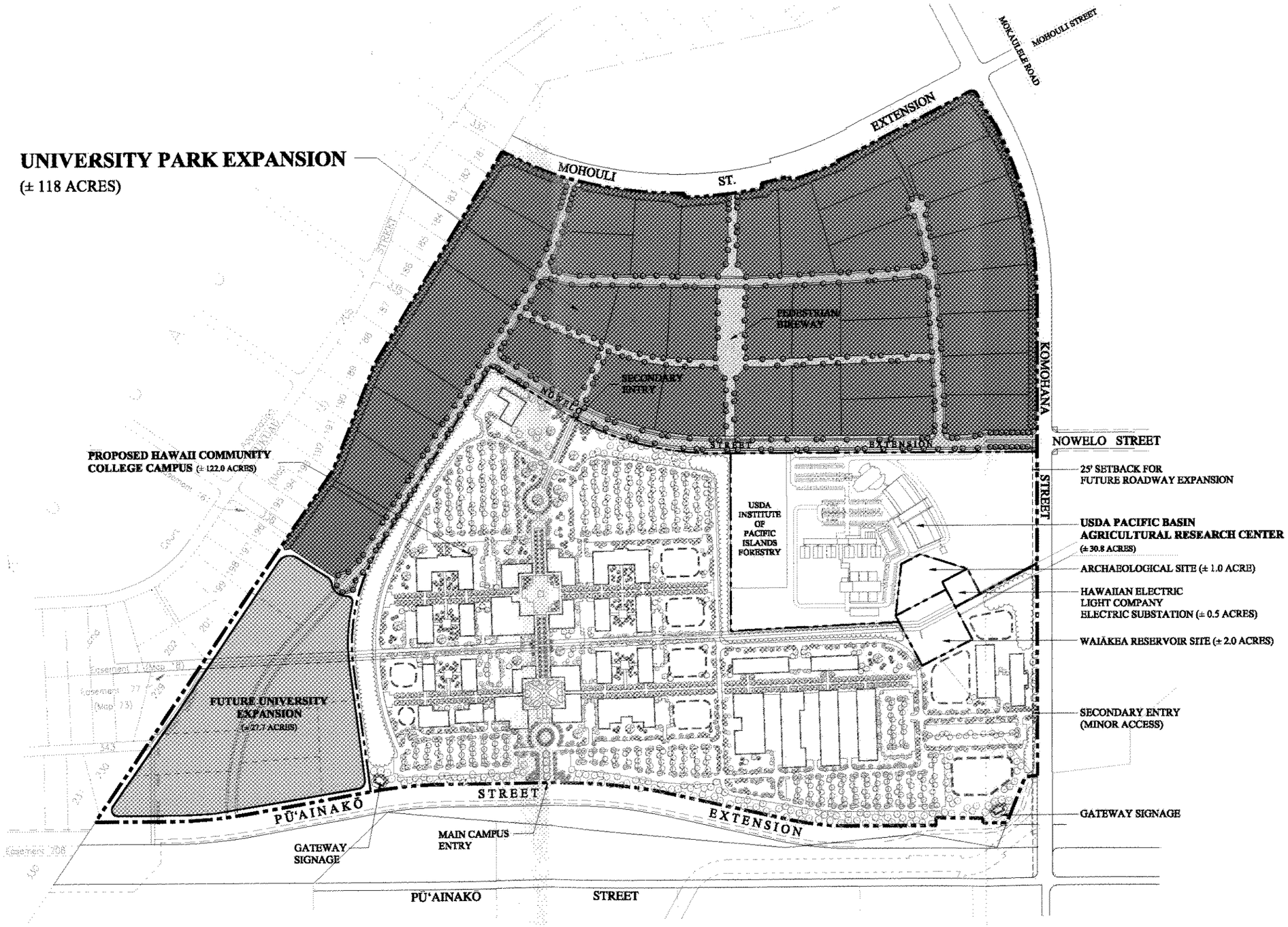
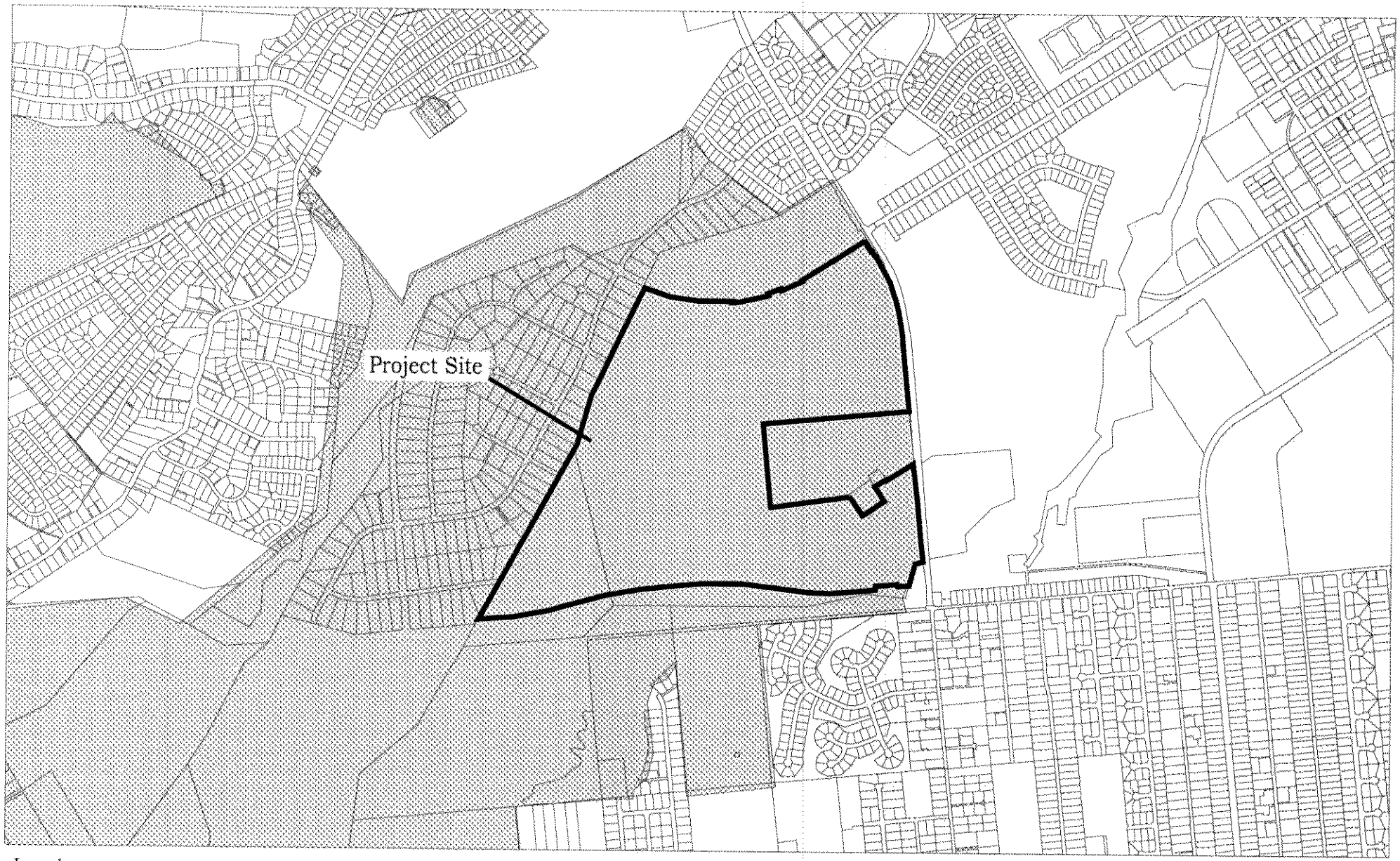


Figure 3
PRELIMINARY MASTER PLAN

UH HILO MAUKA LANDS MASTER PLAN

HILO, ISLAND OF HAWAII

AREA SCALE 1 Acre | NORTH | LINEAL SCALE (FEET) 0 200 400 800 | 07/22/2003 | PBR HAWAII



Legend

- Project Boundary
- Agricultural District
- Urban District
- Conservation District
- Rural District

Source: State Land Use Commission and County of Hawaii
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Figure 4

State Land Use

UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

NORTH

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(FEET)

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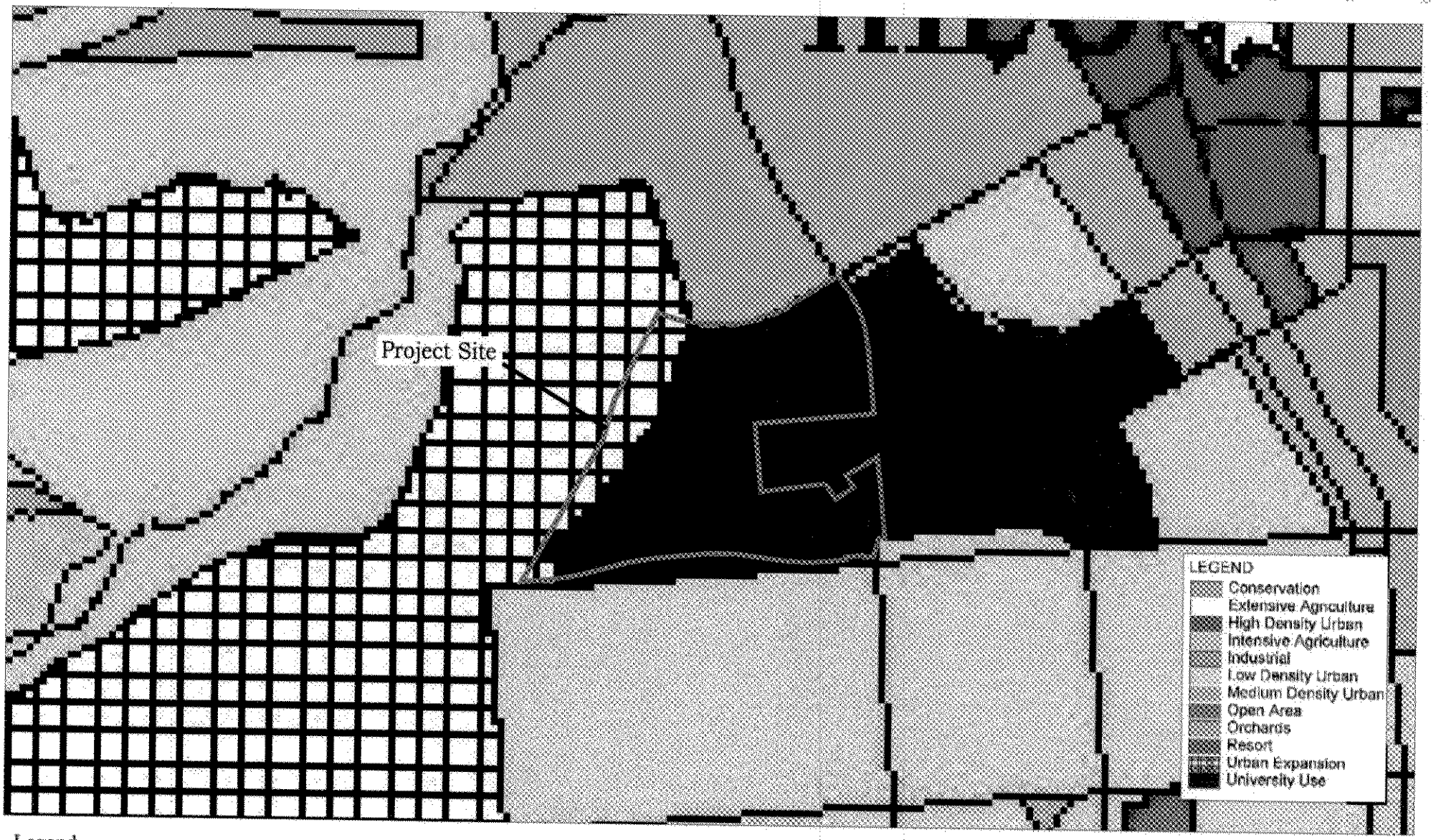

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Project Boundary

Source: General Plan, County of Hawaii
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Figure 5
General Plan Land Use Pattern
Allocation Guide Map
UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

NORTH

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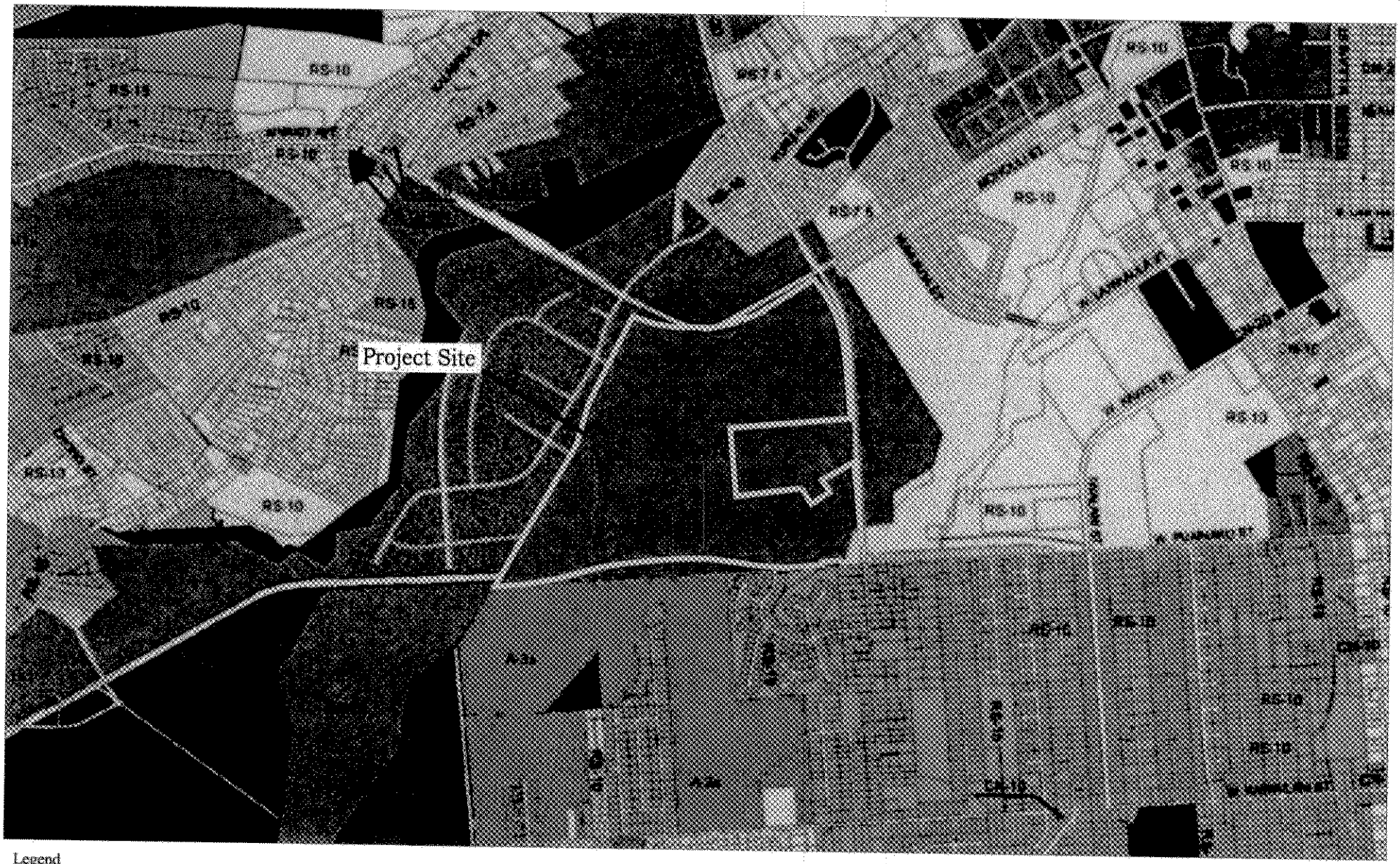

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Project Boundary

A - 1a

Source: County of Hawaii
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Figure 6
Hilo District Zoning Map
UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

NORTH

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- ~~Department of Land and Natural Resources, Historic Preservation Division~~
- ~~Department of Land and Natural Resources, Division of Forestry and Wildlife~~
- ~~Department of Land and Natural Resources, Engineering Division~~
- ~~Department of Land and Natural Resources, Commission on Water Resource Management~~
- ~~Department of Land and Natural Resources, Office of Conservation and Coastal Lands~~
- ~~Department of Land and Natural Resources, Land Division – Hawai'i District Office~~
- ~~Department of Transportation~~
- ~~Office of Environmental Quality Control~~
- ~~Office of Hawaiian Affairs~~

~~County of Hawai'i~~

- ~~Planning Department~~
- ~~Department of Parks & Recreation~~
- ~~Department of Water Supply~~
- ~~Fire Department~~
- ~~Police Department~~

~~Public Utilities~~

- ~~Hawaii Electric Light Company, Inc.~~

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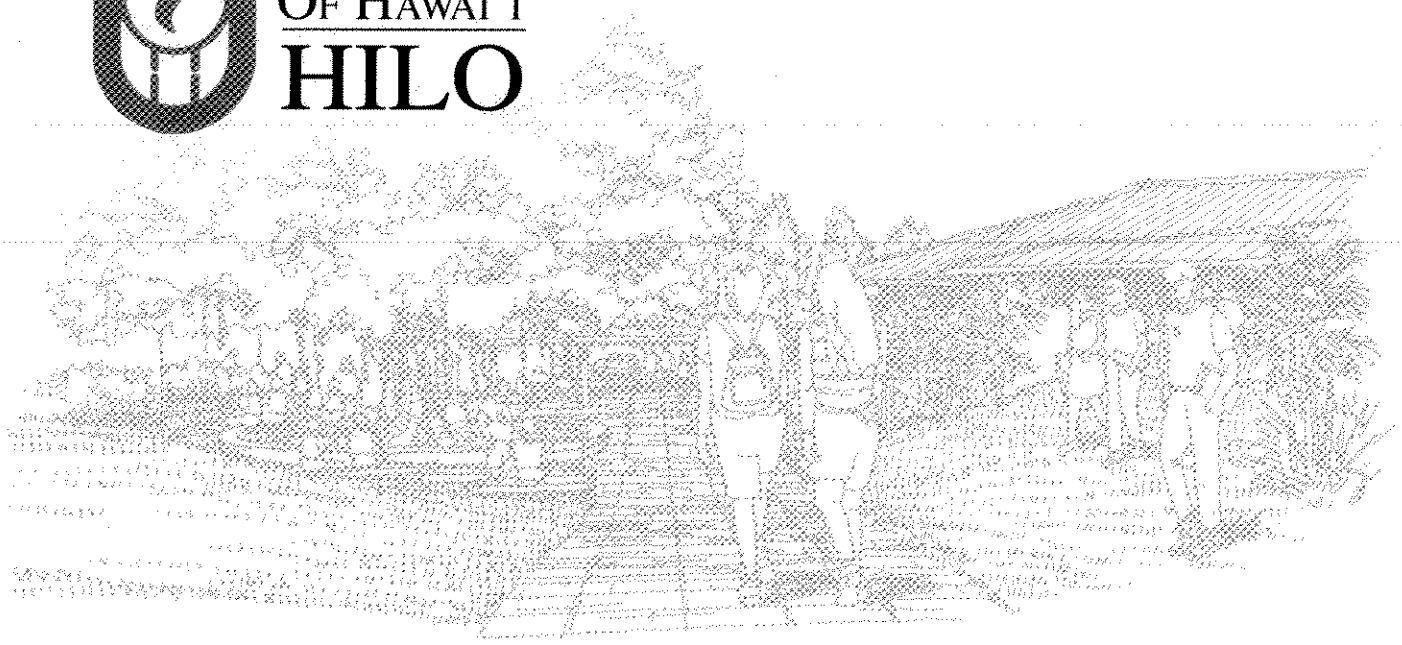
UNIVERSITY OF HAWAI'I HILO



2.0 Description of the Action's Technical, Economic, Social and Environmental Characeristics

2.0 DESCRIPTION OF THE ACTION'S TECHNICAL, ECONOMIC, SOCIAL, AND ENVIRONMENTAL CHARACTERISTICS

The following section provides general background information, a project description, a preliminary development timeframe, and approximate development costs.

2.1 *BACKGROUND*

The University of Hawai'i at Hilo (UHH) is a comprehensive four-year State University offering a residential campus on the eastern side of the Island of Hawai'i. Just minutes from Downtown Hilo, Hilo International Airport, and Hilo Bay (Figure 1), the UHH consists of a 115-acre main campus, an adjoining 116-acre University Park of Science and Technology (University Park), and a 110-acre University Agricultural Farm Laboratory located in Pana'ewa Agricultural Park.

The University of Hawai'i – Hawai'i Community College (Hawai'i CC) is a State Community College that separated from the UHH in the fall of 1990. The Hawai'i CC Manono Campus continues to share facilities and services with the UHH, although it is planned for relocation to a new Komohana Campus across from the University Park.

2.2 *LOCATION AND DESRIPTION OF THE PROPERTY*

The UHH University Park Expansion and the Hawai'i CC ("the Project") will be developed on a 267-acre State-owned parcel located in the city of Hilo. Mauka of the UHH University Park, the parcel is bordered by Mohouli Street Extension to the north, Komohana Street to the east, Pū'ainakō Street Extension (recently constructed and opened to traffic in September 2004) to the south, and the Sunrise Estates Subdivision to the west (Figure 7). The State-owned parcel is classified as ceded land by the State of Hawai'i Department of Land and Natural Resources. The property is currently vacant and covered with thick vegetation.

2.3 *HISTORICAL PERSPECTIVE*

The proposed Project lies within the ahupua'a of Waiākea, which encompasses some 95,000 acres. The Waiākea ahupua'a extends from the coast to approximately the 6,000-foot elevation on the windward slope of Mauna Loa. Five zones of land use and associated resources were described for this ahupua'a, including Coastal Settlement

(Zone 1), Upland Agricultural (Zone 2), Lower Forest (Zone 3), Rain Forest (Zone 4), and Sub-Alpine (Zone 5). The property is situated within the lower elevations of Zone 3, the Upland Agricultural Zone.

Late Prehistoric Through 1800s

Chiefly residences are documented within the Waiākea ahupua'a as early as ca. 1550. Rich resources such as fishponds, crops, sandalwood, bird feathers, and later the whaling industry attracted chiefs. Kamehameha I retained Waiākea after conquering the island, and later gave the 'ili of Pi'opi'o to his favorite wife Ka'ahumanu.

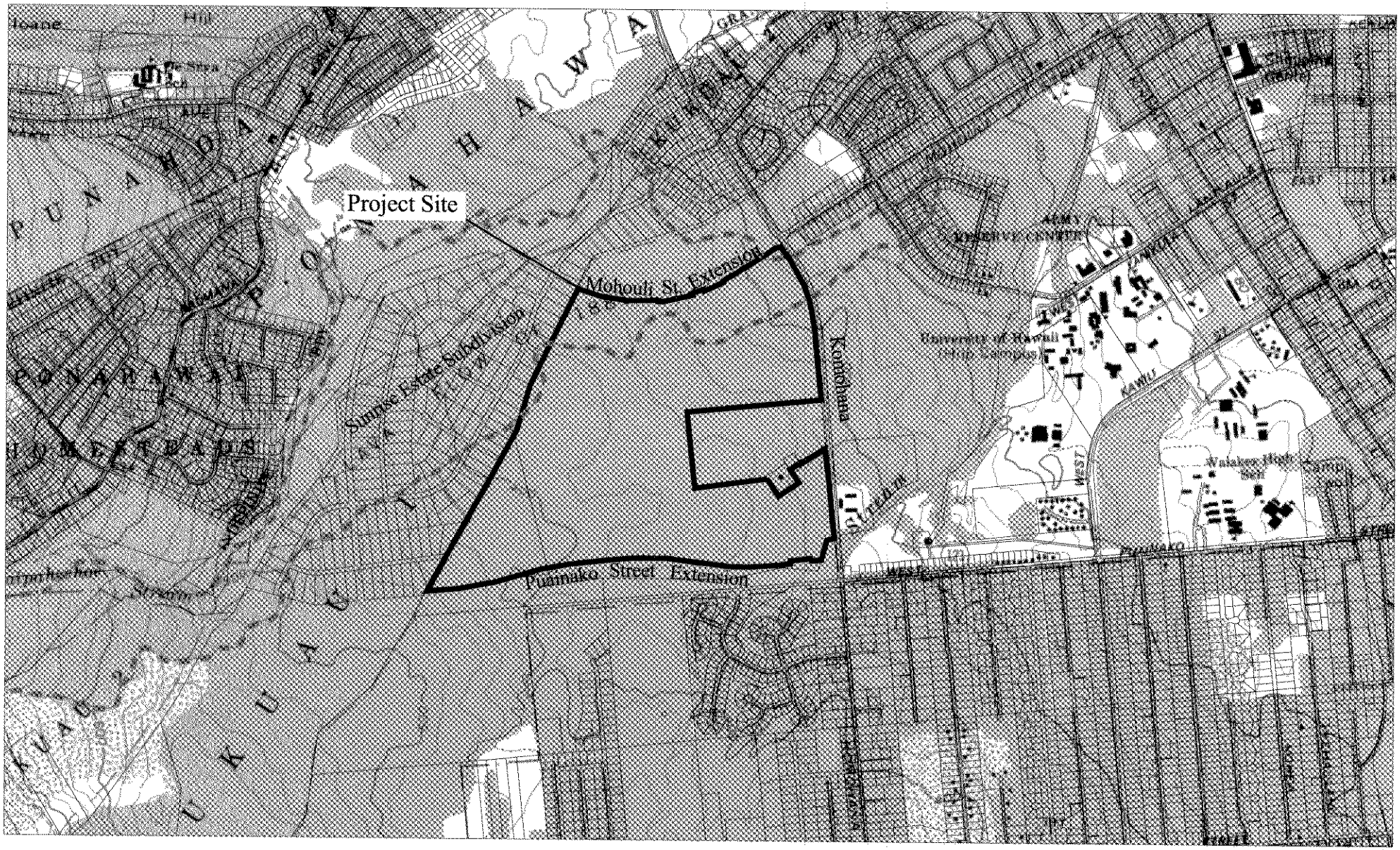
In the early 1800s, a shift from subsistence-based to market-based economy developed. This occurred with the arrival of the sandalwood trade and the whaling industry, as well as the establishment of the American Board of Commissioners for Foreign Missions station in Hilo. Land use remained essentially the same during this time yet was beginning to evolve as industries such as cattle, timber, and whaling intensified. These land uses continued in the mid-1800s, particularly following the Great Mahele and the privatization of land.

With the advent of sugarcane and the Waiākea Mill Company in the late 1800s, plantations developed in the 1860s, and by 1888 the Waiākea Mill had procured the entire Waiākea ahupua'a. Camps near existing sugarcane railroad lines housed immigrant labor.

1900s to Present

In the 1900s, sugarcane production expanded and areas too rocky for sugarcane were used as pasture for the Parker and Shipman Ranches. A substantial amount of grazing land adjacent to Hilo supported cows for several dairies in Hilo. Several large tracts of remaining forest in Waiākea were designated as forest reserve in the 1920s.

By the late 1900s, major construction projects were completed in the Hilo area such as Hilo Bay wharfs, breakwater, and bridges, the Hilo Airport, and construction of Saddle Road. After Statehood and the closing of the sugar mill and cane plant, tourism emerged as the next economic mainstay. Some hotels were built along the Hilo Bay frontage of Waiākea, near Coconut Island (Mokuola). Adjacent to the Project area, large tracts of former Waiākea Homestead and sugarcane lots were converted into housing. The UHH campus was constructed and continues to expand. The Project area most likely ceased to be utilized for pasturage in the 1960s. Since that time, a portion of the property has been used to construct the County's Waiākea Reservoir, waterlines, the Hawaii Electric Light Company, Inc. (HELCO) Komohana electrical substation, Mohouli Street Extension, Pū'ainakō Street Extension, and the planned PBARC complex.



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Project Boundary

Lava Flow of 1881 Boundary

Source: United States Geologic Survey
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Figure 7
Vicinity Map
UHH Mauka Lands Master Plan
HILO, ISLAND OF HAWAII

NORTH

750 0 1500
(FEET)

PBR HAWAII

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2.4 SURROUNDING LAND USES

Vacant State land and the Mohouli Street Extension border the northern portion of the parcel. Komohana Street separates the eastern portion of the parcel from the existing University Park, which is currently being developed by the UHH and has a number of tenants (primarily research and Astronomy-related facilities). Vacant State land and the Pū'ainakō Street Extension border the southern portion of the parcel. Residential developments in the vicinity of the site include the Komohana Gardens Subdivision to the south and the Sunrise Estates Subdivision located west (mauka).

On the eastern portion of the site, four outparcels border Komohana Street. ~~Hawaii Electric Light Company (~~The HELCO~~)~~ Komohana Substation (TMK: 2-4-01:166) is located on an approximately half-acre piece of land. Adjacent to the substation is the 0.5-million gallon (MG) Waiākea Reservoir (TMK: 2-4-01:40), located on a 2.066-acre land parcel. Adjacent to these utilities are the 1.4-acre archaeological preservation area (TMK: 2-4-01:170) and the proposed USDA PBARC (TMK: 2-4-01:169) on a 30-acre parcel of land.

2.5 PURPOSE AND NEED FOR THE PROJECT / STATEMENT OF OBJECTIVES

In order to build upon the economic and educational synergy created between the University, the University Park research facilities, and the community, the UHH plans to expand University Park onto currently undeveloped State lands mauka of the existing University Park. The proposed University Park Expansion will encompass approximately 118 acres, and the remainder of the 267-acre State-owned parcel will be used to develop a permanent campus for the Hawai'i CC (122 acres) and other University-related functions (28 acres).

2.6 PROJECT DESCRIPTION

The UHH Mauka Lands Master Plan involves the expansion of UHH University Park and the relocation of Hawai'i CC in Hilo, Hawai'i. The UHH University Park Expansion and the Hawai'i CC developments will be referred to as "the Project". Located west of Komohana Street, mauka of the existing University Park between Mohouli Street Extension and the Sunrise Estates Subdivision, and wrapping around or surrounding the proposed USDA PBARC, the Project will occupy approximately 267 acres of currently undeveloped land.

The UHH Mauka Lands Master Plan (Figure 3) includes 39 lots ranging in size between 1.9 and 5.7 acres, with most lots averaging 2.5 acres. The lots surround a 4.7-acre pedestrian court in a campus-like environment. The pedestrian court will provide a pedestrian and bicycle link to the proposed Hawai'i CC Komohana Campus and the PBARC, encouraging synergistic connections with neighboring research and educational facilities.

The *Hawai'i Community College Long Range Development Plan* (LRDP) (Figure 3) includes approximately 122 acres to accommodate the proposed Komohana Campus and an ultimate student population of 3,000 Full-Time Equivalent (FTE). Program requirements total a projected assigned square footage of 564,053.

The following summarizes the *UHH University Park Expansion Master Plan (Draft)* (Appendix G) and the *Hawai'i CC LRDP* (Appendix H).

2.6.1 PLAZAS AND OPEN SPACES

Central open spaces link the University Park Expansion, the Hawai'i CC, and adjacent properties via pedestrian/bikeway corridors to create a campus-like atmosphere and encourage pedestrian and bicycle use.

An approximately four-~~(4)~~-acre, 150-foot-wide Central Courtyard is proposed to run in a north-south direction through the University Park Expansion. The Central Courtyard is envisioned as a beautifully landscaped area where researchers and employees can exercise, eat, or gather and interact. The Central Courtyard is typically 40 feet wide and would provide pedestrian and bicycle links to nearby streets, the USDA PBARC, and the Hawai'i CC Komohana Campus.

The *Hawai'i CC LRDP* establishes a hierarchical system of open spaces. The Central Plaza and Entry Courtyard are connected by the North-South Mall, which is a major pedestrian spine. A clock tower in the middle of the Central Plaza will be the focal point and landmark element of the campus. Buildings that house facilities central to Hawai'i CC function will enclose the Central Plaza and Entry Courtyard.

2.6.2 BUILDINGS/FUNCTIONAL SITING

Design Guidelines for the University Park Expansion are being prepared to provide the overall placement and standards for buildings.

The Hawai'i CC campus is designed for one- and two-story structures. Design Guidelines published in the 1996 LRDP provide the overall design direction, materials, and standards for the building projects. Three support facilities most frequented by

visitors or night students (Student Services Administration Building, Institutional Support Office Building–including the Security Command Center, and OCET) form the Entry Plaza or "front door" to the campus and are clustered around the Entry Courtyard.

2.6.3 LANDSCAPING

A 50-foot landscape setback buffer is recommended along the western edge of the Project to screen the developments from the Sunrise Estates Subdivision. The landscape buffer should continue along Mohouli Street Extension and possibly widen to 100 feet along the Komohana Street side of the property, allowing 50 feet for possible road widening. As recommended in the Cultural Impact Assessment, established vegetation, particularly any existing native or rare plants such as 'ōhi'a lehua and hāpu'u groves, should remain within this buffer or be preserved or transplanted throughout the Project, where appropriate. Landscaping for the Hawai'i CC should follow a "Hawaiian Garden" concept. Courtyards with theme gardens and accent plantings along major pedestrian paths and at entries will enhance the campus' sense of hierarchy and educational value. The northern edge of the campus should be augmented with native plant material to create a natural area that blends into adjacent parcels. An archaeologically-sensitive area at the intersection of Komohana Street and Pū'ainakō Street Extension is envisioned to remain an undisturbed area with re-established native plants.

2.6.4 GATEWAYS AND ENTRIES

Gateways and entries can enhance community image and define identities of the UHH University Park Expansion and the Hawai'i CC, while creating a sense of arrival. Gateway elements including signage and special landscaping features will be provided at two gateways (at the corner closest to the intersection of Komohana and Pū'ainakō Streets and the southwest corner along the Pū'ainakō Street Extension) along the periphery of the Hawai'i CC campus.

Elements important to the design of entries include generous drop-off locations and landscaping designed for directing views into the site. Main entry to the University Park Expansion is proposed off Komohana Street where it intersects with Nowelo Street Extension. The Nowelo Street entry will have a 89-foot right-of-way, with four 12-foot-wide travel lanes (two in each direction), a 9-foot-wide median, two 6-foot-wide bicycle lanes (one in each direction), 10-foot-wide sidewalks, and a 15-foot-wide utility easement on one side. Four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting. An additional entry will be off the Mohouli Street Extension. The primary entry to Hawai'i CC will be off the Pū'ainakō Street Extension and will include double-traffic lanes, a generously-landscaped median, and ten-foot-wide sidewalks. This entry will

be embellished with special landscaping treatment, signage, and lighting. A second major entry, from Nowelo Street Extension, will include a landscaped median, signage, and tree plantings along the street. Both entries will have large turnaround loops, which could display landmark works of art or other special entry features. Accent lighting and appropriate signage should also be installed. A minor entry could be provided off Komohana Street (right turn in, right turn out only) to serve as a more direct entry for the Agriculture/Agroforestry and other programs, if allowed by the County of Hawai'i. This entry would help keep heavier traffic away from the main campus and serve as an emergency egress.

2.6.5 PEDESTRIAN AND BICYCLE CIRCULATION

Pedestrian Access and Circulation. An interconnected pedestrian network throughout the University Park Expansion includes sidewalks along roadways to provide access to all lots within the site. The pedestrian mall provides a pedestrian and bicycle link, separated from vehicle traffic, through the University Park Expansion to the Hawai'i CC campus and USDA facilities. At the Hawai'i CC, major pedestrian paths and covered walkways along the North-South Mall will be designed as arcades and loggias along the buildings fronting the Mall and Central Plaza. Secondary courtyards and groupings of classroom buildings are organized around the North-South Mall and connected by secondary pathways providing links to each instructional facility. Additional minor pathways will consist of covered and uncovered walkways providing access between buildings and parking lots.

Bicycle Access and Circulation. Bicycle lanes will be provided along the Nowelo Street Extension. A separated bikeway system at the University Park Expansion will provide bicycle access on paths within the pedestrian mall and to the Hawai'i CC campus and the USDA facilities.

Barrier-Free Access and Circulation. Sidewalks and pedestrian malls will be sized and planned to ensure that individuals with disabilities have access to lots within the University Park Expansion, the Hawai'i CC, and the USDA facilities. Development within the Project must comply with requirements of the American's with Disabilities Act.

2.6.6 VEHICLE CIRCULATION AND PARKING AREAS

The main vehicular entry to the University Park Expansion will be from Komohana Street via the Nowelo Street Extension, just opposite of the entrance to the existing University Park. From the entry, the roadway will taper down to an 80-foot right-of-way, with four 12-foot-wide travel lanes (two in each direction), two 6-foot-wide bicycle lanes, 10-foot-wide sidewalks (one in each direction), and a 15-foot-wide utility easement on one side. Four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting. A

secondary vehicular entry will be provided from Mohouli Street Extension. Access to each lot will be from internal roadways (similar to the roadway from Nowelo Street entry except with a 60-foot right-of-way) or Nowelo Street Extension, which will terminate at a T-intersection with an internal road. Should the remaining 28 acres of "future university expansion" at the southwestern corner of the parcel be developed into additional lots, the internal road running in a north-south direction from Mohouli Street could be extended to connect with Pū'ainakō Street Extension.

The main vehicular entry to Hawai'i CC will be from Pū'ainakō Street Extension, which provides a major link between Volcano Highway (Highway 11) and Saddle Road (Highway 20). A secondary, rear entry would be provided by the proposed Nowelo Street Extension. Currently, Nowelo Street runs makai from Komohana Street into the University Park. Once the proposed bridge connection over Waiākea Stream is complete, Nowelo Street will provide a direct connection to the UHH main campus and the USDA research facilities. The extension of Nowelo Street across Komohana Street will also promote access between the Hawai'i CC campus, the University Park Expansion, and the USDA facilities. As noted in Section 6.5.2, a minor entry is being considered for limited (right turn in, right turn out only), controlled access off Komohana Street, near the Agriculture facility. This minor access would allow large trucks to directly access the agriculture and shop facilities when necessary. A 24-foot-wide loop road will connect the entries and front and rear parking lots at Hawai'i CC. A second loop road will encircle the Trade & Industry facilities and their parking area. Primary parking areas within the Hawai'i CC are located along the northern and southern boundaries, off the main and rear entries. These proposed locations limit vehicle movement to the periphery and give priority to pedestrians. Convenient and accessible parking for individuals with disabilities (when major parking lots are too far from buildings), restricted parking, and loading zones are addressed with smaller, interior parking lots located near facilities and the primary pedestrian pathways. All parking will be at-grade, and over 2,500 stalls can be developed. This exceeds the number of stalls the campus programs require, therefore, parking areas can be phased in as needed. In primary parking lots, curbs, rather than wheel stops, will allow for wider landscaped areas to break up the rows of automobiles.

2.6.7 SERVICE VEHICLE ACCESS

Service vehicles will access lots through internal roadways at the University Park Expansion and loop roads at the Hawai'i CC campus. Within each lot, service access will be sized and located to conform to County of Hawai'i requirements. To the extent possible, service areas should be located away from major pedestrian paths and building entries and should be hidden from view from roadways. Walls, fencing, and/or landscaping should be used to visually screen these areas.

2.6.8 EMERGENCY AND FIRE VEHICLE ACCESS

Emergency and fire vehicle access will be provided to all lots from roadways within the University Park Expansion and the Hawai'i CC. The proposed minor entry to Agricultural facilities off Komohana Street could also serve as an emergency egress. Each facility would have a service drive to enable emergency vehicles to move throughout the Project site. The minimum width of service drives would be 20 feet, meeting code requirements for the navigation of fire engines. If additional fire access is required, twenty-foot-wide easements would need to be identified between buildings.

2.7 *PHASING OF THE PROJECT*

The Project is planned for development after the Final Environmental Impact Statement (FEIS) is accepted (anticipated in 2005) and will be constructed in approximately nine phases. The first phase of the Project will include the proposed extension of Nowelo Street into the subject property and the development of the PBARC. The University Park Expansion would be developed thereafter, as market demand dictates in four subsequent phases, with full absorption of the University Park Expansion expected by 2020. Hawai'i CC administration estimates that the first phase of construction of the Hawai'i CC Komohana Campus may be completed by 2010 at the earliest.

2.8 *PRELIMINARY PROJECT COST ESTIMATE*

The preliminary cost estimate for road, water, drainage, sewer, and electrical improvements for the University Park Expansion portion of the Project is $21,830,305 in 2004 dollars. Engineering Concepts, Inc. developed this cost estimate in the *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel* (Appendix E), which is contingent on approval by various County agencies. The cost estimate does not include landscaping and irrigation costs or development costs such as permit fees, design, administration, construction inspection, surveying soil investigation, water development charge, sewer connection charge, etc. Infrastructure costs within the Hawai'i CC are not included in the cost estimate, with the exception of a low service water line that will be used to form a loop.

Total construction cost for the proposed Hawai'i CC Komohana Campus is approximately $211,117,260.00 in 2003 dollars, with no escalation provided for inflation. However, current plans require development of the Hawai'i CC Komohana Campus in four phases. The first phase, anticipated for completion in 2010, is estimated to cost approximately $51,882,380.00.

2.9 *USE OF PUBLIC FUNDS OR LANDS*

The Project will require both the use of State funds and lands.

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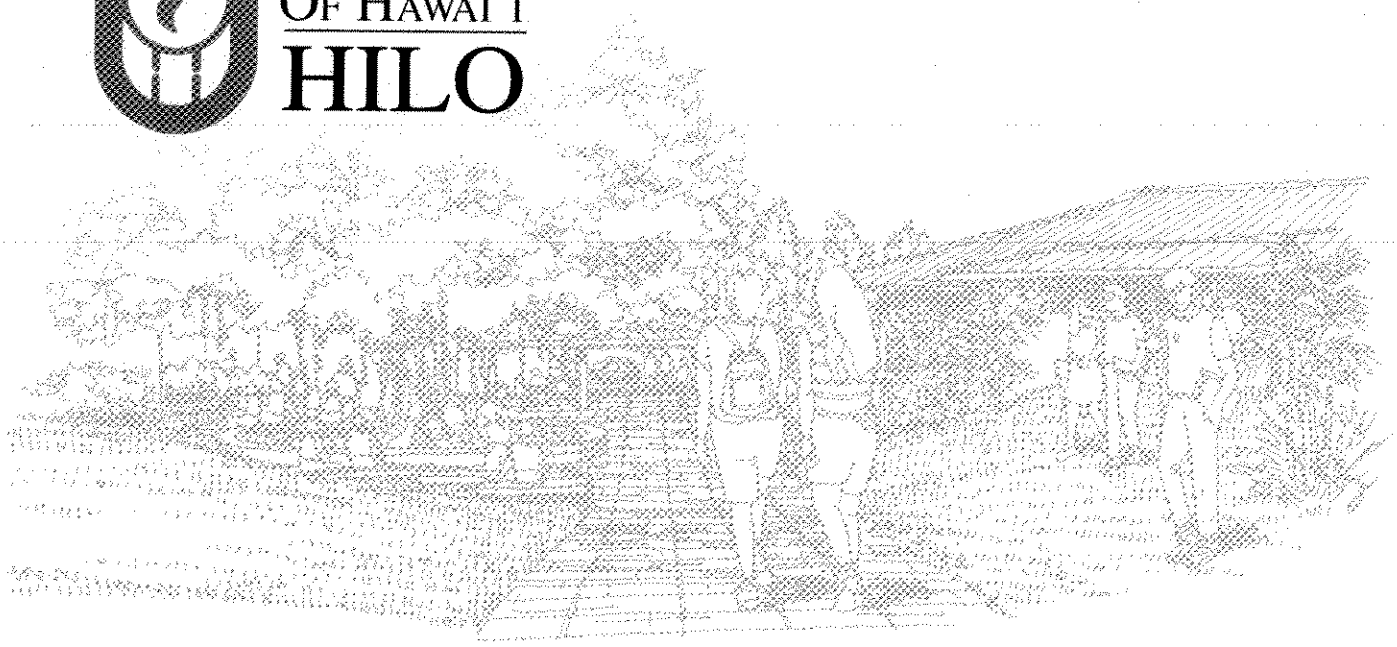
UNIVERSITY OF HAWAI'I HILO



3.0 Relationship of the Proposed Action to Land Use Plans, Policies, and Controls for the Affected Area

3.0 RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

3.1 STATE OF HAWAI'I

3.1.1 CHAPTER 343, HAWAII REVISED STATUTES

This ~~Draft~~ Environmental Impact Statement (~~D~~EIS) ~~is being~~has been prepared due to the Project's use of State lands and funds. The ~~D~~EIS ~~will~~ covers the entire 267-acre State-owned parcel, including the UHH University Park Expansion and the Hawai'i CC Komohana Campus.

3.1.2 CHAPTER 205, HAWAII REVISED STATUTES

The 267-acre State parcel is entirely within the State Land Use Agricultural District. ~~It is designated on the existing 1989 *County of Hawai'i General Plan* Land Use Pattern Allocation Guide (LUPAG) map as well as the proposed 2001 version of the LUPAG amended map for University Use (Figure 5).~~ To accommodate the proposed development, a State Land Use District Boundary Amendment (SLUDBA) will be required to amend the land use designation from Agricultural to Urban.

3.2 COUNTY OF HAWAI'I

Relevant County of Hawai'i land use regulatory policy documents and guidance plans pertaining to the Project include the *General Plan*, LUPAG map, and the Hawai'i County Code (Comprehensive Zoning Ordinance). The Project is located well outside of the Special Management Area (SMA).

3.2.1 GENERAL PLAN

The County of Hawai'i *General Plan*, adopted by ordinance in 1989, is the policy document for the long-range development of the Island of Hawai'i. The *General Plan* provides direction for the future growth of the County and contains a series of land use maps (LUPAG maps), which designate the Project site as University Use and Urban Expansion (Figure 5).

3.2.2 COUNTY ZONING

The Hawai'i County *General Plan* is also the basis for Ordinance No. 63, the County Comprehensive Zoning Ordinance. As confirmed by the County of Hawai'i Planning Department, the entire Project site is zoned Agriculture (A-1a) (Figure 6). Under the current County Zoning Ordinance, a Use Permit would be required for the University Park Expansion and the Hawai'i CC Komohana Campus. However, the County Planning Development may request an amendment to the Zoning Ordinance to create a new zoning designation for colleges and universities. The structural height limit for a non-agricultural zoning district will be followed. Prior to the construction or installation of any new structure or development, Plan Approval will be obtained from the County Planning Department.

3.3 *FEDERAL*

3.3.1 AMERICANS WITH DISABILITIES ACT (ADA)

The *Americans with Disabilities Act* (ADA) of 1990 sets guidelines for accessibility to buildings and facilities by individuals with disabilities. These guidelines are to be applied during the design, construction, and alteration of buildings and facilities covered by Titles II and III of the ADA. Guidelines will be applied to the extent required by regulations issued by Federal agencies, including the Department of Justice and the Department of Transportation, under the ADA.

Site Considerations. Primary site accessibility shall be provided from public right-of-ways to all entrance points and all individual facilities that require access. Parking for individuals with disabilities and accessible routes in accordance with ADA must be provided to link all facilities.

Building Consideration. All facilities must be totally accessible to individuals with disabilities, as governed by the ADA.

- At least one entrance, preferably the principal entrance, must interface with an accessible route on the site.
- Access must be provided to all floors of all buildings except in unusual circumstances.
- All toilet facilities must be accessible.
- Equal emergency egress must be provided for disabled and able-bodied occupants.

Because of the requirement to provide access to all floors, almost every new building two stories or higher must include an elevator(s).

All facilities will be designed to meet the ADA guidelines and the requirements of Section 103-50 *Hawaii Revised Statues* (HRS), except: 1) where compliance would cause substantial harm to cultural, historical, religious, or significant natural features and characteristics; 2) where compliance could substantially alter the nature of the setting or the purpose of the facility, or portion of the facility; 3) where compliance would require construction methods or materials that are prohibited by Federal, State, or local regulations or statutes; and 4) where compliance would not be feasible due to terrain or prevailing construction practices.

3.4 APPROVALS AND PERMITS

An approximate list of permits and approvals required for the proposed project is shown in ~~Table 3~~the following table.

~~**Table 1. Required Permits and Approvals**~~

Permit/Approval	Responsible Agency
Chapter 343, HRS compliance	University of Hawai'i at Hilo Office of Environmental Quality Control
State Land Use District Boundary Amendment	Land Use Commission
Use Permit or Zoning	County of Hawai'i Planning Department
Grading/Building Permits	County of Hawai'i Department of Public Works
NPDES Permit	State Department of Health
Water	County of Hawai'i Department of Water Supply
ADA Accessibility	Disability and Communication Access Board
UIC Permit (for drywalls)	State Department of Health
Approval for Sewer Connection	County of Hawai'i Department of Environmental Management
Approval for Road Connection (to Komohana Street)	County of Hawai'i Department of Public Works
Approval for Road Connection (to Pū'ainakō Street)	State Department of Transportation
Plan Approval	County of Hawai'i Planning Department

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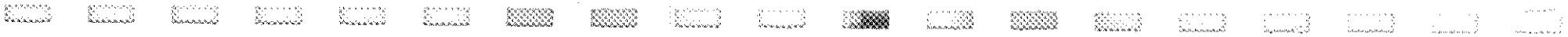
UNIVERSITY OF HAWAI'I HILO

4.0 Physical and Biological Environment



4.0 PHYSICAL AND BIOLOGICAL ENVIRONMENT

This chapter discusses the existing physical and biological environment of the Project and its probable impacts. Mitigative measures, if necessary, are also discussed.

4.1 CLIMATE, TOPOGRAPHY, AND SOILS

4.1.1 CLIMATE

Temperatures in the Hilo area are very moderate, with average daily minimum and maximum temperatures ranging from 66 to 82 degrees Fahrenheit. Average monthly temperatures recorded at Hilo International Airport, located about 1 mile east of the project area, were about 73 degrees Fahrenheit with a range between 70 and 76 degrees Fahrenheit. Rainfall in the Hilo district is substantial, with an average of 129 inches per year. Northeast trade winds typically occur during the day, while winds from the southwest typically occur during the night due to cold air drainage from the mountains. The mean annual wind speed at the airport is about 8 miles per hour (mph), and usually varies between about 4 and 12 mph during the day.

4.1.2 TOPOGRAPHY

The Island of Hawai'i is the largest island in the Hawaiian Archipelago, covering an area of approximately 4,000 square miles, which is larger than the size of all the other Hawaiian Islands combined. Hawai'i Island was formed by the activity of five shield volcanoes: 1) Kohala (long extinct); 2) Mauna Kea (some activity during recent geologic times); 3) Hualālai (last erupted in 1801 and considered dormant); 4) Mauna Loa (active); and 5) Kilauea (active). The Project site is at the eastern end of the island on the lower, northeastern flank of the Mauna Loa Volcano.

The Project site slopes from the west to the east at a varying elevation from about 450 feet above mean sea level (msl) at the southwest corner (Future University Expansion area) to about 280 feet above msl at the northeast corner (intersection of Mohouli Street Extension and Komohana Street). The slope of the site is generally ranges from 5 to 10 percent, with isolated areas having slopes greater than 15 percent. The topographic features in the immediate vicinity of the Project site consist of gradually increasing slopes traveling in a northeast to southwest direction (Figure 8).

4.1.3 SOILS

SCS Soils Survey

The U.S. Department of Agriculture, Soil Conservation Service's *Soil Survey of Island of Hawaii, State of Hawaii*, includes general soil maps based upon soil surveys (SCS 1973). These soil maps show the developed soil associations, which are classified by soil series and soil phase.

Soils within the Project site mostly consist of pāhoehoe lava flows (rLW) (Figure 9). This land type occurs at elevations from sea level to 13,000 feet. Pāhoehoe lava has a billowy, glassy, and relatively smooth surface. However, some surface areas are rough and broken, with hummocks and pressure domes. Pāhoehoe lava has no soil covering and it is typically bare of vegetation, with the exception of mosses and lichens. In areas of higher rainfall, scattered 'ōhelo berry, 'a'ali'i, and 'ōhi'a trees have grown in cracks and crevices.

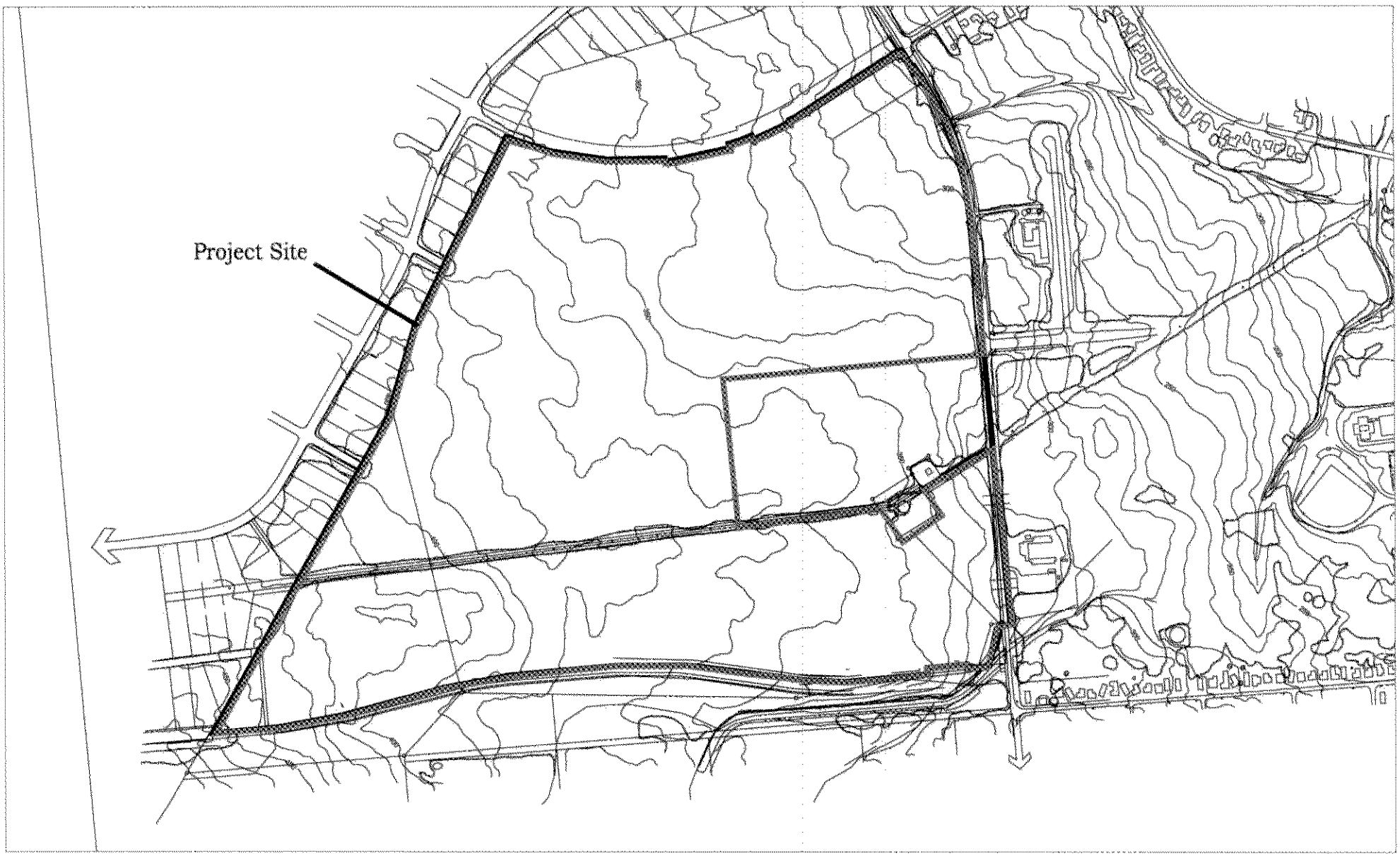
Soils of the northern portion (near Mohouli Street Extension) and the southeastern portion (at the intersection of Pū'ainakō Street Extension and Komohana Street) consist of Keaukaha Extremely Rocky Muck (rKFD) (Figure 9). The Keaukaha series consists of well-drained, thin organic soils overlaying pāhoehoe lava bedrock. Rock outcrops occupy about 25 percent of the area. The soil above the lava is rapidly permeable. The pāhoehoe lava is very slowly permeable, but the water moves rapidly through the cracks. Runoff is medium, and the erosion hazard is slight.

Land Study Bureau

The Land Study Bureau's *Detailed Land Classification – Island of Hawaii*, has compiled and interpreted information about the quality, location, and extent of lands adapted for various purposes (LSB 1965). The classification developed under this report establishes ratings for overall agricultural usage and for selected individual uses. Productivity ratings established under this study characterize the soil's agricultural suitability for both individual crops and overall suitability (master productivity rating). Suitability ratings vary from: A, very good; B, good; C, fair; D, poor; and E, very poorly suited. The overall master productivity ratings for soils within the property are mostly E and some D, indicating that most of the soils are very poorly suited for overall agricultural usage (Figure 10).

4.1.4 EFFECTS ON CLIMATE, TOPOGRAPHY, AND SOILS

Construction of the Project is not expected to have a significant impact on the existing topography or physical character of the property. Excavation and grading work would occur with construction of the new buildings and necessary infrastructure. Effective design would help achieve a balanced cut and fill condition to minimize disturbances.



Legend

Project Boundary

Source: R.M. Towill Corporation
Q:\Hawaii\UHHilo-University Park Expansion\GIS\projects\topo.apr

Figure 8
Aerial Topographic Map of Area
UHH Mauka Lands Master Plan
HILO, ISLAND OF HAWAII

NORTH

150 0 300
(FEET)

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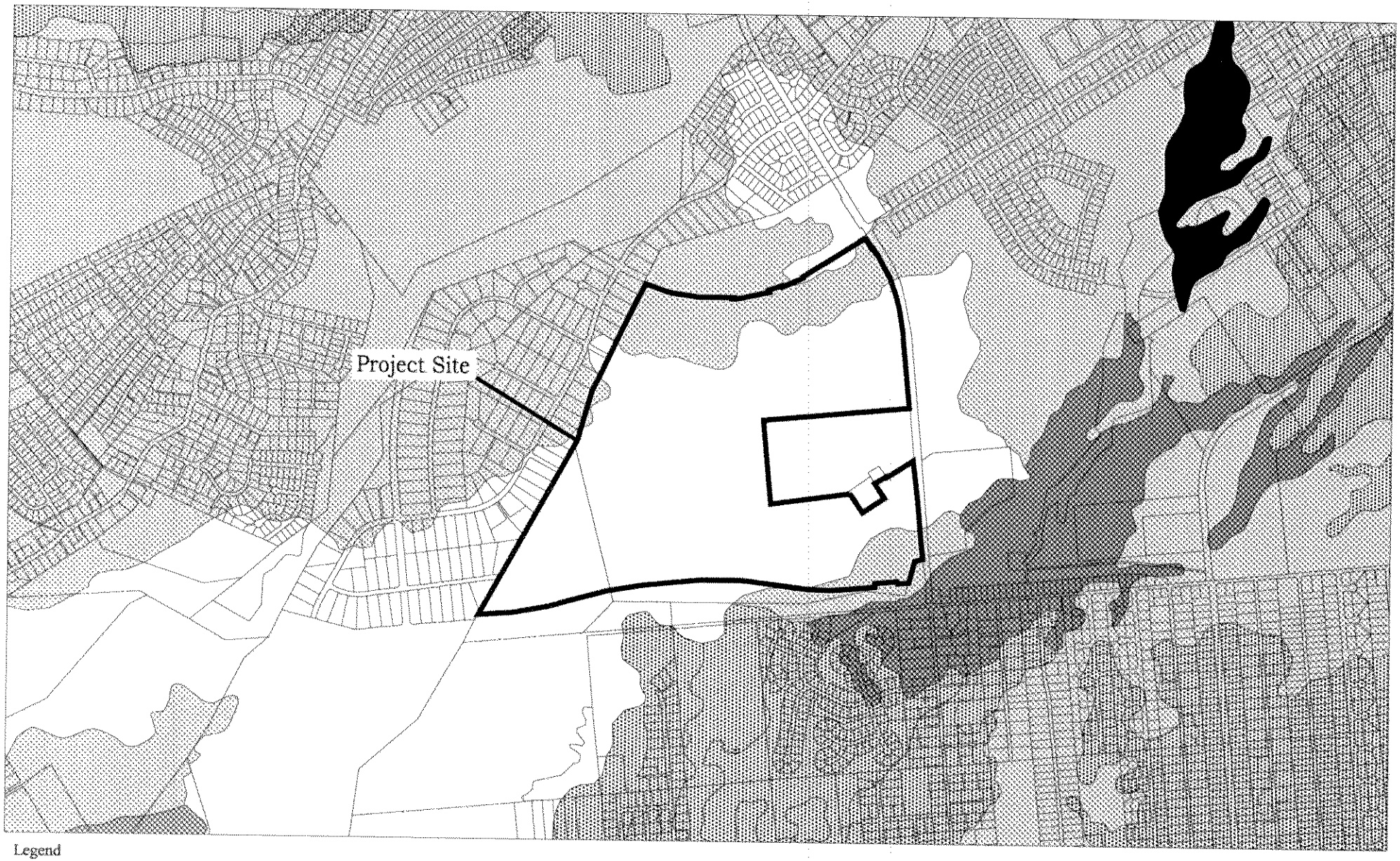

Legend

- Project Boundary
- Keaukaha Extremely Rocky Muck
- Lava Flows, Pahoehoe
- Panaewa Very Rocky Silty Clay Loam
- Olaa Extremely Stony Silty Clay Loam
- Other Soils

Source: Soil Conservation Service
Q:\Hawaii\UHHilo-University Park Expansion\GIS\projects\soil survey.apr

Figure 9
Soil Survey
UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

NORTH

750 0 1500

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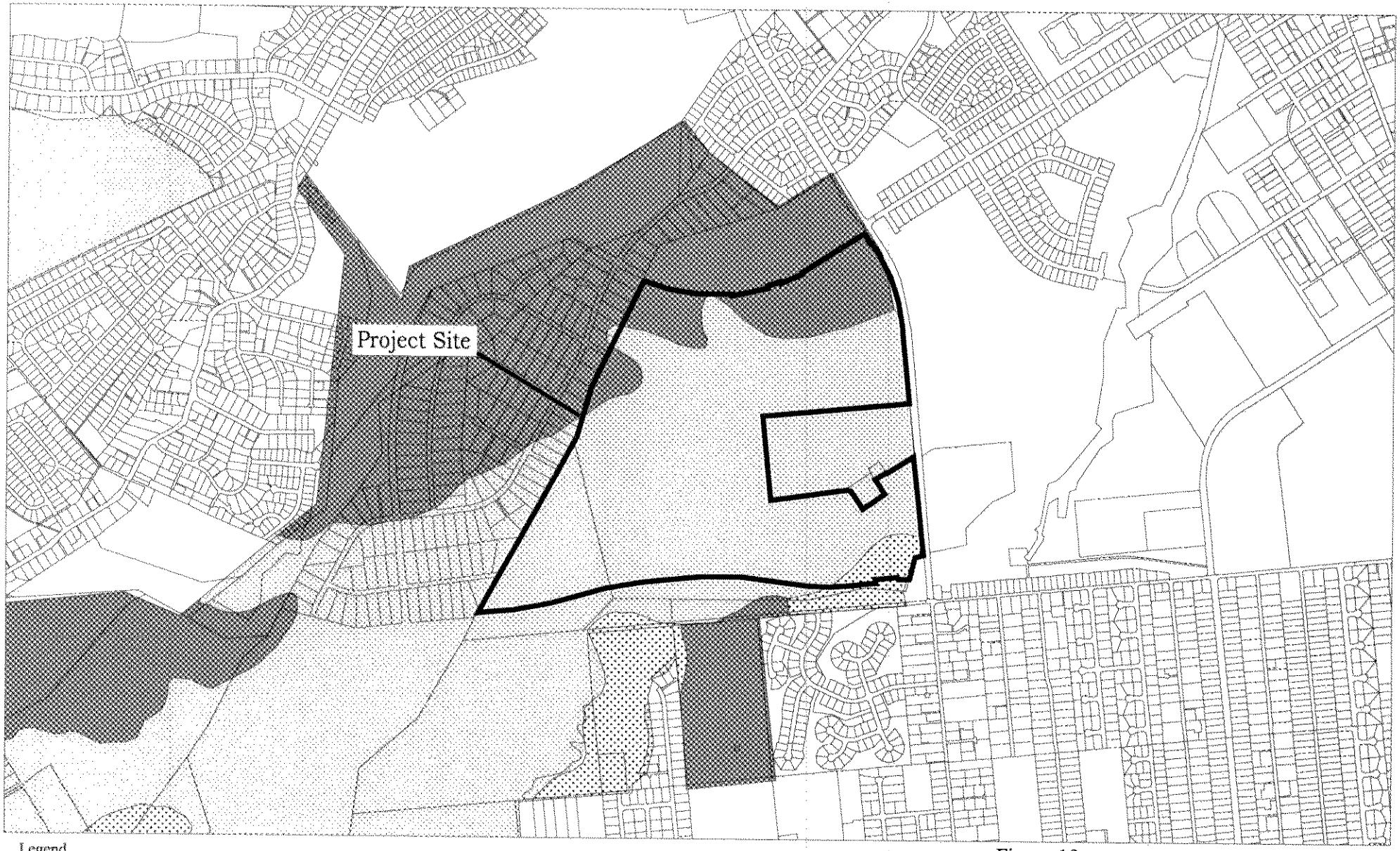

Legend

- Project Boundary
- B
- C
- D
- E
- Not Classified/Urban

Source: Land Study Bureau
Q:\Hawaii\UHHilo-University Park Expansion\GIS\projects\lsb soil.apr

Land is rated A - E by the Land Study Bureau, A being the highest level of productivity and E being the lowest.

Figure 10
Land Study Bureau Soil Suitability Ratings Map
UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

NORTH

750 0 1500

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Grading activities will be conducted in accordance with permit provisions from the County and the State Department of Health (DOH).

Construction of the UHH University Park Expansion and the Hawai'i CC would inevitably involve land-disturbing activities, possibly resulting in soil erosion. As discussed under the soils section, the property mainly consists of relatively recent pāhoehoe lava flow with limited soil cover and very poorly suitable soils. Areas with older flows have a reduced potential for soil erosion. To minimize potential construction impacts on erosion, various erosion control measures would be considered, including the use of temporary berms and cut-off ditches, the use of temporary silt fencing and screens, thorough watering of graded areas after construction activity has ceased for the day or weekend, or sodding or planting immediately after grading work has been completed.

Proposed erosion control measures would be developed during the final design of the Project and would comply with the County's Erosion and Sedimentation Control regulations prescribed under Chapter 10 of the *Hawaii County Code* (County 1999). Appropriate measures will be included in an Erosion Control Plan prepared and submitted to the County for ministerial approval. Other mitigative measures would be specified as part of the National Pollutant Discharge Elimination System (NPDES) permits obtained for the site.

After construction, new buildings could affect temperatures within the Project site; however, any change in temperature is not expected to be significant.

4.2 *NATURAL HAZARDS*

The Island of Hawai'i is subject to earthquakes, lava flows, hurricanes, tsunami, and flooding hazards. Hawai'i experiences thousands of earthquakes each year, however, most are only detectable by instruments. Since 1868, most of the larger, damaging earthquakes (magnitude 6 or greater) have occurred in the southeastern region of the island. The largest earthquake near the Hilo area had a magnitude of 6.2 and occurred in Honomū in 1973.

The current USGS volcanic hazard zone map for the Island of Hawai'i divides the island into zones ranked from 1 through 9 (with 1 being the area of greatest hazard and 9 being the area of least hazard) based on probability of coverage by lava flows. According to this map the entire Hilo ~~District~~area is within Zone 3. This hazard rating indicates that the ~~area~~zone is gradationally less hazardous than Zone 2 because it is a greater distance from active vents and the topography makes it less likely to be covered by lava flows. ~~The area~~Zone 3 has had one to five percent covered by lava since 1800, and 15 to 75 percent covered in the last 750 years.

The Island of Hawai'i has historically received less threat and damage from hurricanes as compared to Kaua'i. However, as with other existing and future developments in the South Hilo District and island-wide, structures built on the project site could potentially be damaged by high winds and heavy rainfall from a hurricane passing ~~close to~~over the island.

According to the Flood Insurance Rate Map (FIRM), Community Panel Number 155166 0880 C (revised September 16, 1988), the majority of the property and the immediate surrounding area is designated Zone X, which is an area determined to be outside the 500-year floodplain (Figure 11). A portion of the northern section of the property is located within Zone A, an area inside the 100-year floodplain. Designated floodways located in the northern portion and south of the property are associated with an unnamed tributary and Waiākea Stream, respectively. The floodways run in a west to east-northeast direction. The Project site is not located within a tsunami inundation area since it is several miles away from the shoreline at an elevation of over 330 feet mean sea level (msl).

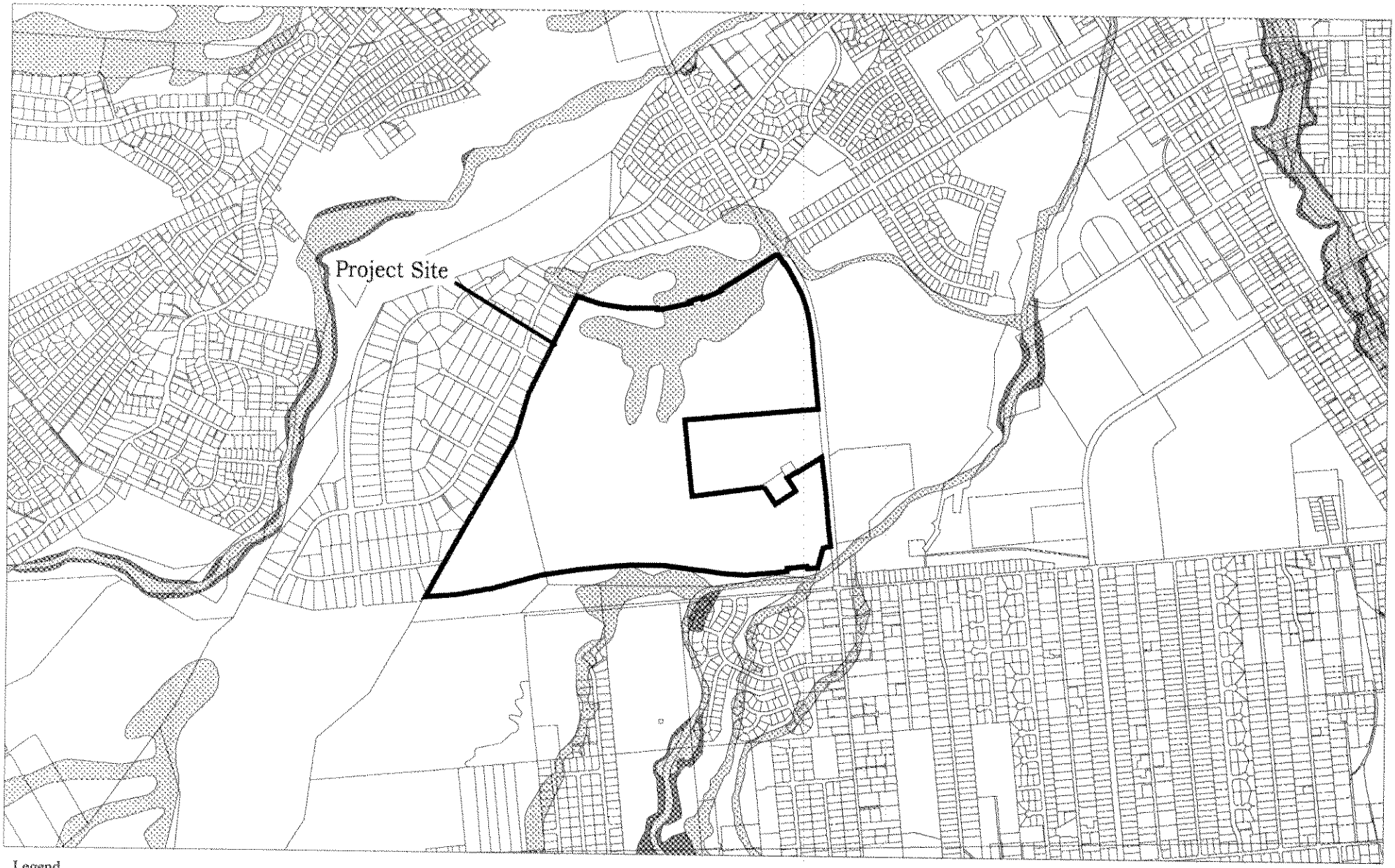
~~*Potential Impacts from Natural Hazards*~~

4.2.1 EFFECTS FROM NATURAL HAZARDS

Although the potential for future natural hazards of significant force is low, the Project site may be subject to damage from earthquakes, lava flows, hurricanes, and/or flooding hazards. However, the ~~area~~site is no more susceptible to damage by natural hazard than other homes and buildings present in the surrounding Hilo community, given that the majority of the site is outside of the 100-year and 500-year floodplains (Zone X), the entire island is designated Zone 4 for seismic hazard, and the entire Hilo area is designated Zone 3 for lava flow hazard. To minimize potential damages from earthquakes, project facilities and other accessory structures would be structurally designed and constructed in accordance with applicable County design standards for Zone ~~3~~4 areas.

The potential damage from strong hurricane winds should be relatively minor due to the project design and expected materials used for the construction of Hawai'i CC and University Park facilities. Utilities and infrastructure improvements should not be affected since they would be located underground. To minimize potential damages, the Project would be designed and constructed in accordance with appropriate County design requirements and standards.

Most of the Project facilities would not be subject to flooding hazards since they are located outside of designated floodways. The areas contributing to the Zone A floodplain appear to be greatly reduced due to the construction of the Sunrise Estates Subdivision and related drainage improvements. When the lots affected by the Zone A designation are developed, a detailed flood study should be performed to determine



Legend

- Project Boundary
- Zone A: Inside 100 Year Floodplain (No Base Flood Elevtions Determined)
- Zone D: Undetermined But Possible Flood Hazards
- Zone X: Outside 100 Year and 500 Year Floodplain
- Zone X500: Inside 500 Year Floodplain

Source: Flood Insurance Rate Map, County of Hawaii
O:\Hawaii\UHHilo-University Park Expansion\GIS\projects\flood.apr

Figure 11
Flood Insurance Rate Map
UHH Mauka Lands Master Plan
HILO, ISLAND OF HAWAII

NORTH

750 0 1500
(FEET)

PBR HAWAII

8/07/03

the 100-year floodplain. If the floodplain differs from what is shown on the FIRM, an application should be made for a Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR). Appropriate drainage improvements (discussed in Section 6.3) will be provided in compliance with County building codes and design standards to serve the property and address surface runoff from increased impervious surfaces.

4.3 *AQUATIC RESOURCES AND WATER QUALITY*

4.3.1 EXISTING AQUATIC RESOURCES AND WATER QUALITY

Waiākea Stream is one of several streams flowing into Waiākea Pond and Wailoa River, which discharges into the south part of Hilo Bay. Along most of the stream course, portions of the channel have been modified with levees and revetments, and a few sections are concrete-lined due to roadway crossings. However, the streambed comprised of bedrock material, remains in a fairly natural state. In the vicinity of the Project, Waiākea Stream travels in a southwest to northeast direction and consists of exposed basalt bedrock with scattered pools in rock depressions.

A biological survey of Waiākea Stream between the western portion of the UHH campus and the Komohana Gardens Subdivision was conducted by AECOS, Inc. (AECOS) on November 23, 2001. During the field survey, the stream reach near the Project site was defined as "interrupted" and included a few short flowing sections, some completely dry segments, isolated pools, and some seeps. Pools of water, fed by the considerable rainfall received in Hilo and seeps in some cases, were retained in areas where the streambed was dense basalt. Freshwater fauna were most abundant in deeper pools located well upstream and well downstream of the Project site.

Water quality measurements were made in three locations and selected parameters were measured to characterize the aquatic environments present. The samples taken indicated that turbidity and total suspended solids (TSS) levels were relatively low, suggesting still water isolated from runoff inputs. The samples also showed that biological primary productivity was dominated by benthic algae. Compared with those in 1996, values observed in 2001 showed slightly lower Dissolved Oxygen (DO) and slightly higher conductivity; however, these values were not indicative of water quality problems.

4.3.2 EFFECTS ON AQUATIC RESOURCES AND WATER QUALITY

The project would increase impervious surfaces such as facilities and paved areas (roads, walkways, etc.), and on-site surface water runoff would effectually increase. Since the County requires that on-site storm drainage facilities be designed and sized to

control runoff in excess of estimated pre-development quantities, several on-site drywells would be provided.

The Project should have minimal impact on the aquatic environment and water quality associated with Waiākea Stream, as additional runoff would be retained on-site. Extensive vegetation and numerous cracks in the pāhoehoe lava flows surrounding the Project site will further reduce surface runoff and prevent it from reaching Waiākea Stream, Waiākea Pond, Wailoa River, and the south part of Hilo Bay. Observed aquatic species, none of which were listed as threatened or endangered, are unlikely to be adversely impacted, given the anticipated quality of water and the distance between their habitat and the Project site.

4.4 *BOTANICAL RESOURCES*

4.4.1 EXISTING BOTANICAL RESOURCES

A Botanical Survey of the Project site was prepared by Char & Associates in October 2003. Field studies of the area were conducted on October 6 and 7, 2003 to inventory the flora, search for threatened and endangered species, and identify areas of potential environmental problems or concerns. Three vegetation types, 'ōhi'a/uluhe forest, strawberry guava thicket, and ruderal vegetation, were identified and are discussed below. The report is included in Appendix A.

'Ōhi'a/Uluhe Forest. 'Ōhi'a/Uluhe forest is associated with geologically young lava flows and shallow soils on the lower windward slopes of the Puna and Hilo districts. The forest covers a majority of the property and is a lowland, wet forest primarily composed of a thick, nearly continuous blanket of uluhe fern (*Dicranopteris linearis*) with tall, widely spaced 'ōhi'a trees (*Metrosideros polymorpha*). The 'ōhi'a/uluhe forest does not support a rich diversity of native plant species.

Two introduced shrubs, melastoma (*Melastoma candidum*) and strawberry guava (*Psidium cattleianum*), form scattered, fairly dense thickets in the project site. The shrubs have spread rapidly and invaded lowland mesic and wet forest habitats. Other woody components observed in smaller numbers include gunpowder trees (*Trema orientalis*), hala (*Pandanus tectorius*), king palms (*Archontophoenix alexandrae*), mango (*Mangifera indica*), octopus trees (*Schefflera actinophylla*), guava (*Psidium guajava*), neneleau (*Rhus sandwicensis*), and melochia (*Melochia umbellata*). Scattered patches of blechnum fern (*Blechnum appendiculatum*), Glenwoodgrass (*Sacciolepis indica*), Hilo grass (*Paspalum conjugatum*), strawberry guava seedlings, and Star-of-Bethlehem (*Hippobroma longiflora*). They are associated with open areas around and under the melastoma and strawberry guava thickets. Along a portion of the Lava Flow of 1881, clumps of broomsedge grass (*Andropogon virginicus*) are common. Two invasive alien species occurring are firetree

(*Morella faya*), which is scattered throughout the flow, and downy or rose myrtle (*Rhodomyrtus tomentosa*), which is locally common.

Strawberry Guava Thicket. Dense thickets of strawberry guava, both red- and yellow-fruited forms, and scattered 'ōhi'a trees are found around the northeast and southeast corner, adjacent to the Pū'ainakō Street extension. Smaller thickets of melastoma are scattered, and shade-tolerant species such as Glenwood grass, blechnum fern, ni'ani'au fern (*Nephrolepis exaltata*), young plants of fiddlewood (*Citharexylum caudatum*), and Japanese climbing fern (*Lygodium japonicum*) are found sporadically. In some areas, maile-scented fern or laua'e (*Phymatosorus grossus*) is abundant.

The strawberry guava thicket on the southeast corner of the project site appears recently disturbed, as it supports a number of ornamental/landscape plants, including two *Philodendron* species, avocado (*Persea americana*), mango, *Heliconia*, *Pleomele fragrans*, and monstera (*Monstera deliciosa*).

Ruderal Vegetation. Ruderal vegetation consists of a varied assemblage of mostly introduced grasses, herbs, and shrubs. It occupies a small portion of the project site and is found in areas infrequently maintained, such as the utility easement and along site peripheries. Broomsedge grass and molasses grass (*Melinis minutiflora*) are most abundant. Other commonly observed species include Glenwood grass, Rib grass, hairy sword fern (*Nephrolepis multiflora*), sensitive plant (*Mimosa pudica*), Spanish clover (*Desmodium incanum*), ōwī (*Stachytarpheta australis*), California grass (*Brachiaria mutica*), yellow foxtail (*Setaria parviflora*), bamboo orchid (*Arundina graminifolia*), and three *Crotalaria* species. Wedelia (*Sphagneticola trilobata*), a commonly planted ground cover plant, is found on the utility easement bordering the USDA PBARC property.

Scrubby vegetation composed of mats of uluhe fern interspersed with young melochia and gunpowder trees, shrubs of lantana (*Lantana camara*), strawberry guava, melastoma, and sourbush (*Pluchea carolinensis*) borders disturbed areas. A few native plants that prefer open, sunny sites, including neneleau trees, pala'ā fern (*Sphenomeris chinensis*), small 'uhaloa (*Waltheria indica*) shrubs, and four sedge species: *Fimbristylis dichotoma*, *Cyperus polystachyos*, *Scleria testacea*, and kuolohia (*Rhynchospora chinensis*), are found in the project site.

A total of 126 species were inventoried on the property, 99 (79 percent) of which are introduced or alien species. Most of these introduced species are associated with ruderal vegetation, although a few represent ornamental/landscape material that has escaped cultivation and established populations. The inventory included 23 native species, 17 of which are indigenous (native to the Hawaiian Islands and elsewhere) and six of which are endemic (native only to the Hawaiian Islands). Endemic plants found on the project site include 'ōhi'a, 'ama'u (*Sadleria cyatheoides*), hāpu'u (*Cibotium glaucum*), ni'ani'au (*Neprolepis exaltata* ssp. *hawaiiensis*), neneleau (*Rhus sandwicensis*), and 'ahanui or uki (*Machaerina mariscoides* ssp. *meyenii*).

4.4.2 EFFECTS ON BOTANICAL RESOURCES

The Project is not expected to have a significant impact on botanical resources. There are no threatened or endangered plants, or species of concern within the property. Some native plants will be removed yet can be found elsewhere in 'ōhi'a/uluhe forests throughout the Puna and Hilo regions. The study recommended that native species be used, transplanted, or incorporated into the landscaping plan. Act 73 of the Hawaii Revised Statutes mandates that any new or renovated landscapes for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants wherever and whenever feasible.

After reviewing the EISPN and DEIS, the State DLNR, Division of Forestry and Wildlife had no comments to offer concerning the Project. GMO-Free Maui, a local non-profit organization of citizens and farmers, voiced concerns regarding the environmental impacts of genetically engineered plants and foods. This letter was forwarded to the Pacific Basin Agricultural Research Center.

4.5 MAMMALIAN AND AVIAN SPECIES

A Wildlife Survey of the Project site was prepared by Tim J. Ohashi in October 2003. Surveys were conducted on October 11 and 18, 2003 to identify the existing avian and mammalian species and to determine how any threatened, endangered, or sensitive species that might be present would be impacted by the Project. The report is included in Appendix B.

4.5.1 EXISTING MAMMALIAN AND AVIAN SPECIES

Mammalian Species. Two mammalian species were observed from the property, yet only one was found within it. Feral Pigs (*Sus scrofa*) that likely live throughout the mosaic of native and introduced vegetation were encountered during the survey. Hawaiian Hoary Bats (*Lasiurus cinereus semotus*) are not normally present in the closed canopy forests that prevail throughout the Project site; however, one was observed outside the parcel, flying southwest (mauka) at dusk.

Although no Small Indian Mongooses (*Herpestes auropunctatus*), Cats (*Felis cattus*), or Feral Dogs (*Canis familiaris*) were found during the survey, they are likely to live in the area. Rats (*Rattus* spp.) () and House Mice (*Mus musculus*) probably occur on the site; however, they are not considered important in an environmental analysis.

Avian Species. As expected, no native forest bird species were found within the property. It is generally accepted that stresses brought about by introduced plants, animals, diseases, and parasites have eliminated lowland populations of native birds. Pacific Golden Plovers (*Pluvialis dominica*) were seen in flight over the parcel. Dense forest is not suitable habitat for plovers, which feed in open fields and lawns. Plovers migrate from northern latitudes and are winter residents of Hawai'i, adults arriving in late August and young in late September and October. They leave for breeding grounds in late March and April. Pueo (*Asio flammeus*) were not observed during the survey, and the project site can only support those foraging. The habitat is suitable to Hawaiian Hawks (*Buteo solitarius*), or *'io*; however, none were observed.

Eight introduced species were observed during the survey. The two most abundant include Melodious Laughing Thrushes (*Garrulax canorus*) and Japanese White-eyes (*Zosterops japonica*), which thrive in various habitats with suitable vegetation, feeding on insects, nectar, and fruit. Spotted Doves (*Streptopelia chinensis*) were seen and heard throughout the parcel, foraging with other species, like Zebra Doves (*Geopelia striata*). Northern Cardinals (*Cardinalis cardinalis*), Nutmeg Mannikins (*Lonchura punctulata*), and House Finches (*Carpodacus mexicanus*) are normally found in other environments, however were encountered, perhaps due to the diverse habitats and vegetation surrounding the project site. Common Mynas (*Acridotheres tristis*) were seen transiting to surrounding open areas, as the thick forest is not an ideal habitat.

Threatened and Endangered Species. No threatened or endangered species were observed in the wildlife survey. Although the project site is within current known distribution of the Pueo and endangered Hawaiian Hawk, none were seen. Hawaiian Petrels and Newell's Shearwaters have been recorded traveling between Hilo and mauka locations on Mauna Kea; however, none were observed from the project site and the property is unlikely to host a colony of either species. An endangered Hawaiian Hoary Bat was seen just outside the parcel, yet it could not be determined whether the species is dependent on this particular parcel or if the individual was merely passing over it, as observed.

4.5.2 EFFECTS ON MAMMALIAN AND AVIAN SPECIES

Existing species will be displaced by the proposed Project; however, nearby natural and on-site landscaped areas will provide similar habitat. The avian and mammalian species observed in the wildlife survey or presumed to live in the area largely consist of aliens that are harmful to native avian and plant communities. These introduced species will relocate to a wide range of habitats and eventually may return to the site after completion of the project. Native birds, for which the habitat of the project area is suitable, will survive in forests adjacent to the site or elsewhere on the island. Hawaiian Hoary Bats are frequently seen along edges of closed canopy forests, among exotic

trees, and in orchards. They have a wide distribution throughout the Island of Hawai'i and should not be adversely impacted by the Project.

After reviewing the EISPN and the DEIS, the State DLNR, Division of Forestry and Wildlife had no comments to offer concerning the Project.

4.6 AIR QUALITY

4.6.1 EXISTING AIR QUALITY

Air quality in the Project area is believed to be relatively good, except for occasional impacts from nearby volcanic emissions and localized traffic congestion. The limited air quality data available for the area from the State Department of Health (DOH) indicate that pollutant concentrations are well within State and Federal air quality standards.

Manmade particulate emissions in Hawai'i generally originate from area sources such as agriculture and the mineral product industry. Power plants, fuel-burning industries, and other point sources almost exclusively emit manmade sulfur dioxides while nitrogen oxides and carbon monoxides are primarily emitted from motor vehicle traffic and industrial point sources. Sulfur dioxide emissions from Kilauea Volcano are converted into particulate sulfate, which causes volcanic haze (vog) to blanket the Hilo area during Kona wind conditions.

4.6.2 EFFECTS ON AIR QUALITY

The following section provides a brief description of potential short- and long-term impacts on air quality occurring either directly or indirectly through construction of and activities resulting from the Project.

Potential Short-Term Impacts

Short-term impacts from fugitive dust will likely occur during the construction phase, and exhaust emissions from stationary and mobile construction equipment, traffic disruption, and workers' vehicles may occur to a lesser extent. There is a potential for fugitive dust emissions during all phases of construction. Proposed construction activities will occur in proximity to existing residences, public areas, and major thoroughfares, posing potential impacts from dust. A dust control management plan will be developed to identify and address all activities having the potential to generate fugitive dust. As noted by the County Police Department, dust and debris control measures will be implemented during all phases of development, especially during construction.

Construction activities must comply with the provisions of *Hawaii Administrative Rules*, §11-60.1-33 on Fugitive Dust.

The various contractors should provide adequate measures to control dust from the road areas and during the various construction phases. These measures include, but are not limited to, the following:

a) Plan the different phases of construction to minimize the amount of dust-generating materials and activities, centralize on-site vehicular traffic routes, and locate potential dust-generating equipment in areas of the least impact;
b) Provide an adequate water source at the site prior to beginning construction activities;
c) Landscape and provide rapid covering of bare areas, including slopes, from the initial grading phase;
d) Minimize dust from shoulders and access roads;
e) Provide adequate dust control measures during weekends, after hours, and prior to beginning daily construction activities; and
f) Control dust from debris being hauled away from the project site.

Potential Long-Term Effects

The Project will result in increased motor vehicle traffic on nearby roadways, potentially causing long-term impacts on ambient air quality in the vicinity. Motor vehicles with gasoline-powered engines are significant sources of carbon monoxide that emit nitrogen oxides and other contaminants.

Federal air pollution control regulations require that new motor vehicles be equipped with emission-control devices. Amendments to the *Clean Air Act* require further emission reductions, which have been phased in since 1994. The added restrictions on emissions from new motor vehicles will lower average emissions each year as older vehicles leave the State's roadways. Carbon monoxide emissions, for example, will go down by an average of about ten percent per vehicle during the next ten years due to the replacement of older vehicles with newer models (B.D. Neal 2002). Therefore, the additional traffic generated by the project is not expected to significantly impact the ambient air quality.

Over the long term, air pollution could indirectly result from the power-generating facilities that provide electrical power to the Project and the vehicles that transport and bury its solid waste at the landfill. However, any related air quality impacts for a project of this nature and size would be negligible.

4.7 NOISE

4.7.1 EXISTING ACOUSTICAL ENVIRONMENT

Dominant noise sources in the Project vicinity are generated by vehicular traffic, wind, and occasional distant aircraft flybys. It is fairly noisy along Komohana and Pū'ainakō Streets, where noise levels vary between 72 and 78 decibels (dBA) (*PBARC EA, 2002*). These noise levels reflect the present traffic volumes along major roadways serving the South Hilo District, the higher than posted traffic speeds, and the types of vehicles predominately traveling on the roads (trucks and SUVs with larger tires).

The nearest residential or noise-sensitive area within the Project's immediate vicinity is the Sunrise Estates Subdivision, which shares the northwest boundary. Other residences are separated from the Project by the Pū'ainakō Street Extension.

4.7.2 EFFECTS ON THE ACOUSTICAL ENVIRONMENT

Short-Term Impacts

Short-term noise impacts are likely to occur during the construction phase of the Project, as a result of excavation, grading, and construction activities. Typical construction equipment noise ranges between 70 and 95 dBA. Any noise impact from these construction activities would be short-term and relatively minor since the site is generally bounded on three sides by roadways (Mohouli Street Extension, Komohana Street, and Pū'ainakō Street Extension). Construction equipment would be equipped with mufflers, as required under DOH regulations. In cases where construction noise exceeds, or is expected to exceed, the maximum permissible noise level allowable to property line limits (70 dBA), a permit would be obtained from the DOH to allow these activities and to mitigate potential short-term construction noise impacts. Specific permit restrictions for construction activities are:

- "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels...before 7:00 a.m. and after 6:00 p.m. of the same day, Monday through Friday."

- "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels...before 9:00 a.m. and after 6:00 p.m. on Saturday."

- "No permit shall allow any construction activities which emit noise in excess of the maximum permissible sound levels on Sundays and on holidays."

Long-Term Impacts

Potential long-term impacts on the acoustical environment are primarily associated with noise generated by additional traffic and on-site equipment. The project would

add traffic volumes and increase noise levels on Komohana Street, Mohouli Street Extension, and Pū'ainakō Street Extension.

Noise from pumps, air heating units (AHUs), compressors, condensing units, and other on-site equipment would be addressed during the design phase. Noise at the property line from on-site equipment must be at a level of 70 dBA or less in order to be within the State DOH maximum permissible sound limit for the Class C Zoning District (Agriculture, County, Industrial).

The academic and research activities conducted by the proposed Project should not pose a significant noise impact to surrounding parcels and should be within the 70-dBA limit. Design of the Project would incorporate appropriate measures, including barriers, enclosures, silencers, etc., to minimize noise from on-site equipment. During the EISPN public review period, the State DOH, Noise, Radiation & IAQ Branch wrote that Project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46, Community Noise Control.

4.8 ARCHAEOLOGICAL AND CULTURAL RESOURCES

4.8.1 ARCHAEOLOGICAL RESOURCES

Previous Archaeological Studies

Prior archaeological investigations of the Waiākea ahupua'a include Smith (1991; 1992), Borthwick *et al.* (1993) and the series of reports related to the Pū'ainakō Street Extension/Realignment project.

In the Project vicinity, archaeological research has shown that historic properties were concentrated on older, more weathered lava flows that had significantly greater soil development.

Updated Archaeological Inventory Survey

An *Archaeological Inventory Survey* of the Project site was completed by Scientific Consultant Services, Inc. (SCS) in November 2003. The report was reviewed by the State Historic Preservation Division in September 2004 and the final is included in Appendix C. Archaeological field studies of the area were conducted in May and June 2003 and determined that no pre-Contact sites existed.

Sites identified in this survey were assessed in accordance with Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Section 6E-7 and 6E-8 contained in draft *Hawaii Administrative Rules* 13§12-275. To be significant, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association. The site must also be associated with important

historical events or the lives of past important persons, embody distinctive characteristics representing the work of a master or possessing high artistic value, yield important pre-historical or historical information, or have important cultural value to native Hawaiian people or another ethnic group of the State.

Sixteen sites, comprising 80 features, were recorded in this survey and three previously documented sites were reassessed. Most of these sites were interpreted as being related to historic sugar cane cultivation, ranching, or military activities. Of the 19 sites, 17 required no further work and two were recommended for Data Recovery. Sites 24243 and 24244 were recorded because of their importance in documenting military defense and training activities in the upland Hilo area. No sites were recommended for preservation. After fieldwork had been completed by SCS, a cultural practitioner, JGeno Enocencio, requested to visit the project site. Mr. Enocencio, accompanied by his son and two archaeologists from SCS, visited on September 18 and viewed various features discovered by SCS. He provided some comments on the military features of the property.

The *Archaeological Inventory Survey* identified no pre-Contact sites in the Project area. Two military-related sites were recommended for Data Recovery and no recommendations for site preservation were made.

4.8.2 EFFECTS ON ARCHAEOLOGICAL RESOURCES

Seventeen sites requiring no mitigation were identified as sugar cane fields, dirt roads, and geologic features. They are associated with historic agriculture and pasture activities, which previously altered the land. Prior land uses and the Lava Flow of 1881 suggest that pre-Contact sites were destroyed long ago.

4.8.3 TRADITIONAL AND CULTURAL PRACTICES

A Cultural Impact Assessment was performed by PBR HAWAII in September 2003. The study assessed the potential impacts of the Project on traditional cultural practices, including native Hawaiian gathering rights. A review of existing archaeological information as well as oral interviews with cultural practitioners familiar with the area were part of this study. The assessment is included below in its entirety.

> History. Waiākea and Hilo have been known as rich, sustainable areas associated with a number of Hawai'i's most prominent ali'i (chiefs) and often mentioned in Hawaiian folklore and history because of their resources. Both Hilo and Waiākea are mentioned as a residence or favorite visiting place in famous stories such as Hi'iaka and Pele, 'Umi-a-Liloa, 'Ulu, Kawelo, Keaomelemele, and Kūapāka'a. In narratives recorded as Kepā Maly, the lands of Waiākea were actually named after a high chief:

> ...the lands of Waiākea were named for the high chief Waiākea-nui-kumuhonua. The brother of Pi'ihonua-a-ka-lani and Pana'ewa-nui-moku-lehua. After departing from Pana'ewa, Ka-Miki mā met Haili-kula-manu, who was a guardian of Waiākea. Haili led Ka-Miki and his companions to his chief's compound at Kalepolepo [February 17,1916]. Arrangements were made for Ka-Miki to compete with the 'ōlohe – experts of Waiākea, with the events to be held at the kahua [contest site] at Kalepolepo...

Waiākea was the home of 'Ulu, a legendary man living in a time of famine. 'Ulu eventually died of starvation and was buried next to a fresh water spring. The next day, an 'ulu (breadfruit) tree filled with fruit stood where he was buried, ending the famine in Waiākea. In *Native Planters in Old Hawai'i*, Handy and Handy recorded the agricultural development of Waiākea and Hilo:

> In lava-strewn South Hilo there were no streams whose valleys or banks were capable of being developed in terraces, but [taro] cuttings were stuck into the ground on the shores and islets for many miles along the course of the Wailuku River far up into the forest zone. In the marshes surrounding Waiākea Bay, east of Hilo, taro was planted in a unique way known as kanu kipi...On the lava-strewn plain of Waiākea and the slopes between Waiākea and the Wailuku River, dry taro was formerly planted wherever there was enough soil. There were forest plantation in Pana'ewa and in the lower fern-forest zone above Hilo Town and along the course of the Wailuku River (Handy & Handy, 1972).

While Waiākea was, in ancient times, very rich in agriculture, it became a home for sugar plantations from the mid-1800s through the mid-1900s. Waiākea and Hilo's lands were filled with crops of sugar, as commercial sugar became the top industry and Waiākea Mill the largest in the district. After statehood and with the closing of Waiākea Mill, Hilo relied on tourism as its economic mainstay. Waiākea eventually included in an airport, hotels along Hilo Bay, residential subdivisions, and an accredited University.

Existing Conditions. According to Van James in his book *Ancient Sites of Hawai'i*, Hilo was known to support ancient settlements. Although it is certain that there were many heiau, Hawaiian temples of worship, the only evidence of ancient temples in the area include Naha and Pinao Pōhaku. Recorded accounts of destroyed heiau include Kaipalaoa, Kānoa, Kīnailoa, and 'Ōhele heiau.

The sources of Hilo's rich water supply include two major rivers, a number of streams, Waiākea Fishpond, and an annual rainfall of about 140 inches. Famous natural landmarks in the district include the 'Akaka Falls and Waiānuenue (Rainbow Falls). Other natural features include Ka Wa'a o Māui, Mo'o Kuna, and the Boiling Pots, all on the Wailuku River.

The following individuals were asked if they were aware of any cultural practices or archaeologically significant sites within the property: Mr. Jeno Enoncencio (Cultural Specialist), Mrs. Pua Kanehele (Professor/Kumu Hula), Mr. Larry Kimura (Professor of Hawaiian Studies - UH Hilo), Mr. Kepā Maly, Ms. Kealoha Piscotta (Cultural Specialist), Ms. 'Ululani Sherlock (Cultural Specialist), and Mr. Kalani Flores (Instructor at Hawai'i Community College).

Mr. Flores deferred comment and suggested that Hawaiian organizations such as the Edith Kanaka'ole Foundation and Hawaiian Civic Clubs might have more information. Hawaiian Studies professor and co-founder of the Edith Kanaka'ole Foundation, Ms. Pua Kanahele said she was not familiar with Waiākea but offered some oral history of the Waiākea area.

Mr. Larry Kimura, a professor of Hawaiian Studies and Language at the University of Hawai'i at Hilo, was not aware of any obvious cultural practices or archaeological evidence in the area. Mr. Kimura noted that the Lava Flow of 1881 flowed through the area and may have covered any culturally significant sites. He also mentioned that the proposed development is near the campsite where Princess Ruth Ke'elikōlani was summoned to help the people of Hilo and try to stop the lava flow from destroying more of Hilo town.

Ke'elikōlani was often referred to as "the Last of the Kamehamehas". The high Chiefess was an ali'i who held true to Hawaiian beliefs, refusing instruction and influences from the protestant missionaries. Although fully capable, Ruth refused to speak any English. Many Hawaiians loved her, while many hated or were terrified of her. In 1881, lava flowed to the edge of Hilo town. After months of prayer, many Hawaiians approached the Kamehameha descendent and requested her help. Kristin Zambuka, author of *The High Chiefess Ke'elikōlani* writes:

> She sent for her bookkeeper to fetch her required offerings for Pele: red silk handkerchiefs and brandy...Ruth tied one of the red handkerchiefs around her throat, bandanna style, then announced that she was ready to go the edge of lava...They were awed as the mighty Chiefess moved boldly and fearlessly towards the fiery edge as if she were going to greet an old friend...Chanting loudly to Pele at time, then softening her voice to a conversational tone, Ruth spoke to the goddess, defying the intense heat and moving so near that some of retainers swore later that the Chiefess actually stepped on to the hot molten lava as she began her eerie ritual...By the first light of morning, their unbelieving eyes saw the lava had stopped, some said within a yard of Princess Ruth's sleeping body.

Mr. Kimura stated that any development in the Waiākea area should be culturally sensitive and respectful to its history:

> I would like to propose that due respect be given especially to the 1881 lava flow because of the significance of its being stopped by Princess Ruth (Zambuka). I am of course backing my concern that every effort be made to be mindful of the destruction of the natural landscape and native plants and their importance to Hawaiian cultural lore and values. A committee to initiate acts of respect for the natural native landscape and plants and their importance to Hawaiian cultural lore and values should be initiated so that the relevance of the Hawaiian cultural connections can survive in spite of future development being planned for the project.

Kepā Maly performed studies in the immediate vicinity of the proposed site:

> I have done some extensive documentary research and limited oral history interviews in the area you described, and know that there are a number of storied places from traditional accounts and historical testimonies in the vicinity.

Mr. Maly agreed with Mr. Kimura and stated:

> Larry Kimura's comments on the 1881 lava are most likely accurate for a portion of the property; and I concur with his thoughts about care for the 'ōhi'a, as well as the neneleau and other patches of native plants left in the area. Anything natural and native, or of cultural-historical archaeological interest (regardless of its period in history – i.e., traditional or historic plantation) is becoming almost impossible to locate in the Hilo Town/UH vicinity. Thus, careful planning and development could help retain some of the unique environment and qualities of Hilo's past.

Potential Impacts. Hilo/Waiākea is rich in water and is a very desirable area for chiefs and commoners alike. Hilo is famous for its rain and the abundance of 'ōhi'a lehua. Although no negative cultural impacts were identified through consultation, special care should be taken to preserve as much of the natural landscape consisting of 'ōhi'a lehua and neneleau (also known as neleau), which takes many years to mature. Kanilehua is the name for Hilo's misty rain that lehua blossoms drink. It is often referenced in chants and songs. An alternate interpretation is "rain that make the lehua blossoms rustle" (Pūku'i, Elbert 1986).

The State Office of Environmental Quality Control (OEQC) reviewed the DEIS and requested that consultation with native Hawaiian groups (i.e., Hawaiian Civic Clubs and Community Associations) be conducted (Chapter 15.0). During the pre-consultation process, the Office of Hawaiian Affairs (OHA) suggested contacting Ululani Sherlock (OHA Community Resource Coordinator), Kealoha Piscotta (Mauna Kea Anaina Hou), Geno Enocencio (Native Hawaiian Historic Preservation Council), and local members of the Royal Orders and the Hawaiian Civic Clubs. Each of these individuals and groups were contacted, and seven individuals (cultural specialists and instructors, in addition to the three recommended by OHA) assisted in the preparation of the cultural impact assessment included above. After reviewing the DEIS, OHA had no substantive comments to offer other than to note that the UHH provides a much needed resource to the general population and to native Hawaiians seeking to expand their educational opportunities (Chapter 15.0).

4.8.4 EFFECTS ON TRADITIONAL AND CULTURAL PRACTICES

The Cultural Impact Assessment did not identify any traditional or cultural practices at the site, thus the Project should not pose any negative cultural impacts. Individuals consulted were unaware of any cultural practices and significant archaeological sites throughout the property. It was suggested that the Lava Flow of 1881 covered any culturally significant sites. Participating individuals voiced their concerns for the preservation of natural landscape. Existing landscape would be incorporated throughout the Project in compliance with Act 73 of the *Hawaii Revised Statutes*, which mandates that any new or renovated landscapes for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants wherever and whenever feasible.

4.9 *VISUAL RESOURCES*

4.9.1 EXISTING VISUAL RESOURCES

Existing important visual resources in the Hilo area include major landforms, open spaces, viewing points, scenic drives, and other physical features. The *General Plan* of the County of Hawai'i (County 1989) along with the current draft *General Plan Update* (County 2001) identify a number of sites as important scenic resources contributing to the natural beauty of the South Hilo District. Visual resources in this district are generally dominated by views associated with the coastline and of Mauna Kea and Mauna Loa. Other resources include the many waterfalls associated with Wailuku River Valley.

Important scenic resources relevant to the Project area include:

- Banyan Drive and associated scenic resources such as Lili'uokalani Gardens, Coconut Isle, and Reeds Bay;
- Views of Hilo Bay with Mauna Kea and Mauna Loa in the background from coastal roads;
- Views of Waiākea Fish Pond and the associated Wailoa River area from surrounding roadways.

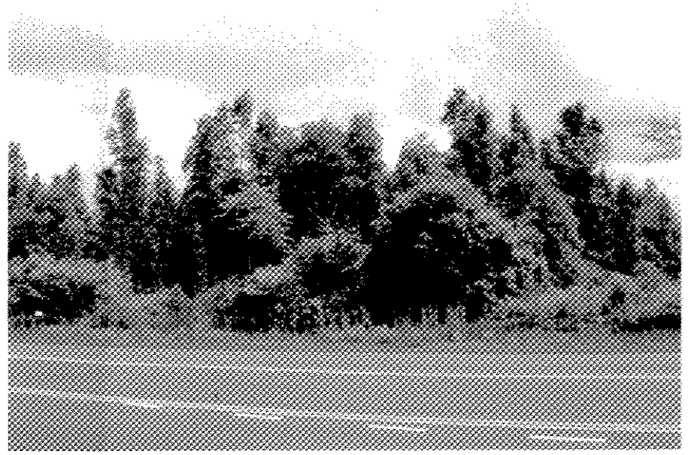
The Project site is currently undeveloped and dominated by a native 'ōhi'a and uluhe forest. No significant or important visual resources or landforms are present within the property. Views of the site from Komohana Street and Mohouli Street Extension are limited to the tall and dense 'ōhi'a and uluhe forest vegetation, which blocks views into the property. Views from the shoreline area toward the Project are also very limited due to the area's relatively flat slope and obstructions from existing structures. The Project may lie within the coastal view plane from house lots within the Sunrise Estates Subdivision and other residential subdivisions located mauka of the property. However, the tall 'ōhi'a and uluhe forest existing along the site boundaries generally limits and obstructs any views of the Project and toward the shoreline.

4.9.2 EFFECTS ON VISUAL RESOURCES

The Project is not expected to have significant impacts on the view planes toward the site or adversely ~~-e~~affect important public viewing points or visual resources. New views of Mauna Kea, Mauna Loa, and the coastline would be created from within the Project site, as the property is currently inaccessible to the public.

Zoning regulations for the Project limit the height of structures to 45 feet. Preliminary design information indicates that most structures will not extend higher than this height limitation. Most buildings and accessory facilities associated with the Project are likely to be single- or two-story structures, similar to those in the existing University Park

No. 1



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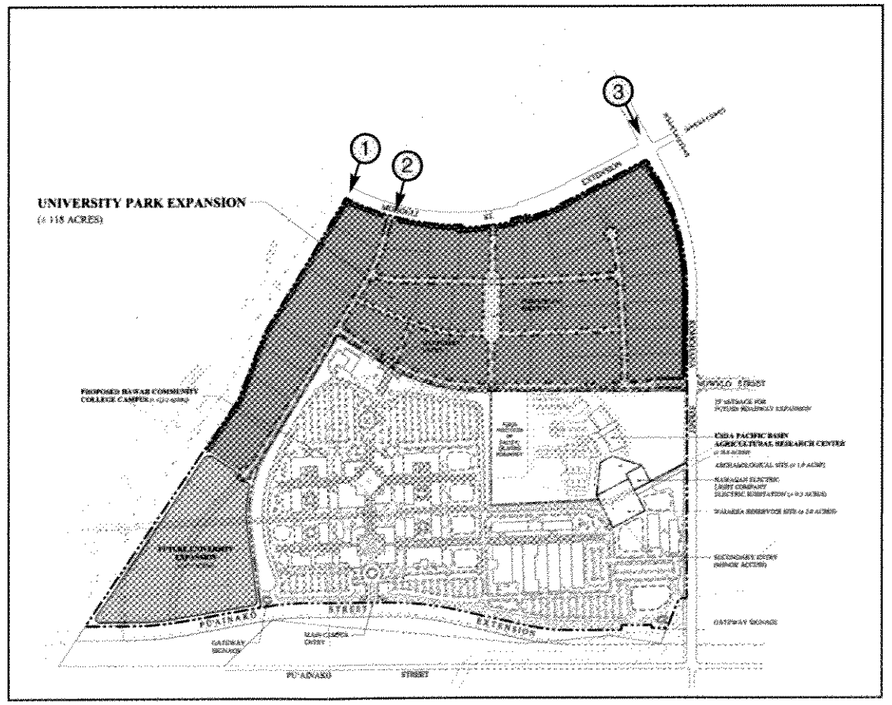
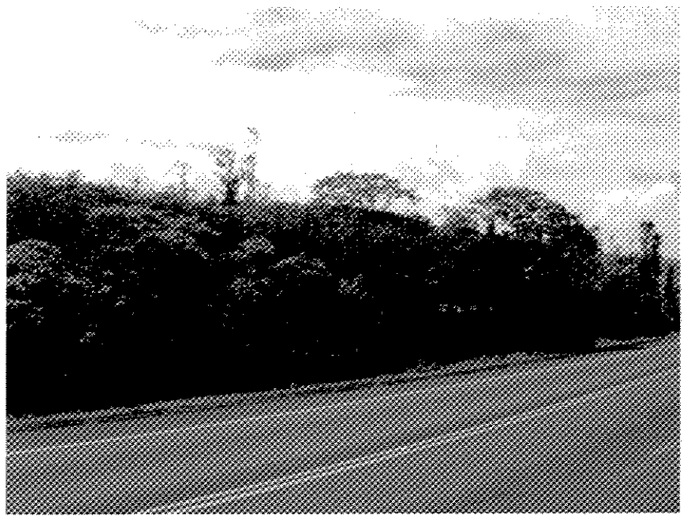


Figure 12a
Visual Analysis
UHH Mauka Lands Master Plan
HILO, ISLAND OF HAWAII

PBR HAWAII

No. 4

No. 5



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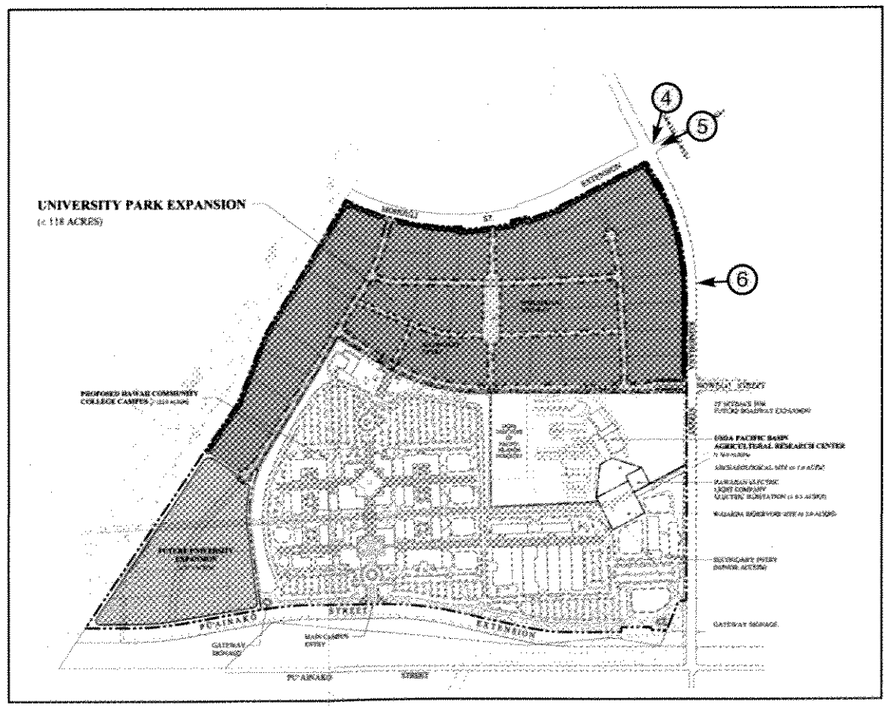
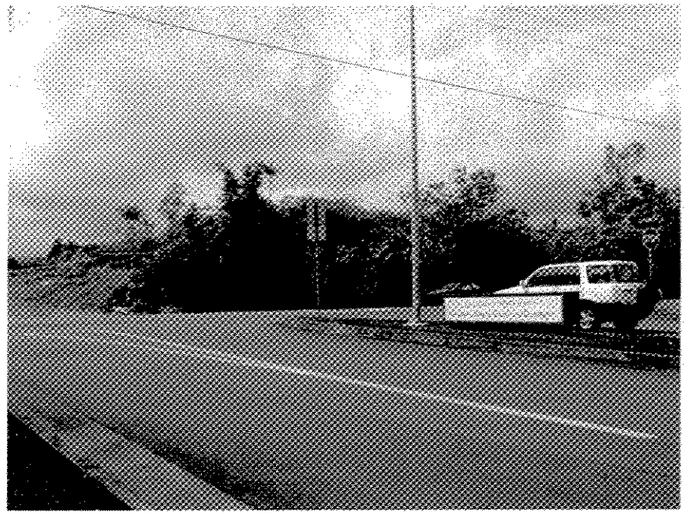


Figure 12b
Visual Analysis
UHH Mauka Lands Master Plan

PBR HAWAII



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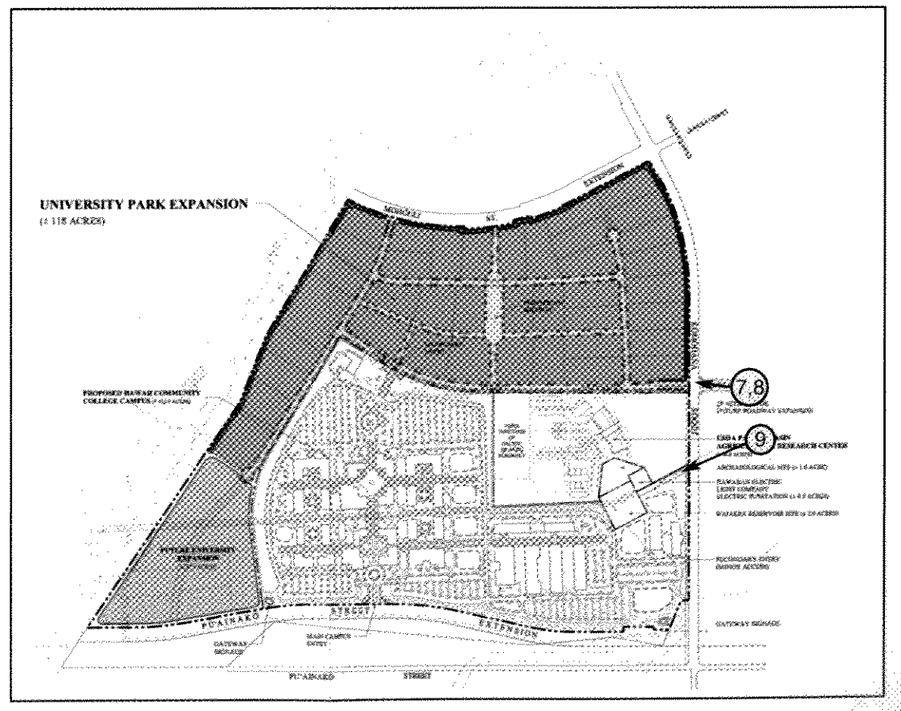
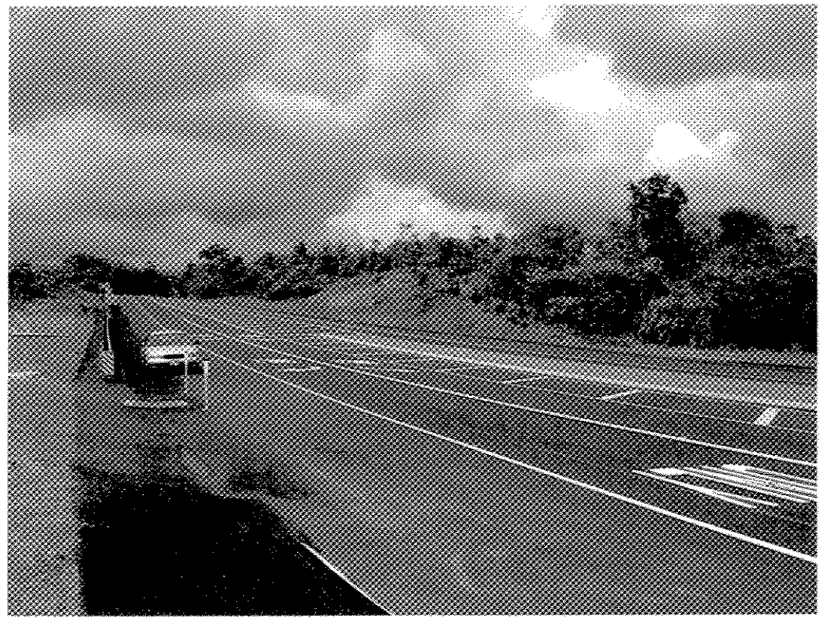


Figure 12c
Visual Analysis
UHH Mauka Lands Master Plan

No. 10



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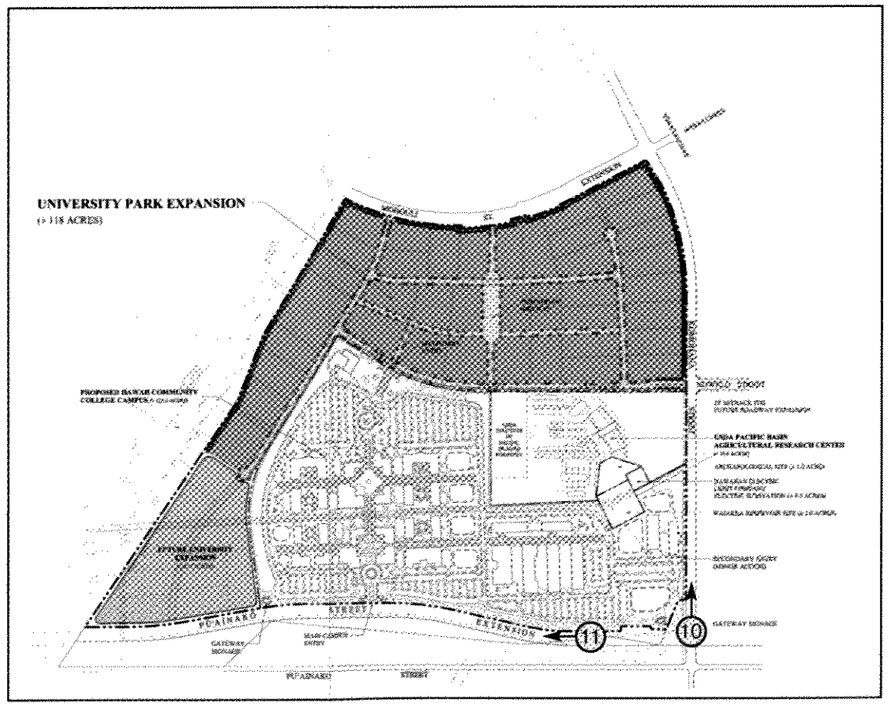


Figure 12d
Visual Analysis
UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

PBR HAWAII

No. 12

No. 13

No. 14

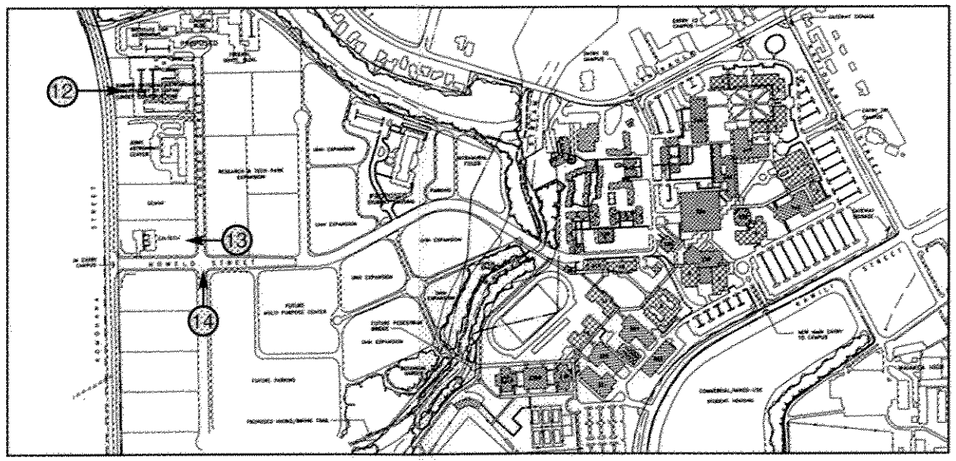


Figure 12e
Visual Analysis
UHH Mauka Lands Master Plan
HILO, ISLAND OF HAWAII

PBR HAWAII

(Figure 12). Because of the height restriction, the generally flat slope and topography, and the existing buildings and structures in Hilo Town obstructing views, the coastal views from mauka residential areas or mauka views from shoreline areas should not be altered by the Project.

In the immediate vicinity, views of the Project should not create a significant visual impact. A 50-foot landscape setback buffer is recommended along the western edge of the UHH University Park Expansion to screen views of the Project from the Sunrise Estates Subdivision. The buffer should continue along Mohouli Street Extension and widen to 100 feet, providing 50 feet for road-widening considerations, along Komohana Street. The north and west edges of the Hawai'i CC campus should be augmented with native plant material to create a natural edge that blends into adjacent parcels. Design plans would incorporate existing trees and native plants into the landscaping concept to further minimize visual impacts.

After reviewing the DEIS, the County Planning Department asked whether any meetings were held with the Sunrise Estates Subdivision community regarding the 50-foot landscape setback buffer (Chapter 15.0). An effort was made to contact the Sunrise Estates Subdivision Community Association, but not specifically on the matter of the landscape setback buffer. Plans for development along the boundary shared with the Sunrise Estates Subdivision are very preliminary at this point and could be revised if required.

Light Pollution Effects

The Project would require outdoor lighting for the gateways, entries, access driveways, parking areas, walkways, building entries and exteriors, and signs. These light fixtures, along with lighting associated with the facilities, would increase light sources that may affect the astronomical observatories on Mauna Kea. As recommended by the University of Hawai'i Environmental Center (Chapter 15.0), the installation of motion-activated outdoor lighting will be considered to minimize lighting impacts to the Mauna Kea Astronomical Observatory.

To mitigate potential adverse light effects from the Project, facilities will be designed in compliance with County of Hawai'i's Ordinance No. 88-122 relating to Outdoor Lighting. The ordinance aids in the conservation of energy and restricts the use of outdoor light fixtures, which at night emit undesirable light rays that can be detrimental to astronomical research. Permissible light fixtures will include only those that limit the direction of light rays downward by completely shielding the lighting source (lamp). Further steps to mitigate the effects of light pollution include avoiding smooth surfaces that reflect light from ground or wall surfaces where lighting fixtures are used and restricting pole heights for lighting standards that match building roof eave heights.

4.10 HYDROGEOLOGICAL RESOURCES

4.10.1 EXISTING HYDROGEOLOGICAL RESOURCES

The State aquifer coding system identifies and describes aquifers in the Island of Hawai'i under the Water Resource Protection Plan. The Project is located within the Northeast Mauna Loa Aquifer Sector (Sector 804), which includes a large majority of the South Hilo District. This sector generally includes the area from the shoreline, inland and up the slopes of Mauna Loa volcano between the Wailua River and the Pahoa District. Within this Northeast Mauna Loa Aquifer Sector are the Hilo (80401) and Keaau (80402) Aquifer Systems. The Project is located within the Hilo Aquifer System.

Groundwater resources associated with the Hilo Aquifer System include basal water floating on salt water and water perched on ash, soil, or alluvium and underlain with basal water. The project site appears to be located within the resource area having water perched on ash, soil, or alluvium. The Hilo Aquifer System has a sustainable yield of 347 million gallons per day (mgd), and the current pumpage from Hilo City wells (Panaewa No. 1, 2, and 3; Pi'ihonua No. 3A and 3B; and Saddle Road) is 9.999 mgd.

4.10.2 EFFECTS ON HYDROGEOLOGICAL RESOURCES

The Project should not have a significant impact on hydrogeological resources in the surrounding area. Construction activities would not alter existing streams or drainage patterns associated with perennial streams, thus the Project would not impact surface water resources.

Domestic water service for the Project would be provided by the County of Hawai'i Department of Water Supply (DWS), whose system complies with drinking water standards as approved by the State DOH. Additional water sources should be available from existing and planned water system improvements, and necessary water allocations would be obtained as discussed in Section 6.1.

The proposed sewerage system for the Project will consist of sewer lines connecting to the County's existing wastewater system, as discussed in Section 6.2. Until the sewer system in Nowelo Street is extended to the USDA Institute of Pacific Islands Forestry (IPIF), the IPIF plans to use a septic tank and leaching field as an interim measure. No septic systems or cesspools, which may affect groundwater resources, would be utilized over a long term. Solid waste generated from activities would not affect groundwater resources, as it would be collected by a private hauler and disposed of at County landfill sites in accordance with County regulations.

To maintain existing pre-development surface runoff conditions, drywells shall be used for the collection and disposal of surface water runoff within the Project. These drywells would allow surface runoff to infiltrate within the property. Infiltration already occurs to a large extent due to the highly porous conditions presented by cracks in the pāhoehoe lava. Drywells would be developed as part of the Project design, and the design plans would be coordinated with the County and State DOH. An Underground Injection Control permit would also be obtained for these drywells, which would be maintained and monitored in accordance with permit conditions.

The DOH Clean Water Branch (CWB) provided comments to the DEIS (Chapter 15.0). In response to the CWB comments, a Federal license or permit (including a Department of Army permit) is not required, as there are no navigable waters within the parcel. As such, a Water Quality Certification is not required. However, a National Pollution Discharge Elimination System (NPDES) permit is required and will be obtained prior to the commencement of construction activities, and a Notice of Intent (NOI) will be submitted to the CWB at least 30 days prior to the commencement of construction activities. In accordance with Section 11-55-38, HAR, the State Historic Preservation Division (SHPD) has reviewed and approved an archaeological inventory survey report for the site to be covered by the NOI. An individual NPDES permit will not be required, as no wastewater will be discharged from the Project into State waters (the Project will connect to the municipal wastewater system).

4.11 CUMULATIVEAND SECONDARY IMPACTS ON THE PHYSICAL AND BIOLOGICAL ENVIRONMENT

Several developments are planned in the Project area and may pose cumulative environmental impacts. These projects are briefly described below and their potential cumulative impacts are discussed in this section and Sections 5.4, 6.6, and 7.7.

Science and Technology Building. A new Science and Technology Building is planned on the main UHH campus at the entry road off Lanikaula Street (east of the UHH Mauka Lands project site). The site currently houses facilities for various science programs. Design and construction of this building is planned to occur between November 2004 and May 2007.

Student Life and Event Complex. A new Student Life and Event Complex will be located near the existing Athletic Complex on the main UHH campus, east of the Mauka Lands project site. The complex will include a multi-purpose facility for sports, recreation, and conference activities, as well as a swimming pool.

United States Department of Agriculture (USDA) Pacific Basin Agricultural Research Center (PBARC). The PBARC, which is surrounded on three sides by the

UHH Mauka Lands project, is being developed on a 30-arce parcel that is currently vacant.

Student Services/Administration Building. Improvements are planned for the Student Services Building on 1.38 acres near the existing Student Services Building, Theatre, and Campus Center on the main UHH campus. The project will provide an addition to the existing Student Services Building to consolidate student services functions and to house the Chancellor's Office and other related administrative functions.

International Village Center. The International Village Center will be developed on 36 acres of land across Kawili Street and will include a student-oriented shopping plaza, dormitory housing, and classroom and cultural facilities and exhibits.

Mauna Kea Astronomy Education Center (MKAEC). The MKAEC, located on a 9-acre site in the existing University Park on Nowelo Street, will serve as an astronomy interpretive center providing education extension services.

4.11.1 CLIMATE, TOPOGRAPHY, AND SOILS

Planned developments in the Project area are not expected to adversely impact regional climate, topography, and soils. Within their respective project sites, construction will impact topographic features and soils, and new buildings may affect the micro-climate; however, the overall topography, soil, and climate of Hilo are not expected to be affected.

4.11.2 NATURAL HAZARDS

It is highly unlikely that any of the proposed buildings and uses associated with the planned developments will affect the potential occurrence of earthquakes, lava flows, hurricanes, or tsunami. The proposed projects are most likely being designed to address seismic, lava flow, flood, and tsunami zone designations for the area to avoid potential damage from natural hazards.

4.11.3 AQUATIC RESOURCES AND WATER QUALITY

The Science and Technology Building, the Student Services/Administration Building, and the International Village Center are located downstream of the Waiākea Stream. The Student Life and Event Complex, the PBARC, and the MKAEC are located upstream of the Waiākea Stream. These projects should not adversely impact aquatic resources and water quality, as on-site drainage facilities such as detention basins will

maintain pre-development runoff levels at each site and should prevent large runoff quantities during most storm events.

4.11.4 BOTANICAL RESOURCES

Impacts on botanical resources are generally limited to the planned development sites. Collectively, the projects are not expected to adversely impact botanical resources in the Hilo area.

4.11.5 MAMMALIAN AND AVIAN SPECIES

Within each project site, existing species are likely to leave during construction but may return to the site, depending on the habitat provided. The Science and Technology Building, the Student Services/Administration Building, and the Student Life and Event Complex will be developed on the existing UHH main campus, which hosts only introduced species. The wildlife survey for the Mauka Lands parcel observed no threatened or endangered species, and it is generally acknowledged that lowland populations of native birds have been eliminated from most areas of Hilo.

4.11.6 AIR QUALITY

Emissions from cars and equipment used to generate electricity can affect air quality. New buildings on currently vacant sites may affect air quality by attracting traffic and using electricity. Where development will replace existing buildings, traffic and electrical demand are not expected to significantly increase on-site. Collectively, the projects are not expected to adversely affect regional air quality, as new technologies, increasingly stringent federal air pollution control regulations, and increasing use of alternative forms of transportation (i.e., bicycles, public transportation) may offset potential increases in air pollution.

4.11.7 NOISE

Although construction will increase existing on-site noise levels, the proposed educational facilities will not generate significant noise over the long term. The projects are not likely to cumulatively affect regional noise levels, as they support research, education, and other student functions.

4.11.8 ARCHAEOLOGICAL AND CULTURAL RESOURCES

Of the planned developments, only two will occur on undeveloped land, the PBARC and the International Village Center. These vacant sites are overgrown and may have been used for sugar cultivation and/or pasture uses, which likely destroyed many archaeological resources. The UHH campus has been extensively altered to accommodate existing facilities, and as such, archaeological resources are unlikely to be found. Any impact to such resources or to traditional and cultural practices would generally be site-specific.

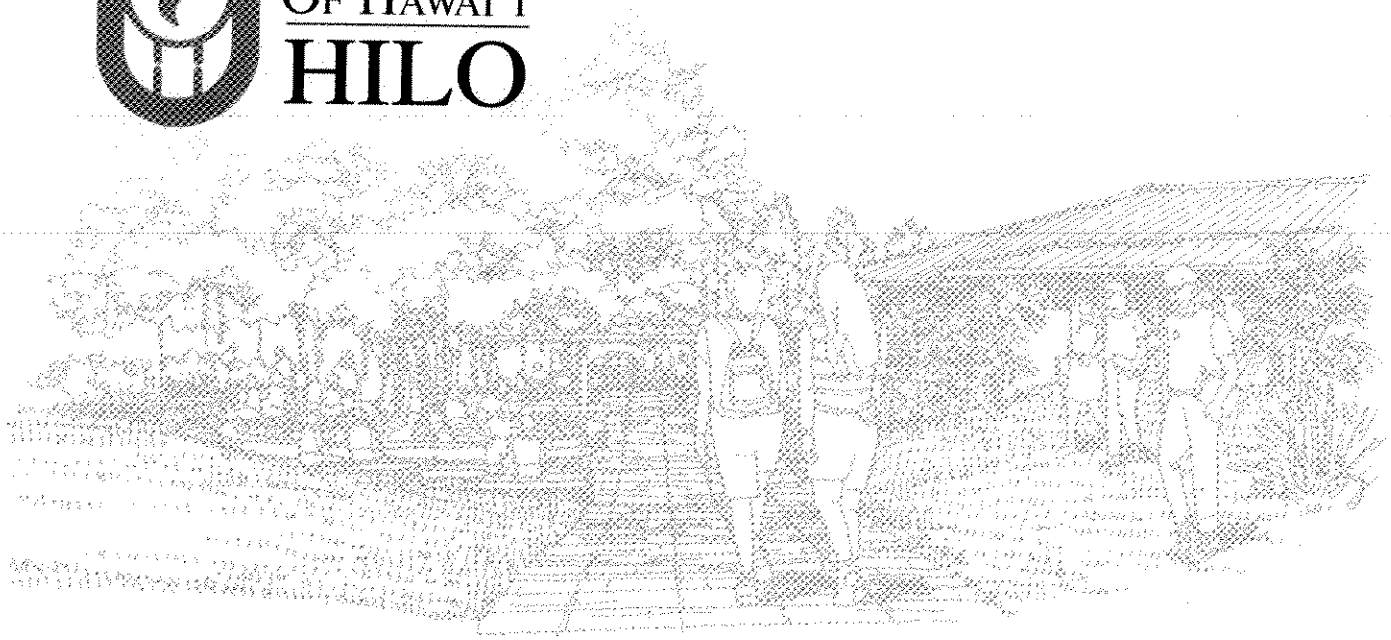
4.11.9 VISUAL RESOURCES

The proposed buildings on University-owned land will reinforce the visual appearance of the UHH campus and the University-related uses in this area. In two cases, the PBARC and the International Village Center will change the visual character of the sites from overgrown lots to University-type facilities.

4.11.10 HYDROGEOLOGICAL RESOURCES

The source of water for all of the projects in the area is the Hilo Aquifer System, which has a sustainable yield of 347 million gallons per day (mgd). As the defacto population of Hilo grows, the water demand for the sustainable yield of the aquifer will increase. However, given the current 9.999-mgd pumpage from Hilo City wells, the day in which the demand is equal to the supply available is unlikely to come for some time.

UNIVERSITY OF HAWAI'I HILO



5.0 Economic and Social Factors

5.0 ECONOMIC AND SOCIAL FACTORS

This chapter discusses the Project's probable impact on economic and fiscal factors associated with the State and County, as well as social factors such as changes in resident population, housing, and community character. Findings of the *Economic Impact Analysis and Public Costs/Benefits Assessment of the Proposed University of Hawai'i at Hilo Mauka Lands Master Plan, Hilo, Hawai'i* by the Hallstrom Group, Inc. (completed in February 2004) are included in this chapter. This report is included in Appendix D.

5.1 BACKGROUND

Hilo is the capital of the County of Hawai'i and the center of much of its agricultural activity. Hilo has been the government center for the island since County government was instituted in 1905. It is also home to the proposed UHH University Park Expansion and Hawai'i Community College Komohana Campus.

Hilo District is large, with various areas supporting the island's tropical agriculture. In 1999, the total farm acreage in Hawai'i County was approximately 870,000 acres, attributing to 60.4 percent of the State's total farm acreage. Hawai'i County is the largest producer of fruit, flowers, macadamia nuts, coffee, and cattle in the State, and has more areas in government forest reserve and private forestland than other counties.

The long-term forecast for Hawai'i County includes steady growth. The population is expected to grow by about one percent annually, with jobs and personal income growing at about 1.6 percent annually.

5.2 SOCIAL IMPACTS

Social impacts within the County of Hawai'i include changes to population and housing, community character, and agriculture.

5.2.1 POPULATION AND HOUSING

The County has a total population of 148,677 persons according to 2000 U.S. Census data. Hilo is the County's most populous town; the Hilo Census Designated Place (CDP) has a total population of 40,759 persons and 14,577 households. The median age of residents in the Hilo CDP is the same as that for the County as a whole, 38.6 years, which is slightly greater than the State median. The housing stock for the Hilo CDP presently accounts for just over 25 percent (16,026 units) of the County total. The

number of dwelling units in Hilo District grew from 14,134 in 1990 to 16,026 in 2000. The majority of housing units are located within established subdivisions. Within the Project vicinity, established subdivisions are located north above the UHH campus, south along Pū'ainakō Street, and within a two-mile radius in the urbanized area of Hilo town.

5.2.2 EFFECTS ON POPULATION AND HOUSING

The University Park Expansion, Hawai'i CC Komohana Campus, and other planned research facilities will likely attract researchers, additional students, faculty, and staff to the South Hilo area. The developments, however, should not have a significant impact on the County's resident population or housing inventory, since the population increase generated by the Project will represent a small percentage of the entire County population. The Project will be built on vacant land owned by the State of Hawai'i and will not displace any existing homes or residents. Although it is likely that new staff and families will move to Hilo from O'ahu or areas outside the State and purchase homes or lots, this relocation will occur over several years as various construction phases are completed (2005 to 2020 timeframe). Population is not expected to increase with the relocation of the Hawai'i CC Campus.

In response to comments received from the County Planning Department regarding student housing (Chapter 15.0), typically, dormitories are not provided on UH Community Colleges (with some exceptions), as the target student population includes surrounding residents. For this reason, there are no plans to provide student housing on the proposed Hawai'i CC Komohana Campus.

5.2.3 EFFECTS ON COMMUNITY CHARACTER

The Project is not expected to significantly impact the existing character of the South Hilo District. The property is currently vacant and the Project will comply with existing and planned land uses. The character of the community in the immediate area can be considered one of higher learning and the Project will comply with the research-oriented goals of the University community. The Project will provide an advanced education to greater numbers of the populace, assist the regional agricultural sector, create basic research and development resources, and generate long-term support for new technology-oriented businesses.

5.3 ECONOMIC CHARACTERISTICS

5.3.1 EXISTING ECONOMIC CHARACTER

Hawai'i County has transformed over the last four decades, from a plantation economy to one of multiple economies. Tourism, diversified agriculture, construction, and local niche industries such as astronomy have replaced sugar as the primary economy. The largest industries in terms of employment are in trade (retail and wholesale) and services. Hotels accounted for some 6,800 jobs in 2000, while agriculture supported only 2,650. Tourism is especially important in East Hawai'i, with Volcanoes National Park attracting 2.7 million visitors per year.

5.3.2 EFFECTS ON THE ECONOMIC CHARACTER

The Hallstrom Group, Inc. analyzed the economic impacts and public costs/benefits of the proposed UHH University Park Expansion and Hawai'i CC, as well as the USDA PBARC facility. Their report concluded that regardless of the cost methodology adopted, in no single year do public coffers suffer a net loss with the Project.

The Hallstrom Group's report stated that in many respects, "the project represents the next, and crucial, step in the on-going evolution of Hilo from an agrarian-based economy (a sector in stagnation since the demise of the sugar industry) into a service and technology-based modern economic structure." The report was oriented toward direct (primary and secondary) impacts, as the Project is substantially comprised of uses that have inordinately high, but difficult to quantify, indirect benefits such as providing an advanced education to greater numbers of the populace, assisting the regional agricultural sector, creating basic research and development resources, and generating long-term support for new technology-oriented businesses.

Capital Investment and Employment Opportunities

The Project's impacts on the economic character of the Big Island include capital investment, employment during construction and operation, wages paid, business operating profits, student and worker expenditures, and other regional monetary and employment effects. Development of the Project will result in numerous construction, equipment operator, and specialty trade jobs (on- and off-site) during planning and emplacement of the infrastructure and building of the improvements. Once the buildings and support facilities are completed, a significant number of additional employment opportunities will be created by the tenant businesses in University Park and for staff and students at the Hawai'i CC and workers at the USDA PBARC. Other jobs will be offered, as the buildings will require landscape, service, maintenance, and renovation in the course of their use.

Local businesses, including contracting companies constructing the improvements and suppliers of the materials needed in the building efforts, will also profit from the Project. The Big Island economy will benefit through money spent at off-site shops, restaurants, and service establishments throughout the island by the Project's employees and constituent operations/businesses. As these wages, profits, and expenditures move through the regional economy, they will have a ripple, or "multiplier," effect – increasing the amount of capital flowing to the entire community. An estimated $473.9 million[1] in direct development capital will flow into Hilo over the 30-year projection model depicting the Project's planning, development, and build-out period. On a stabilized basis, after construction is completed, various operating components of the Project will generate some 3,851 permanent full-time equivalent and/or enhanced employment opportunities – 2,567 jobs directly related to on-site activities and 1,284 indirect positions throughout the Big Island. These positions will represent about 3.9 percent of the island's total employment by 2035.

Based on the Department of Business, Economic Development and Tourism (DBEDT) data stating that one employee position is created for each $75,000 to $100,000 spent, an additional 849 to 1,132 secondary jobs will be supported on the island as a result of the businesses within the Project property. Upon build-out and stabilization, an estimated $84.9 million in gross sales/business activity will be generated annually by cumulative business operations in University Park Phase II. Using a relatively low-end multiplier effect ratio, the Project's total overall direct impact on the island economy would be $7.29 billion over the 30-year projection period and $454.4 million on a stabilized annual basis thereafter.

Public Fiscal Benefits

The USDA PBARC and Hawai'i CC facilities, and some tenants of the University Park will be non-profit, eleemosynary, educational, governmental or similar enterprises exempt from some forms of taxation. Thus, direct governmental cash flow benefits are less than those possible via an open-market development.

Real Property Tax

The total real property tax to be paid to the County of Hawai'i in 2004 dollars ranges from $72,643 in the first year of business occupancy (year 4 of the development model) to a stabilized level of $1,888,719 (at build-out in year 29 and beyond). The aggregate real property taxes paid over the 30-year study timeframe will be $27.4 million.

State Income Tax

The wages of workers and the corporate profits from contractors and supplier serving the development are the sources of State income tax. The total income tax revenues to be received by the State are projected at $209,454 in the first year of construction and at

[1] All figures are expressed in constant 2004 dollars and not inflated over time. Whether the build-out requires 15 or 40 years, the total and annualized impact estimates remain valid.

a maximum of $9.4 million annually in constant 2004 dollars. The Hallstrom Group's report assumed that there are no corporate profits/taxes for the Hawai'i CC and the USDA PBARC. Among the University Park Phase II operations, an estimated two-thirds are for-profit entities, half of which would be subject to income taxes. Direct governmental cash flow benefits are less than what would be possible via an open-market development.

State General Excise Tax

Assuming that all University Park Phase II operations, whether private or mixed public/private enterprises, will be subject to the State general excise tax of 4.166 percent on their daily operations, the anticipated State excise tax receipts resulting from the Project are estimated at $75,223 in the first year of development to a peak of $6.6 million. However, the large majority of Hawai'i CC student expenditures are spent at on-campus locations exempt from excise tax collection.

At full build-out, the County of Hawai'i will receive $27.4 million and the State of Hawai'i will receive $254.9 million during the 30-year projection timeframe. Over this same period, the projects will generate $282.3 million in total tax receipts for the County and State.

Public Costs

On an *actual* cost basis (the preferred analytical method), the State and County expenses associated with the Project (such as police/enforcement, fire protection, emergency medical response, road maintenance, etc.) would range from $51,420 in the first year of business occupancy (year 4 of the 30-year modeling projection) to a stabilized maximum of $1,028,400 at build-out in 2004 dollars. On a *per capita* allowance basis, the direct, indirect, and inferred costs to the State and County at build-out would be $3.89 million annually.

The Hallstrom Group's analysis of public costs/benefits focused on primary tax revenues received by the State and Counties versus the implied costs of providing governmental services to the development and its users. Public safety facilities in central Hilo are nearby and have the personnel and equipment to service the University Park, the Hawai'i CC, and the USDA PBARC. Most public infrastructure systems in the area were designed or are being upgraded to have the capacity to service development in the neighborhood. Safety facilities will expand with overall community growth. Regardless of the cost methodology used (actual or per capita), in no year of the projection or stabilized periods did either the State or the County experience a revenue shortfall due to the Project.

5.4 CUMULATIVE AND SECONDARY IMPACTS ON THE SOCIAL AND ECONOMIC ENVIRONMENT

The UHH has several developments planned in addition to this Project (UHH Mauka Lands Master Plan). These projects, as well as potential cumulative impacts, are described below.

5.4.1 POPULATION, HOUSING, AND COMMUNITY CHARACTER

The developments planned by the UHH or other parties using UHH lands (described in Section 4.11) will help accommodate a growing demand for educational and research facilities in Hilo. No homes or residents will be displaced, as the developments will occur on currently undeveloped sites or sites already used for UHH functions. Many of the planned developments will replace existing buildings; however, development of new facilities on vacant land will provide new employment and education opportunities that may attract students, researchers, faculty, and staff to the South Hilo area. The developments, however, should not have a significant impact on the County's resident population or housing inventory, since the population increase will represent a small percentage of the entire County population and will occur over several years. Collectively, the proposed developments will reinforce the UHH community's character of higher learning.

5.4.2 ECONOMIC CHARACTER

The proposed developments will provide numerous construction, equipment operator, and specialty trade jobs (on- and off-site) during planning and emplacement of the infrastructure and building of the improvements. Several other jobs will be offered to landscape, service, and maintain each building. Local businesses, including those constructing the improvements and those supplying the materials, will profit from the planned developments. Money spent by workers and businesses at off-site shops, restaurants, and service establishments throughout the island will benefit the County's economy. As these wages, profits, and expenditures move through the regional economy, they will have a ripple, or "multiplier," effect – increasing the amount of capital flowing to the entire community. The State's economy will also benefit from the generation of income and general excise tax revenues.

Since the developments are not expected to have a significant impact on population and housing, State and County expenses (i.e., police/enforcement, fire protection, emergency medical response, road maintenance, etc.) are not expected to be adversely affected.

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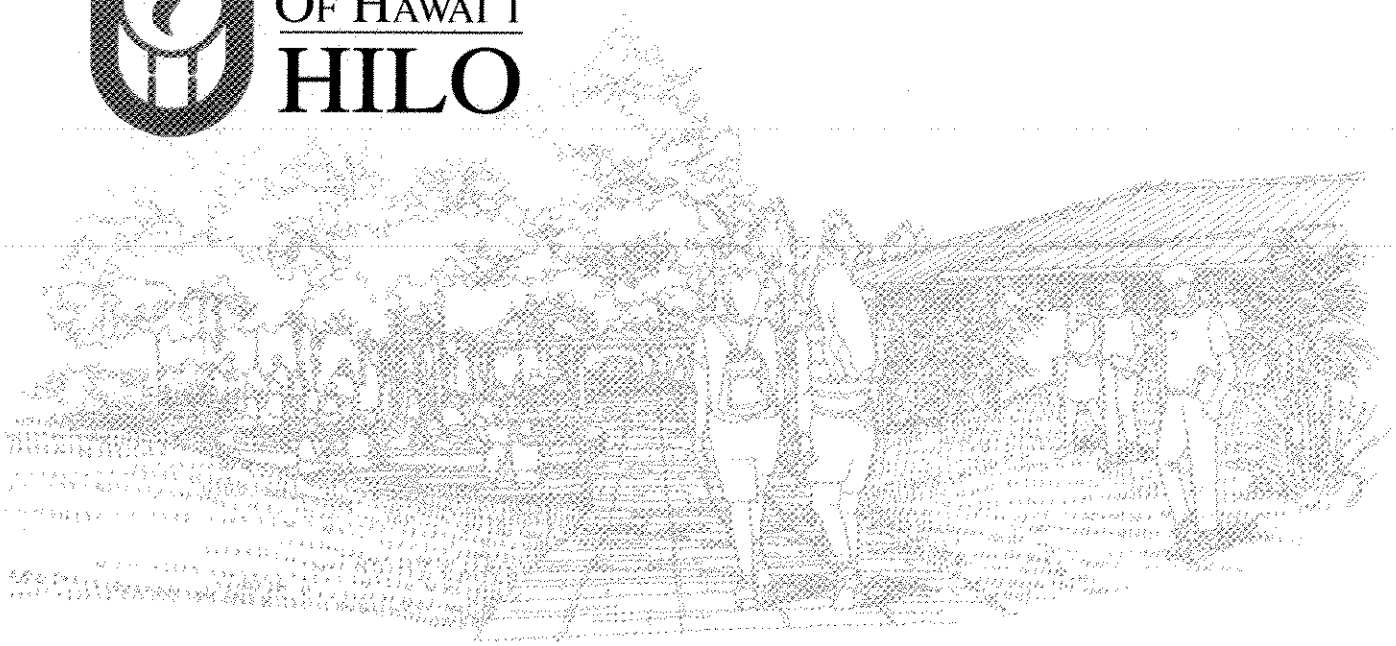


6.0 INFRASTRUCTURE FACILITIES

6.0 INFRASTRUCTURE FACILITIES

This chapter identifies the infrastructure requirements of the Project and addresses its probable effects on existing infrastructure facilities serving the area. The *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel* was developed by Engineering Concepts, Inc. for the approximately 300 acres including the University Park Expansion, and the Hawai'i CC Komohana Campus, as well as the PBARC, the IPIF, and future University Expansion. This report is included in Appendix E.

6.1 WATER FACILITIES

6.1.1 EXISTING WATER FACILITIES

The Hilo Aquifer System has a sustainable yield of 347 million gallons per day (mgd), and the current pumpage from Hilo City wells (Panaewa No. 1, 2, and 3; Pi'ihonua No. 3A and 3B; and Saddle Road) is 9.999 mgd.

The existing UHH campus and University Park are presently served by the 1.0-MG reservoir located along Pū'ainakō Street, near the Sunrise Estates Subdivision. This reservoir has a spillway elevation of 479 feet and is the primary reservoir. The Waiākea Reservoir (0.5-MG reservoir with a spillway elevation of 354 feet), located adjacent to the Hawaii Electric Light Company, Inc. (HELCO) Komohana Substation, provides a secondary source for the UHH campus through the loop formed between the 8-inch line from the Waiākea Reservoir (located under Waiākea Stream and Lanikaula Street) and the 12-inch line (along Campus Road) from the 1.0-MG reservoir. A pressure reducing valve (PRV) with a setting of 65 psi exists at an approximate elevation of 204 feet on the 12-inch line from the 1.0-MG reservoir at Nowelo Street, just before the UHH campus.

Wells at Pi'ihonua pump water into Pi'ihonua Reservoir No. 3 (a 1.0-MG reservoir with a spillway elevation of 300 feet). A booster pump station at Pi'ihonua Reservoir No. 3 then pumps water up to Pi'ihonua Reservoir No. 2 (a 0.8-MG reservoir with a spillway elevation of 646 feet). From there, water flows to Waiākea Reservoir via a PRV located downstream of Pi'ihonua Reservoir No. 2, at an elevation of 279 feet. The PRV is set at 70 psi, which is comparable to a reservoir with a spillway elevation of 441 feet at the PRV location. From this PRV, the transmission main runs along Komohana Street toward Waiākea Reservoir.

The 1.0-MG reservoir located along Pū'ainakō Street is fed by the connection to an existing 12-inch waterline coming from the Kaūmana Reservoir (a 50,000-gallon reservoir with a spillway elevation of 724 feet). From the 1.0-MG reservoir, a 16-inch

transmission main runs along the Pū'ainakō Street Extension and Komohana Street, then connects to the 12-inch waterline in Nowelo Street from the University Park.

The Project area is located mauka of the Underground Injection Control (UIC) line, which regulates the use of injection wells for disposal of domestic and non-domestic wastewater. No State wells are located in or near the Project area.

6.1.2 EFFECTS ON WATER FACILITIES

Due to elevation differences within the Project site, the projected water demand is divided into two water service zones: a high service zone at an elevation above 379 feet, and a low service zone at an elevation below 379 feet. The total average daily domestic water demand for the Project is estimated to be approximately 575,900 gallons per day (GPD) for the entire UHH Mauka Parcel at full occupancy. Two separate water distribution systems are proposed to serve the two water service zones.

Low Service System

The low service system will include areas located below the 379-foot elevation, which will be served by a new 12-inch water main from the 1.0-MG reservoir along Pū'ainakō Street. This reservoir will be the source of water for the University Park Expansion Lots 1 through 35, the Hawai'i CC, the PBARC, and the IPIF. The estimated maximum daily demand for these facilities is 564,150 GPD. This reservoir will also provide water for the proposed China-U.S. Center located across the existing UHH campus on Kāwili Street. The projected maximum daily demand for this facility is 201,153 GPD, making the total projected maximum daily demand for the reservoir 1,371,603 GPD. The 1.0-MG reservoir may not be large enough to serve the total distribution area, including the entire lower half of the Mauka Parcel. The Waiākea Reservoir also provides service to the UHH Campus; however, its storage is primarily allocated to other areas. As the Project is developed, further evaluation will be required to determine whether a new reservoir is required or if the proposed 2.0-MG Pi'ihonua Reservoir No. 2 can be used as a secondary source to service this system during emergencies, using the PRV located within the Mauka Parcel. At the end of Phase 3, the actual water demand should be evaluated to determine if additional storage is required.

The new 12-inch water main will be located in the Nowelo Street Extension and will connect to the existing 16-inch line at the intersection of Nowelo Street and Komohana Street. Water mains of 12 inches will also be constructed in Roads A and B. A 12-inch main within Hawai'i CC will connect the existing 16-inch main in Pū'ainakō Street Extension to the 12-inch main in Nowelo Street Extension. Service stubouts will be provided to each lot, including the PBARC and IPIF facilities, with individual meters proposed for each lot. Waterlines are proposed to be dedicated to the Department of Water Supply (DWS).

High Service System

This system includes areas above the elevation of 379 feet. The Pi'ihonua Reservoir No. 2, with a current capacity of 0.8 MG, will be increased to a 2.0-MG reservoir with a spillway elevation of 646 feet. The DWS has indicated that this reservoir should serve the high service system including the University Park Expansion Lots 36 through 39, the Hawai'i CC, and the Future University Expansion area. The estimated maximum daily demand for these facilities is 299,700 GPD. The proposed 1.0-MG Haleloke Reservoir (with a spillway elevation of 838 feet), located approximately halfway between the existing Pi'ihonua Reservoir No. 1 and the Kaūmana Reservoir, could also help to meet the storage requirement. The *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel* suggests that the water system be re-evaluated when lots within the high service zone are developed to determine which reservoir should provide the storage requirement.

Two proposed distribution systems include the Pi'ihonua Reservoir No. 2 and the Haleloke Reservoir. From Pi'ihonua Reservoir No. 2, there is an existing 16-inch water main in Waiānuenue Avenue until Kaūmana Drive, where there are 6-inch and 8-inch lines. Waterline improvements in Kaūmana Drive are required to increase the size of the line from Waiānuenue Avenue to Mohouli Street Extension. This distribution system would extend from the existing 12-inch main in Mohouli Street Extension, along Road C, to service the mauka portion of the University Park Expansion and Hawai'i CC. The other proposed distribution system begins at the future Haleloke Reservoir, where a proposed 16-inch transmission main will extend to existing 8-inch waterlines in the Sunrise Estates Subdivision. A proposed 12-inch water line will feed the 1.0-MG reservoir located along Pū'ainakō Street via a PRV set to establish a pressure head of 724 feet (similar to the elevation of the existing Kaūmana Reservoir). If the Haleloke Reservoir is used for storage in the high service system, the influent line of the 1.0-MG reservoir along Pū'ainakō Street can be connected.

The DWS anticipates the ability to provide water service to the Project. A calculated water usage for the completed Project will be submitted to DWS for its final determination of water service ability. Some areas of the Project, primarily higher elevations during periods of high water demand, may remain outside of DWS's service zone and experience diminished water pressure, and an Elevation Agreement with DWS will be required to acknowledge this condition. The proposed 1.0-MG Haleloke Reservoir will eventually extend the service zone to areas below an elevation of 738 feet and strengthen the water system in the Mauka Parcel.

On-site water system improvements would consist of 8- and 12-inch water lines within driveways to serve the various facilities. Appropriate coordination with both the University and the DWS will be conducted during the Project's design to address the water system connection and availability. Coordination will also occur with the State DLNR Land Division to incorporate the Project into the State Water Projects Plan, as recommended by the DLNR Commission on Water Resource Management (CWRM)

and the Engineering Division. Calculations will be provided to the DLNR Engineering Division.

After reviewing the DEIS, the CWRM recommended coordination with the Engineering Division of the DLNR to incorporate this Project into the State Water Projects Plan (Chapter 15.0). The CWRM also stated that the Project's water demand of 575,900 gallons per day appeared low, as, according to the County Water System Standards, demand would be on the order of 1.07 million gallons per day. Although the County Water System Standards indicate that the water consumption guidelines for schools and light industry are to be 4,000 gallons per acre per day, the actual meter readings for the existing University Park are much lower. The projected average daily water demand for the Project was based on 2,000 gallons per acre per day. Project engineers have discussed the use of an average daily demand of 2,000 gallons per acre per day with the DWS, which has not expressed any objection. The DWS is currently reviewing the Preliminary Engineering Report, including the design criteria.

6.2 *WASTEWATER FACILITIES*

6.2.1 EXISTING WASTEWATER FACILITIES

The County Hilo Wastewater Treatment Plant, located near the airport fronting Puhi Bay, services the Hilo area. This system presently consists of a 5.0-million gallon per day (MGD) secondary sewage treatment plant with an ocean outfall effluent disposal, and a collection system of sewage pump stations, force mains, and gravity lines. Many areas outside of central Hilo rely on cesspools and septic tanks for wastewater treatment.

The existing University Park sanitary sewer system is comprised of 8-inch and 10-inch sewers that are owned and maintained by the University. This system discharges into the County's sewer system through a connection with the 8-inch County sewer in Lanikaula Street, east of Waiākea Stream. Each lot within the University Park is provided with a sewer service connection. The Project site is located mauka of the existing University Park and is not sewered.

6.2.2 EFFECTS ON WASTEWATER FACILITIES

The design population used to project the wastewater flow from the Project included school facilities (Hawai'i CC), the University Park Expansion (including the USDA PBARC), and the Future University Expansion area. The estimated total capita is 9,632 and the maximum design flow is estimated to be 731,000 gallons per day (GPD).

On-site Improvements

The existing 8-inch sewer line in Nowelo Street will provide temporary service connection for the USDA PBARC, for which construction is anticipated to be completed in June 2006. Since the University Park is not fully developed, the PBARC will temporarily borrow some capacity from the existing sewer. An additional 8-inch sewer line will be constructed in Nowelo Street and will serve only the PBARC. As lots in the existing University Park are developed, the sewer flows will be monitored to determine if the PBARC site can continue to be served by the existing 8-inch line in Nowelo Street. When the existing sewer in University Park is approaching its capacity, the new 8-inch sewer will be connected to the sewer in Road A. To serve Lots 16 to 20, 35 to 39, and the Hawai'i CC, a proposed 8-inch sewer line will be constructed in the pedestrian/bikeway. Another 8-inch sewer in Road B is proposed to serve Lots 21 to 34.

The majority of the Project site slopes toward Mohouli Street in the northeastern corner. The planned sewage system within the UHH Mauka Parcel will also slope toward the northern end of Road A, where it will connect to the off-site sewer system. A portion of the Hawai'i CC slopes toward the southeastern corner. A pump station is proposed to pump the sewage toward a manhole located in the middle of the campus, where it will flow by gravity to the 8-inch sewer line in the pedestrian/bikeway.

Off-site Improvements

The existing University Park sewer system was not sized to accommodate flows outside of the University Park area, therefore a separate off-site sewer along Lanikaula is proposed to transport the wastewater flows generated by the UHH Mauka Parcel to a point in the County's sewer system with the capacity to convey the wastewater to the County's wastewater treatment plant.

From Road A, a proposed 12-inch off-site sewer will be located in the southern shoulder of the roadway in Mohouli Street, until it intersects with Kumukoa Street. The 12-inch sewer will continue in the shoulder area of Kumukoa Street and will cross under Waiākea Stream to Lanikaula Street. The sewer will then parallel the existing Lanikaula Trunk sewer along Lanikaula Street and 'Iolani Street until it intersects with Leilani Street. At this intersection, the proposed sewer will turn onto Leilani Street and finally connect to the County's existing 36-inch sewer at Manono Street. The proposed 12-inch sewer would be a relief sewer that will mitigate the limitations of the existing Lanikaula Trunk Sewer.

The UHH will conduct appropriate coordination with the County Department of Environmental Management (DEM) to address the proposed off-site sewer improvements. Wastewater plans will be prepared and will address connection of the Project site to the Hilo Wastewater Treatment Plant. These plans will conform to the appropriate State Department of Health Administrative Rules and shall be subject to review by the DOH. The availability of a sewer line connection would be developed

during this phase and will be coordinated between the County DEM, the Hawai'i CC, and the UHH.

After reviewing the EISPN, the State Department of Health, Wastewater Branch had no objections to the Project, so long as it is connected to the Hilo Wastewater Treatment Plant (Chapter 14.0). After reviewing the DEIS, the Wastewater Branch stated that it had done a preliminary search of its files and had no wastewater records on the subject property (Chapter 15.0). It further stated that all wastewater plans must conform to applicable provisions of the Department of Health Administrative Rules, Chapter 11-62, "Wastewater Systems," and the Wastewater Branch reserves the right to review the detailed wastewater plans for conformance to applicable rules.

6.3 *DRAINAGE FACILITIES*

6.3.1 EXISTING DRAINAGE FACILITIES

Two major drainageways are located below or makai of the UHH Mauka Parcel in the University Park area. One major drainageway is Waiākea Stream, which traverses along the southern and eastern boundaries of University Park. The other drainageway is a drainage ditch along the northern boundary of University Park. This drainage ditch separates University Park from the University Heights Subdivision and discharges into Waiākea Stream near Lanikaula Street Bridge.
Four drainage crossings exist along Komohana Street: 1) a lined channel under the bridge over Waiākea Stream; 2) an arch culvert (9'-6" x 6'-5") that outlets into an unlined channel diverted along the western boundary of the Komohana Agricultural Complex and discharges into Waiākea Stream; 3) an arch culvert (11'-5" x 7'-3") approximately 250 feet south of the Waiākea Reservoir Access Road discharging into University Park; and 4) an arch culvert (16'-5" x 10'-3") near the Mohouli Street and Komohana Street intersection discharging into the drainage ditch along the northern boundary of University Park.

Surface runoff follows natural slope conditions since the property is undeveloped; however, past observations of the drainage crossings at Komohana Street have shown that very little runoff from the Project site appears to discharge into the University Park area. Two lined trapezoidal drainage ditches located in Kipuni and Makana'a Streets of the Sunrise Estates Subdivision discharge into the Project site during times of heavy rainfall. The drainage ditches are downstream of existing drywell inlets.

The majority of the Project site is designated Zone X by the Flood Insurance Rate Map (FIRM), indicating areas outside of the 500-year floodplain (Figure 11). A portion of the University Park Expansion area is designated Zone A, indicating areas inside the 100-year floodplain (no base flood elevations determined).

6.3.2 EFFECTS ON DRAINAGE FACILITIES

The Project would increase the amount of impervious surfaces by construction of buildings, roadways, parking areas, and walkways; however, the Project is not expected to have a significant impact on existing drainage conditions within the immediate area. The *Storm Drainage Standard* of the County of Hawai'i, October 1970 requires that on-site storm drainage facilities be sized to control runoff in excess of estimated pre-development runoff quantities. The facilities constructed within the Project site will not discharge more than the pre-development runoff onto the roadways. Drywells will be constructed on-site to retain the increased runoff and the overflow will go to the drainage systems in roadways. A stormwater management option will be developed to minimize Project-related increases in pollutant loads.

Runoff will be collected by drainage systems consisting of catchbasins and pipe drains within the roadway, which will ultimately discharge directly into the two existing drainageways located below the Project site. To mitigate increases in storm runoff resulting from the impervious surfaces created by roadways, drywell catchbasins/manholes will be constructed on the main drain. A drainage system will also be constructed in the pedestrian/bikeway to accommodate the overflow from Lots 16 to 20. A pipe connection will be provided to each lot to convey overflow from the drywells. A headwall, drywell inlet, and drain will be constructed in Lots 35 and 39 to connect to the drainage system in Road C. Drywell catchbasins will also be constructed in Road C to mitigate the impact of the offsite runoff.
The drainage system for the University Park Expansion and a portion of the Hawai'i CC will discharge into the drainage ditch located along the northern boundary of the University Park via the existing arch culvert near the Mohouli Street and Komohana Street intersection. The drainage ditch was evaluated to determine the 100-year flood boundary, which is usually located within the banks of a ditch. The slope of the ditch is fairly steep for a major portion of its length, resulting in channel flow velocities that exceed five feet per second. The *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel* suggested lining the banks of the ditch since velocities exceeding 5 feet per second are considered erosive. As part of Phase III improvements for the proposed University Park, the bank along the University Park can be lined with 12-inch thick grouted riprap, east of the drain outlet for South Aohōkū Street. As the drainage ditch approaches Waiākea Stream, it enters the floodplain of Waiākea Stream. The drainage system for the remainder of the Hawai'i CC will discharge into Waiākea Stream via the arch culvert near the Komohana Agricultural Complex.

With the construction and related drainage improvements of the Sunrise Estates Subdivision west and mauka of the Project site, the area contributing to the Zone A designation appears to be greatly reduced. When the lots affected by the Zone A floodplain are developed, a detailed flood study should be performed to determine the 100-year floodplain. If it differs from the existing FIRM, an application should be made

for a Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR).

During the pre-consultation process, the Department of Health requested information regarding pre- and post-Project drainage patterns, runoff volumes, and pollutant loads. Coordination would occur with the County DPW during the design phase for the review and approval of Grading Plans and proposed drainage improvements. As noted by the State DLNR, Engineering Division, the Project shall comply with rules and regulations of the National Flood Insurance Program (NFIP), whenever work is required within a flood zone.

No additional surface water runoff will be allowed onto Pū'ainakō Street Extension. A drainage report with appropriate calculations will be submitted to the State Department of Transportation for review and approval before improvements potentially affecting surface water runoff on a highway right-of-way are initiated.

6.4 SOLID WASTE

6.4.1 EXISTING SOLID WASTE FACILITIES

The Solid Waste Division of the County Department of Environmental Management is responsible for administering the island's solid waste management system. This division operates two active County landfills, South Hilo and Pu'uanahulu in West Hawai'i. No collection services are provided by the County, and residents and businesses either haul their solid waste to any one of 21 transfer stations located throughout the island or hire a private collection service. Transfer stations located in the general vicinity of the Project site include the Hilo, Pāpa'ikou, and Kea'au stations.

In 2000, the total amount of solid waste managed by the County system was approximately 160,000 tons. Of this amount, about 45 percent (70,000 tons) of solid waste was deposited into the South Hilo Landfill and about 55 percent (90,000 tons) was deposited into the Pu'uanahulu Landfill. Since 1995, the quantities of waste being delivered to both landfills have increased at an average rate of about 5 percent per year. The overall waste generation per capita daily rate for the United States, between 1995 and 2000, was 4.6 pounds, compared to 6.2 pounds for the County of Hawai'i and 5.8 pounds for the state.

The County planned to, but did not close the South Hilo Landfill in the mid-1990s. The last DOH solid waste facility permit to operate the landfill lapsed in 1998 and, regardless of the permit status, the landfill will soon be full. The South Hilo Landfill was established in the 1970s, before federal regulations were developed. The landfill is unlined; however, no significant groundwater contamination has been detected during quarterly monitoring. The footprint of the landfill is limited by property boundaries,

and lateral expansion is not allowed by current regulations, unless the new waste management units are lined. The ultimate height of the landfill is limited by the geometry of the footprint and the side slopes. The *2002 Solid Waste Management Plan Update* estimated that the South Hilo Landfill, as of mid-2001, had approximately 500,000 cubic yards of remaining air space and would be full by the summer of 2004. The plan also stated that the landfill must be closed in the next five years.

The UHH has one of the more extensive and active recycling plans compared with other government facilities on the island. Procedures have evolved to provide for the collection of glass, aluminum, white paper, mixed paper, and newspaper. Recycling bins are distributed throughout the campus, and a student worker position is dedicated to collecting recyclables from bins and depositing them at waste pick-up locations. The contractor collects recyclables at no cost to the University in exchange for salvage sales.

6.4.2 EFFECTS ON SOLID WASTE FACILITIES

Construction of the Project will generate solid waste typical of normal construction-related activities over a short time period. Generated wastes will consist primarily of vegetation, rocks, and other debris resulting from the clearing and grubbing of Project area. The contractor will be required to remove all debris from the site and properly dispose them at the South Hilo Landfill in conformance with County regulations. Such activities are expected to have a minor impact on County solid waste facilities.

Research and campus-related activities conducted at the Project site would inevitably result in increased solid waste material being generated. Selected contractors will be instructed to provide a job-site recycling plan for construction wastes and to use products with recycled content, where feasible. The Project will incorporate provisions for recycling. The UHH will expand its recycling efforts into the Project site as it is developed and becomes operational. Non-recyclable waste from the Project would be transported to a landfill by a private contractor. At this time, it is not known whether the South Hilo Landfill will be available until the year 2020, or a new landfill site would be available. Nevertheless, appropriate coordination with the County will be conducted during the Project's design and construction phasing plans to address solid waste facilities. Additional developments occurring within the immediate vicinity of Project, including the PBARC/IPIF complexes, will also generate increased solid waste needing to be disposed at a landfill.

To minimize the amount of waste generated, the Project will adopt similar recycling procedures already being implemented by the UHH. The UH Environmental Center recommended that the recycling plan include plastic containers, especially given the State's new Bottle Bill. A beverage container redemption station is also recommended on campus. A comprehensive waste management plan emphasizing source reduction

and reuse will be developed. After reviewing the EISPN, the State Department of Health, Solid and Hazardous Waste Branch had no comments to offer.

6.5 *TRANSPORTATION*

With the expansion of the University Park and the new Hawai'i CC Komohana Campus, traffic in the area is expected to increase, but over 20 years. A *Traffic Impact Assessment Report* (TIAR) was prepared by Julian Ng, Inc. to identify traffic impacts of the proposed Project and roadway improvements to adequately serve projected peak hour traffic volumes. This report is included in Appendix F.

6.5.1 EXISTING ROADS AND VEHICULAR TRAFFIC

From a regional perspective, the Project is accessible via Kanoelehua Avenue/Volcano Highway/State Highway 11 (a segment of the round-the-island "Belt Highway" which carries traffic beginning at the mauka end of Kaūmana Drive/Waianuenue Avenue, crossing the island, and connecting the Kona and Kohala Districts with East Hawai'i) and the Hilo Bayfront Highway/State Highway 19 (road carrying traffic to Hilo from the northern parts of the island). The recently constructed Pū'ainakō Street Extension also serves as a link in the arterial flow between Highway 11 (Volcano Highway) and Saddle Road (Highway 20), bypassing Hilo Town.

There are no existing roadways within the Project area; however, existing and proposed roadways that directly influence circulation patterns in and around the area are described below.

Komohana Street. Komohana Street is a two-lane roadway with an 80-foot right-of-way and speed limit of 45 miles per hour. This street borders the eastern edge of the property and provides direct cross-town access between north and south Hilo. It also serves as a north-south bypass of commercial areas in Hilo. There are few driveways, and intersections are spaced far apart. Parking on the roadway is not permitted. Future widening of Komohana Street is planned, but has not yet been programmed and will not take place for at least ten years.

Mohouli Street. Mohouli Street borders the Project site on the north and is a two-lane roadway with a varying right-of-way (from 60 to 135 feet). Mohouli Street extends from Kīlauea Avenue in the east to 'Ainakō Avenue in the lower Kaūmana community (west of Komohana Street) and provides a second connection between the Kaūmana area of Hilo and the rest of Hilo. Additional improvements to Mohouli Street east of Komohana Street are planned.

Nowelo Street (University Park Expansion Entry Road). Nowelo Street is the main roadway within the UHH University Park and would serve as the main access to the proposed Project area. At its intersection with Komohana Street, Nowelo Street has an 85-foot right-of-way (9-foot-wide median and 28-foot-wide pavement, 4-foot-wide planter strips and 6-foot-wide walkways on either side). Nowelo Street is planned to extend west of Komohana Street and provide access to the PBARC, the Hawai'i CC, and the University Park Expansion. Planning work for the construction of Nowelo Street Extension is ongoing and the first phase is anticipated for completion by 2005.

Pū'ainakō Street. Pū'ainakō Street, which borders the Project site on the south, was recently extended 4.5 miles west as a two-lane collector street with a 120-foot right-of-way between Komohana Street and Saddle Road (State Highway 200, also designated Kaūmana Drive). The Pū'ainakō Street Extension was opened to traffic in September 2004.

Existing traffic volumes in the Project area are represented by one-day traffic counts of approaches and departures to two major intersections. Traffic volumes at the intersection of Komohana Street and Mohouli Street were counted during the summer, when schools are not in full session and there is less traffic compared to other months of the year. Traffic at the intersection of Komohana Street and Pū'ainakō Street was counted in April, when schools are in full session. As shown in the table below, the daily traffic volume on Komohana Street between Mohouli Street and Pū'ainakō Street was 16,445 vehicles per day in the summer (south leg of the Mohouli Street intersection) and 16,850 vehicles per day, or 2.5 percent higher, in April (north leg of the Pū'ainakō Street intersection).

State Traffic Count Data

	Approach	Departure	Total
Daily traffic at Komohana and Mohouli Streets, counted July 23-24, 2002			
Komohana Street, north leg	5,486	5,974	11,460
Mohouli Street, east leg	6,577	5,932	12,509
Mohouli Street, west leg	4,719	4,569	9,288
Komohana Street, south leg	8,749	7,706	16,445
Daily traffic at Komohana and Pū'ainakō Streets, counted April 15-16, 2002			
Komohana Street, north leg	7,868	8,982	16,850
Pū'ainakō Street, east leg	3,656	3,421	7,077
Komohana Street, south leg	6,870	6,015	12,885

Source: State of Hawai'i, Department of Transportation, Highways Division

Existing traffic in the area has peak volumes in the morning and afternoon. The peak hours of traffic at the intersection of Komohana Street and Mohouli Street occur in the morning between 7:00 and 8:00 a.m., and in the afternoon between 4:15 and 5:15 p.m. Peak hours of traffic at the intersection of Komohana Street and Pū'ainakō Street are in

the morning between 6:45 and 7:45 a.m., and in the afternoon between 4:00 and 5:00 p.m. Traffic counts taken in the spring were only 2.5 percent higher than counts taken during the summer, and peak hour traffic did not vary substantially (2.7 percent higher in the AM Peak Hour and 2.1 percent higher in the PM Peak Hour). A traffic signal controls the intersection of Komohana Street and Mohouli Street, where separate lanes and signal phases are provided for left turns. The average delay per vehicle (ADPV) in seconds, the overall volume-to-capacity ratio (v/c), and the level of service (LOS) for each approach and the overall intersection are shown in the following table. The State Department of Transportation (DOT) has estimated that average daily traffic (ADT) on Pū'ainakō Street has not changed significantly in the last ten years.

Existing Peak Hour Conditions
Komohana Street and Mohouli Street

	AM Peak Hour			PM Peak Hour		
	v/c	ADPV	LOS	v/c	ADPV	LOS
Eastbound approach	0.36	28.1	C	0.62	50.6	D
Westbound approach	0.60	49.9	D	0.89	55.4	E
Northbound approach	0.83	53.3	D	0.86	52.9	D
Southbound approach	0.64	52.6	D	0.83	56.4	E
Overall intersection	0.60	46.7	D	0.86	54.3	D

v/c: Overall volume to capacity ratio
ADPV: Average delay per vehicle in seconds
LOS A: Little or no delay (≤ 11 cars/mile/lane); LOS B: Short traffic delays (≤ 18 cars/mile/lane);
LOS C: Average traffic delays (≤ 26 cars/mile/lane); LOS D: Long traffic delays (≤ 35 cars/mile/lane);
LOS E: Very long traffic delays (≤ 45 cars/mile/lane); LOS F: Very long traffic delays (> 45 cars/mile/lane)

6.5.2 EFFECTS ON ROADS AND VEHICULAR TRAFFIC

Assuming the Project is completed by the year 2025, an estimated 15,000 trip ends each weekday will be generated by the Project at full development. The peak hour traffic volumes generated by the University Park Expansion were based on 2,100 employees, and the traffic volumes for the Hawai'i CC were based on an enrollment of 4,300 students. Entering and exiting traffic at peak hours, with the Project, are shown below.

Project Traffic Generation

	AM Peak Hour		PM Peak Hour	
	Entering	Exiting	Entering	Exiting
2,100 Employees, University Park Expansion	749	154	129	731
4,300 Students, Hawai'i Community College	548	54	497	234
Total Trip Ends	**1,297**	**208**	**626**	**965**

The proposed Project is not expected to result in a net increase in traffic on Komohana Street to the south, Mohouli Street to the west, or on Pū'ainakō Street to the west. The impact of the Project at the intersection of Komohana Street and Mohouli Street will be an increase in average delays in both peak traffic hours. However, the overall condition of the intersection will remain an acceptable Level of Service D. Similar impacts will occur in the AM Peak Hour at the Nowelo Street intersection and in the PM Peak Hour at the Pū'ainakō Street intersection with Komohana Street. The following table indicates the anticipated average delay per vehicle and level of service at these signalized intersections.

Summary of Future (2025) Conditions at Signalized Intersections

	AM Peak Hour		PM Peak Hour	
	ADPV	LOS	ADPV	LOS
Komohana Street and Mohouli Street				
With project, unmitigated	46.6	D	54.3	D
Komohana Street and Nowelo Street				
With project, unmitigated	48.6	D	94.4	F
With project, mitigated	47.7	D	54.3	D
Komohana Street and Pū'ainakō Street				
With project, unmitigated	71.1	E	54.6	D
With project, mitigated	50.2	D	52.1	D

ADPV: Average delay per vehicle in seconds
LOS A: Little or no delay (≤ 11 cars/mile/lane); LOS B: Short traffic delays (≤ 18 cars/mile/lane);
LOS C: Average traffic delays (≤ 26 cars/mile/lane); LOS D: Long traffic delays (≤ 35 cars/mile/lane);
LOS E: Very long traffic delays (≤ 45 cars/mile/lane); LOS F: Very long traffic delays (> 45 cars/mile/lane)

Traffic on Pū'ainakō Street and Mohouli Street will proceed uninterrupted as stop signs will control entry from minor streets such as Project roadways or driveways. These unsignalized intersections were analyzed and results indicated that left turns onto Pū'ainakō Street would not have excessive delays. However, left turns onto Mohouli Street could have long delays if a single movement is made. The TIAR suggested a median refuge lane on Mohouli Street to mitigate this situation by allowing drivers to cross eastbound traffic and then merge with westbound traffic.

The TIAR found that with or without the Project, future traffic volumes would require that Komohana Street be four-lanes-wide with separate left turn lanes at major intersections. Peak hour traffic generated by the Hawai'i CC will be a small portion of the total traffic. To mitigate traffic impacts, the TIAR suggested constructing a third lane on eastbound Nowelo Street approaching the Komohana Street intersection to provide a separate lane for left turns, through movements, and right turns, after the University Park Expansion is at 50 percent occupancy or after 2010, whichever is later. The TIAR also recommended a second right turn lane from westbound Pū'ainakō Street to northbound Komohana Street, when the University Park Expansion reaches 15 percent occupancy, or after 2006, whichever is later. A median refuge lane on Mohouli

Street was also suggested to mitigate the long delays in making left turns onto Mohouli Street from minor roadways at unsignalized intersections.

The traffic impact analyses performed for the TIAR assumed full development of the Project in 2025. Analyses used the existing roadway system and were based on a trip distribution including many trips to and from the residential upper Pana'ewa area. However, actual use of the University Park may evolve over several years, and completion of the future Kupulau Street Extension and connection to Ponahawai Street will provide alternative paths between the Project site and the upper Pana'ewa area. Therefore, the TIAR recommended that mitigative measures be implemented only when needed, but that setbacks and other reservation of land for future roadway widening be included in the master plan for future implementation as follows: 1) Mohouli Street as a four-lane roadway with additional width at intersections for a separate left turn lane; 2) Komohana Street as a four-lane roadway with additional width at intersections for left turn lanes and separate right turn lanes; and 3) Pū'ainakō Street as a two-lane roadway with a median left turn lane. Left turns should be provided to facilitate access to the site, and other improvements should be implemented as warranted by Project development and traffic conditions.

Improvements proposed in the *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel*, prepared by Engineering Concepts, Inc., include an 89-foot right-of-way width for the Nowelo Street Extension at the intersection with Komohana Street. Pavement will be 69 feet wide curb-to-curb and will provide two 12-foot-wide travel lanes in each direction (one for straight and left-turn movements and the other for right turns only), a 6-foot-wide bike lane in each direction, and a 9-foot median. The right-of-way will also include 10-foot-wide walkways on either side. The Komohana Street and Nowelo Street intersection will be signalized, and a 100-foot-long left turn storage lane will be added to Komohana Street to provide left turn movements into the Project area. Depending on future traffic volumes, the storage lane may need to be extended later. When the Project area is approximately 50 percent occupied, a separate left turn lane from the Nowelo Street Extension to Komohana Street should be constructed, and current traffic volumes should be evaluated to determine if a left-turn storage lane is warranted. The County of Hawai'i has long planned for Komohana Street as a 4-lane roadway with two through lanes in each direction (given its 80-foot right-of-way), but has not viewed widening the roadway from two lanes to four lanes until future traffic volumes warrant such improvements.

Two major access points are proposed for the Hawai'i CC, one from the Pū'ainakō Street Extension and the other from the Nowelo Street Extension. A second entry from Komohana Street with restricted right turn movement is proposed, and the TIAR suggested that left turns in and out the entry be prohibited.

Within the Project area, three internal roadways, Roads A, B, and C, are proposed. Each of these roads will have a right-of-way width of 60 feet with 40-foot-wide pavement

(one 12-foot travel lane and one 8-foot parking lane in each direction) and 10-foot-wide walkways on either side. A 10-foot-wide utility easement is proposed on both sides of the roadway. Four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting. The utilities in the proposed roadways will conform to the utility location in the County of Hawai'i Standard Details. Road A will connect to the Nowelo Street Extension and provide access to Lots 1 through 15. Road B will connect Roads A and C and provide access to Lots 21 through 30. Road C, located at the end of the Nowelo Street Extension, will connect to Mohouli Street and provide a secondary access to the University Park Expansion. As suggested by the TIAR, a median refuge lane will be provided on Mohouli Street to enable drivers to cross eastbound traffic and then merge with westbound traffic.

To create a "campus-like" atmosphere and encourage pedestrian and bicycle use, a central open space will link the University Park Expansion, the Hawai'i CC, and the adjacent research facilities via a pedestrian/bikeway corridor. An approximately four-acre Central Courtyard is proposed for the University Park Expansion and will run in a north-south direction through the middle of the subdivision, with pedestrian and bicycle links to nearby streets, the USDA/IPIF site, and the Hawai'i CC. The typical width of the Central Courtyard is 150 feet and the access corridors are 40-feet-wide ~~pedestrian/bikeway corridor is 40 feet, and 150 feet at its widest point in the Central Courtyard.~~

Entries and Roadways

University Park Expansion

Main entry to the University Park Expansion is proposed off Komohana Street, where it intersects with Nowelo Street Extension. Access to each lot will be from internal roadways or Nowelo Street Extension, which will terminate at a T-intersection with an internal road. A secondary entry will be off Mohouli Street Extension.

Nowelo Street Entry and Roadway. The Nowelo Street entry will have a 89-foot right-of-way, with four 12-foot-wide travel lanes (two in each direction), a 9-foot-wide median, two 6-foot-wide bicycle lanes (one in each direction), 10-foot-wide sidewalks (one in each direction), and a 15-foot-wide utility easement on one side. From the entry, the roadway will taper down to an 80-foot right-of-way, with four 12-foot-wide travel lanes (two in each direction), two 6-foot-wide bicycle lanes, 10-foot-wide sidewalks (one in each direction), and a 15-foot-wide utility easement on one side. Four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting.

Internal Roadways. Internal roadways within the University Park Expansion will have a 60-foot right of way, with two 12-foot-wide travel lanes (one in each

direction), 8-foot-wide parking lanes, and 10-foot-wide sidewalks. Should the remaining 28 acres of "future university expansion" at the southwestern corner of the parcel be developed into additional lots, the internal road running in a north-south direction from Mohouli Street could be extended to connect with Pū'ainakō Street Extension. Four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting.

Hawai'i CC

Main entry to Hawai'i CC will be off the Pū'ainakō Street Extension.

Pū'ainakō Street Entry and Roadway. The Pū'ainakō Street entry will be embellished with special landscaping treatment, signage, and lighting. When warranted, channelization, street lighting, and signalization will be provided. The roadway will include double-traffic lanes, a generously-landscaped median, and 10-foot-wide sidewalks.

Internal Roadways. A 24-foot-wide loop road will connect the entries and front and rear parking lots at Hawai'i CC. A second loop road will encircle proposed Trade & Industry facilities and their parking area.

A second major entry, from Nowelo Street Extension, will include a landscaped median, signage, and tree plantings along the street. Both entries will have large turnaround loops, which could display landmark artworks or other entry features. A minor entry could be provided off Komohana Street (right turn in, right turn out only) to serve as a more direct entry for the Agriculture/Agroforestry and other programs, if allowed by the County of Hawai'i. This entry would help keep heavier traffic away from the main campus and serve as an emergency egress. Plans will reflect that no left turns are permitted into this entry from Komohana Street, as recommended by the County Police Department.

~~***Pedestrian Access and Circulation***~~

~~An interconnected pedestrian network is planned to include sidewalks along all roadways and access to all lots within the Project. The Central Courtyard provides a pedestrian and bicycle link separated from vehicle traffic (except where crossing the Nowelo Street Extension), from the Mohouli Street Extension through the University Park Expansion to the Hawai'i CC and USDA facilities. At the Hawai'i CC, major pedestrian paths and covered walkways along the North-South Mall will be designed as arcades and loggias along the buildings fronting the Mall and Central Plaza. Secondary courtyards and groupings of classroom buildings are organized around the North-South Mall and connected by secondary pathways providing links to each instructional facility. Additional minor pathways will consist of covered and~~

~~uncovered walkways providing access between buildings and parking lots.~~ *(moved to Section 6.5.3)*

~~***Bicycle Access and Circulation***~~

~~Bicycle lanes will be provided along the Nowelo Street Extension. Bicycle access will also be provided in a separate bikeway system within the University Park Expansion and to the Hawai'i CC campus and the USDA facilities. Appropriate bicycle and pedestrian improvements along the Pū'ainakō Street Extension fronting the proposed Hawai'i CC Komohana Campus will be considered when the Hawai'i CC is being designed.~~ *(moved to Section 6.5.4)*

~~***Barrier-Free Access and Circulation***~~

~~Pedestrian malls and sidewalks to lots within the Project will be sized and planned for access by individuals with disabilities. Development within each parcel must comply with requirements of the Americans with Disabilities Act, as noted in Section 3.3.~~ *(moved to Section 6.5.5)*

In response to the State DOT and County Police Department comments to the EISPN, the TIAR included traffic counts at the intersection of Komohana Street and Pū'ainakō Street Extension during a regular UHH session. It also recommended appropriate measures to mitigate traffic impacts on roads and intersections bordering the Project. The need for guardrails and other safety improvements will be determined during the design of the Hawai'i CC entry, which may not be developed until 2010. The TIAR determined that traffic signal lights at the intersection of Nowelo Street and Komohana Street are warranted. At this time, it does not appear that a right turn deceleration lane off Pū'ainakō Street is warranted, but the TIAR recommended a median left turn lane off Pū'ainakō Street for traffic heading into the main campus entrance. The contractor(s) of major roadways within the Project will be instructed to limit ingress/egress to one specific area during construction to mitigate the impact to traffic. The UHH will coordinate with the County regarding plans for future connector roads. Plans for any construction work within the Pū'ainakō Street Extension State right-of-way will be submitted to the State DOT, Hawai'i District Office for review and approval.

After reviewing the DEIS, the Hawai'i County Police Department proposed traffic improvements for consideration (Chapter 15.0). Pū'ainakō Street Extension opened in September 2004 and traffic counts could not be incorporated into the DEIS. A right turn deceleration lane off Pū'ainakō Street Extension for vehicles turning into the main campus entry will be considered during the design of the roadway connection. A left turn lane for westbound traffic on Mohouli Street into the project roadway will be provided when the project roadway is constructed. Proposed roadway improvements on the lower portion of Mohouli Street and Pū'ainakō Street will be developed

independently of this Project, which will be coordinated with future Komohana Street improvements.

The County Planning Department reviewed the DEIS and provided comments (Chapter 15.0) regarding three potential stubouts from the Sunrise Estates Subdivision abutting the Project boundary. While current plans are very preliminary and could accommodate either vehicular and/or pedestrian (and bicycle) connections, it is anticipated that residents of the Sunrise Estates Subdivision would prefer to limit pedestrian and/or bicycle connections. Greater vehicular (and pedestrian and bicycle) connectivity would enhance, rather than detract from, the plans for the UHH Mauka Lands property.

6.5.3 WALKWAYS AND PEDESTRIAN TRAFFIC

An interconnected pedestrian network is planned to include sidewalks along all roadways and access to all lots within the Project. The Central Courtyard provides a pedestrian and bicycle link separated from vehicle traffic (except where crossing the Nowelo Street Extension), from the Mohouli Street Extension through the University Park Expansion to the Hawai'i CC and USDA facilities. At the Hawai'i CC, major pedestrian paths and covered walkways along the North-South Mall will be designed as arcades and loggias along the buildings fronting the Mall and Central Plaza. Secondary courtyards and groupings of classroom buildings are organized around the North-South Mall and connected by secondary pathways providing links to each instructional facility. Additional minor pathways will consist of covered and uncovered walkways providing access between buildings and parking lots.

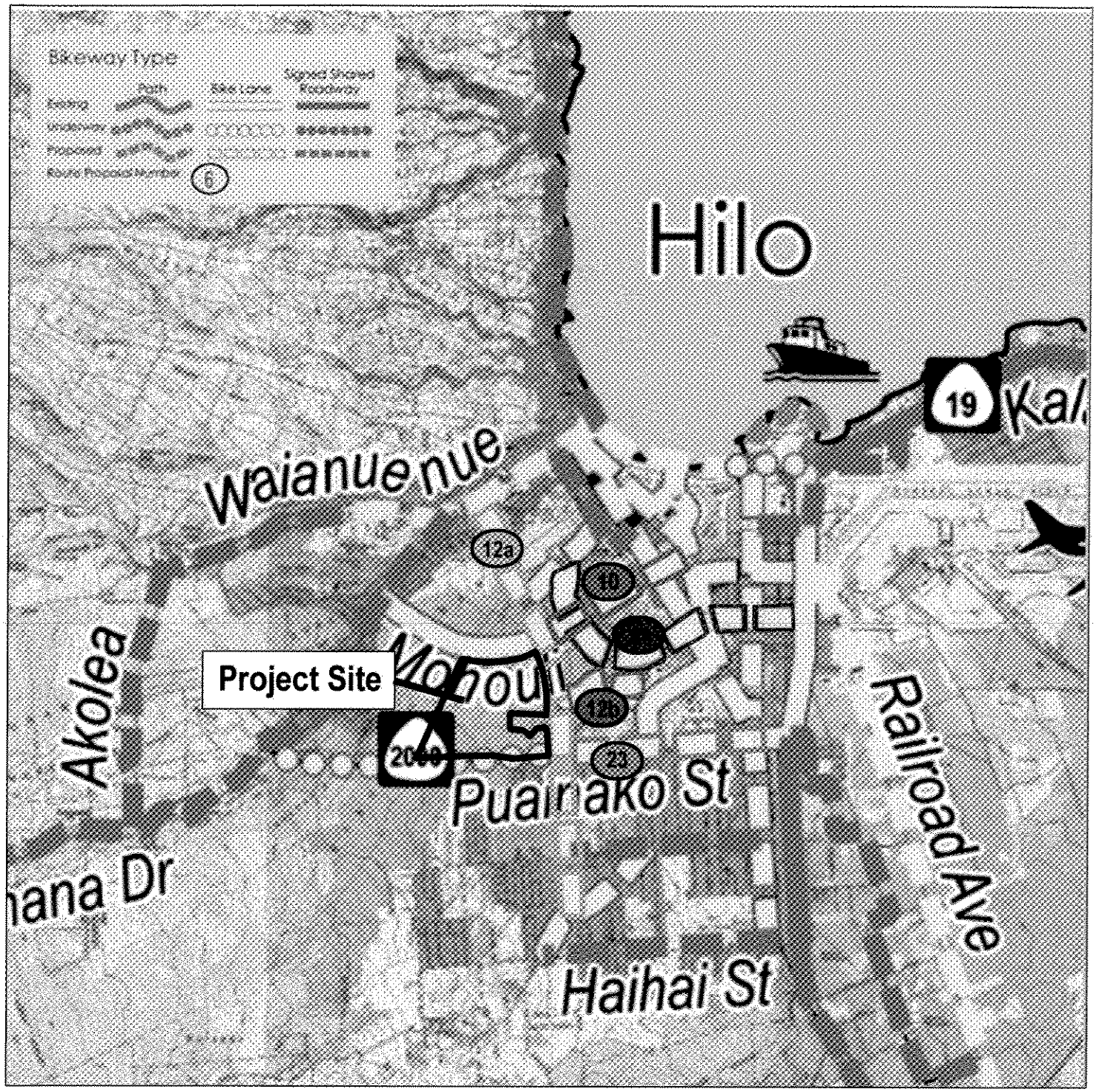
6.5.4 BICYCLE FACILITIES

The State Department of Transportation has developed a master plan to enhancing the bicycling environment in Hawai'i. *Bike Plan Hawaii 2003* identifies existing and proposed bicycle facilities on all islands.

Existing Bicycle Facilities in Hilo

- Kanoelehua Avenue Bike Lane *(Kamehameha Avenue to Pū'ainakō Street)*
- Kanoelehua Avenue Signed Shared Road *(Pū'ainakō Street to Makalika)*
- Kawili Street Bike Lane *(Manono Street to Pu'ainakō Street)*
- Kalanianaole Avenue Signed Shared Road *(Kamehameha Avenue to Leleiwi Beach Park)*
- Mohouli Street Extension Signed Shared Road *(Beyond Komohana Street)*

Bicycle Facilities Currently Underway in Hilo



LEGEND

- **Mohouli Street**
  Komohaha Street-Kilauea Avenue
- **Kumukoa Street/West Lanikaula Street/ East Lanikaula Street**
  Kukuau Street-Kanoelehua Avenue
- **Komohana Street**
  Waianuenue Avenue-Ainaola Drive
- **Nowelo Street**
  Komohana-UH Hilo Expansion Area
- **West Puainako Street**
  Komohana Street-Kinoole Street

Source: Bike Plan Hawaii 2003
State of Hawaii Department of Transportation
Q:\Hawaii\UHHilo-University Park Expansion\GIS\Projects

Figure 13
Proposed Bicycle Facilities

UHH Mauka Lands Master Plan

HILO, ISLAND OF HAWAII

NOT TO SCALE

PBR HAWAII

- Hilo Bayfront Highway Bike Lane *(Manono Street to Kanoelehua Avenue)*
- Pū'ainakō Street Extension Signed Shared Road *(Beyond Komohana Street)*

Proposed Bicycle Facilities in the Project Vicinity

Figure 13 shows the proposed bicycle facilities in the Project vicinity. The numbers correspond to those used in *Bike Plan Hawaii 2003.*

- 10 – Mohouli Street Bike Lane *(Komohana Street to Kilauea Avenue)*
- 11 – Kumukoa Street/West Lanikaula Street/East Lanikaula Street Bike Lane *(Kukuau Street to Kanoelehua Avenue)*
- 12a – Komohana Street Bike Lane *(Waianuenue Avenue to Ainaola Drive)*
- 12b – Nowelo Street Bike Lane *(Komohana to UH Hilo Expansion Area)*
- 23 – West Pū'ainakō Street Bike Lane *(Komohana Street to Kinoole Street)*

Existing and proposed bicycle facilities will encourage bicycle use in the Hilo area and between the UHH main campus, University Park, and the Mauka Lands area, linking the bike lanes within the Project site to Pū'ainakō Street Extension, Komohana Street, and Mohouli Street Extension. As shown in Figure 5 of the Preliminary Engineering Report (Appendix E), a Bbicycle lanes will be provided along the Nowelo Street Extension, which would be a feeder road to the Hawai'i CC. Bicycle access will also be provided in a separate bikeway system within the University Park Expansion and to the Hawai'i CC campus and the USDA facilities. Appropriate bicycle and pedestrian improvements along the Pū'ainakō Street Extension fronting the proposed Hawai'i CC Komohana Campus will be considered when the Hawai'i CC is being designed.

The DEIS was distributed to members of the Hawai'i County Bicycle and Pedestrian Advisory Committee, and Mr. Ron Reilly (Chairman) and Mr. Herbert Soloway (Member) provided individual comments (Chapter 15.0). In response to their comments, current plans for the typical roadway sections for Roads A, B, and C are shown in Figure 7 of the Preliminary Engineering Report (Appendix E). These plans show 8-foot-wide parking lanes on both sides of the internal roadways (within the existing University Park, there is very little street parking or even much traffic on internal roadways). The eventual traffic pattern (cars versus bicycles) will determine whether or not bike lanes are warranted; however, as more people start biking, on-street parking could be removed from internal roadways, which could then be striped for bike lanes.

Mr. Reilly also made recommendations that both the UHH and Hawai'i CC provide weatherproof, secure bicycle lockers at all sites that are expected to require long-term (greater than 30 minutes) bicycle parking. He also recommended hot showers and changing locker facilities for bicyclists, and covered bicycle parking as close as possible to each building at UHH and Hawai'i CC.

6.5.5 BARRIER-FREE ACCESS AND CIRCULATION

Pedestrian malls and sidewalks to lots within the Project will be sized and planned for access by individuals with disabilities. Development within each parcel must comply with requirements of the Americans with Disabilities Act, as noted in Section 3.3.

6.5.6 EXISTING PUBLIC TRANSPORTATION

The Hawai'i County Mass Transit Agency provides public transportation around the island on the Hele-On bus. Buses stop at the main entrance of the UHH campus (in front of the University Classroom Building) on routes between Downtown and Prince Kuhio Plaza. The Mass Transit Agency also offers a Shared Ride Taxi program, which provides door to door transportation for as little as $2 within the urbanized area of Hilo. The UHH provides a free van shuttle service between some apartment complexes and the UHH campus.

6.5.7 EFFECTS ON PUBLIC TRANSPORTATION

In the future, when the University Park Expansion and Hawai'i CC facilities are in operation and when there is sufficient demand for public transportation, the Mass Transit Agency and the UHH may consider expanding routes to provide service to the Project area.

6.6 *CUMULATIVE AND SECONDARY IMPACTS ON INFRASTRUCTURE FACILITIES*

6.6.1 WATER FACILITIES

Although several planned developments in Hilo will occur on sites with existing buildings and associated infrastructure, improvements to the existing domestic water storage and delivery system may be needed. The County will review each project to ensure that there are no major impacts to the municipal water system.

6.6.2 WASTEWATER FACILITIES

Each proposed building may have impact on the municipal wastewater collection, treatment, and disposal system. To ensure that the wastewater system can accommodate future developments without being adversely affected, each project is reviewed by the County so that it may identify any improvements that might be required.

6.6.3 DRAINAGE FACILITIES

The planned developments would increase the amount of impervious surfaces by construction of buildings, roadways, parking areas, and walkways (although most of the developments will occur on already developed sites). No significant impacts on existing drainage conditions are anticipated, as on-site storm drainage facilities will be sized to control runoff in excess of estimated pre-development runoff quantities, in accordance with the *Storm Drainage Standard* of the County of Hawai'i, October 1970. The overflow entering the drainage systems in roadways will not be greater that pre-development quantities. Stormwater management options can be developed to minimize increases in pollutant loads.

6.6.4 SOLID WASTE FACILITIES

As the defacto population increases, the capacity of the South Hilo Landfill will decrease. Since the County's population is not expected to significantly increase with the planned developments alone, and since recycling practices are increasing, over the long term, the amount of solid waste generated directly and indirectly per capita is decreasing. However, this does not discount the County's need to address the eventual closure of the South Hilo Landfill.

6.6.5 TRANSPORTATION FACILITIES

The Science and Technology Building is located east of the Project on the UHH main campus. Its central location makes walking to other science buildings and the Library and Media Center easy (within a five-minute walk). Vehicular traffic generated by the building is more likely to impact Lanikaula Street than Mohouli Street, Komohana Street, or Pū'ainakō Street, which border the proposed Project.

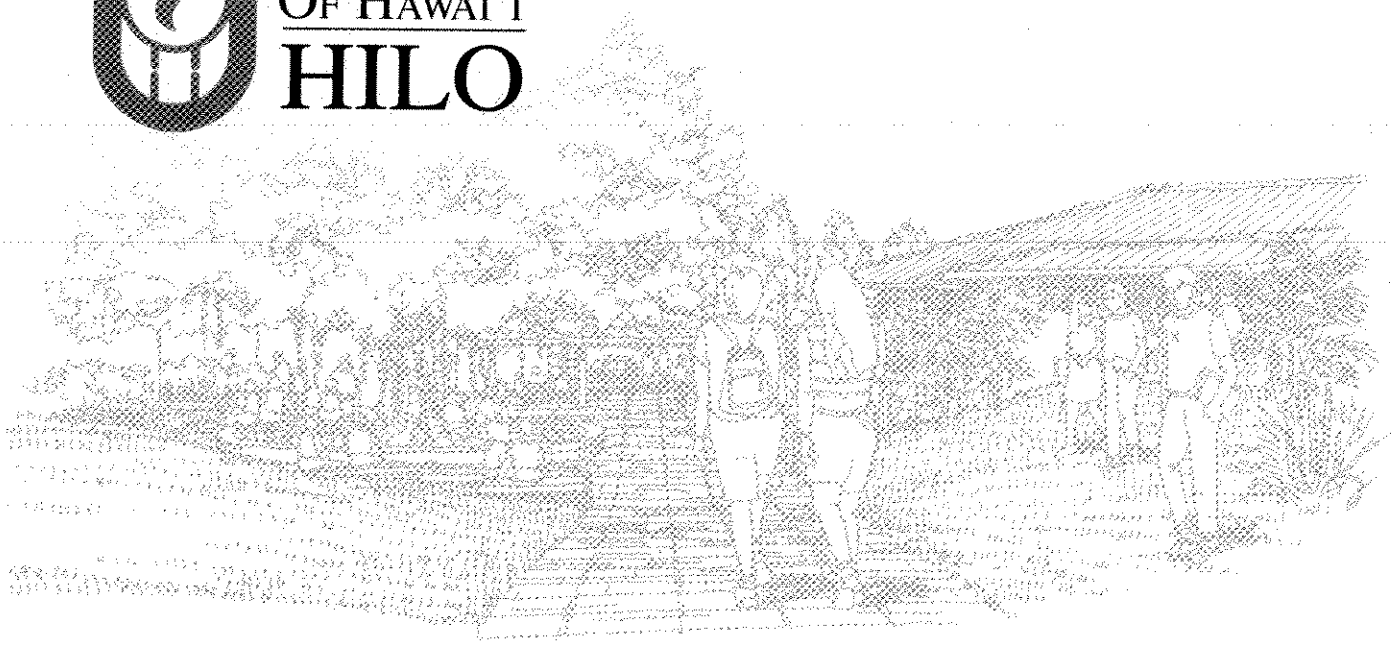
The Student Services/Administration Building and the International Village Center are more likely to generate vehicular traffic on West Kawili Street and Pū'ainakō Street (below West Kawili Street) than Mohouli Street and Komohana Street near the proposed Project site.

Vehicular traffic generated by the Student Life and Event Complex and the MKAEC was included in the traffic estimates for the existing University Park. These traffic conditions were incorporated into the TIAR for this Project. Primary guest parking for the MKAEC will be located on the UHH main campus, and a van shuttle service will take guests to/from the MKAEC.

Vehicular traffic for the PBARC was also incorporated into the TIAR. A separate bikeway system will be provided between the PBARC and the University Park

Expansion and Hawai'i CC. Nearby existing and proposed bicycle facilities (Figure 13) will further encourage the use of bicycles.

UNIVERSITY OF HAWAI'I HILO



7.0 Public Facilities and Utilities

7.0 PUBLIC FACILITIES AND UTILITIES

The *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel* was prepared by Engineering Concepts Inc. to assess the Project's impact on electrical, telephone, and communication systems. A copy of this report is included in Appendix E.

7.1 ELECTRICAL AND COMMUNICATION FACILITIES

7.1.1 EXISTING ELECTRICAL FACILITIES

The Hawaii Electric Light Company, Inc. (HELCO) provides electrical power to the Island of Hawai'i. HELCO is a privately-owned utility company regulated by the State Public Utilities Commission. Peak electrical demand is currently 186,700 kilowatts (KW) and total generation system capability is 255,100 KW. HELCO's reserve margin is currently 27 percent for the entire island, and its Komohana Substation has adequate generation to serve the first phase of this Project.

HELCO's power generation system is produced by the HELCO-owned steam units, diesel units, and gas turbines located in various areas of the island. Remaining capacity is purchased from three privately-owned companies. HELCO's network of power plants serving Hilo includes the Kanoelehua Power Plant, Puna Power Plant, Wailuku Hydro Power Plant, Hilo Coast Power Plant, and Shipman Power Plant.

There are three levels of transmission voltages to transfer power between areas on Hawai'i Island. These voltages are 69 kilo-volt (KV), 34.5 KV, and 13.8 KV. The four cross-island transmission lines are energized at 69 KV; however, one of the Kaūmana to Ke'āmuku transmission lines was constructed for 138 KV. This distribution system basically consists of overhead pole lines and underground systems.

The HELCO Komohana Substation is located on about a half-acre of land approximately 400 feet from Komohana Street. Komohana Substation is adjacent to the Project area, near the PBARC and Waiākea Reservoir. There are both 69- and 12.47-KV overhead electrical lines associated with the substation. These lines are located in the 50-foot-wide utility easement along the southern boundary of the PBARC, before crossing Komohana Street into the existing University Park. The utility easement continues west of the Komohana Substation, through the proposed Hawai'i CC and Future University Expansion area. In 1996, HELCO added a 10-megavolt-ampere (MVA) substation transformer at the Komohana Substation to increase its capacity from 7.5 MVA to 17.5 MVA. The 10- and 7.5-MVA transformers at Komohana Substation are currently close to their rated capacity.

Roadway Lighting System

There is currently no roadway lighting system on the UHH Mauka Parcel.

7.1.2 EFFECTS ON ELECTRICAL FACILITIES

New research facilities and a new campus developed for the Project will increase the demand for electrical power. HELCO currently has adequate generation capacity to serve the subject loads in Phase I; however, the Komohana Substation transformation capacity must be increased to accommodate future loads. An additional 69- to 12.47-KV substation transformer and associated equipment must be added at Komohana Substation. Additional 12.47-KV distribution lines will also be required to connect the new substation transformer to the Project's new loads via Komohana Street. The existing overhead 69- and 12.47-KV lines will require relocation. Distribution line easements will be arranged from Komohana Substation to and within the Project site. During Phase II of the UHH Mauka Parcel development, HELCO will determine if an additional transformer will be required.

The proposed route to serve the Project is from Komohana Substation via Komohana Street. The new duct system will consist of concrete-encased ducts and reinforced concrete manholes and handholes per HELCO requirements. HELCO requires that the duct system connect to an existing HELCO manhole on Nowelo Street, on the east side of Komohana Street. This manhole will connect to a new vacuum switch and switchgear on Nowelo Street, on the west side of Komohana Street, to serve Phases I through IV of the UHH Mauka Parcel development. If required by HELCO, during Phase V, another vacuum switch and switchgear may be added along Road C to feed lots along this road and future lots. Two 4-inch and four 5-inch ducts will cross Komohana Street and continue to the end of Nowelo Street, providing service to the PBARC, the IPIF facility, Hawai'i CC, and the lots along the north side of Nowelo Street. Two 4-inch and two 5-inch ducts will be extended from Nowelo Street to feed Road C, which will connect with Road A. Service stubouts will be provided to each lot.

As recommended by HELCO after its review of the EISPN, suitable conservation and energy-efficient features to reduce peak electrical demand will be incorporated into plans for the Project. HELCO also recommended that the Project take advantage of waste heat recovery equipment to recycle and reuse the waste heat rejected by air conditioning and refrigeration equipment to substantially reduce the amount of energy required. A remote meter reading option is available using electrical lines as communication media to a central master receiver at the substation. This option would require additional equipment in the HELCO meters and substation, and a cost estimate will be requested from the HELCO Engineering Department. The UHH and its consulting civil engineers, Engineering Concepts, Inc., will contact HELCO's Engineering Department to open a service request to ensure timely procurement of long lead equipment. The service request will include calculation of the anticipated electrical

demand and the phasing schedule required to determine the final electrical requirements for the Project. Hawaii Public Utilities Commission approval will be obtained before the long lead items are ordered, due to the anticipated HELCO expenditures exceeding $500,000.

As noted by the State DBEDT, the Project shall comply with applicable provisions of Hawaii Revised Statutes, Chapters 344 and 226, "State Environmental Policy" and "Hawaii State Planning Act". Project buildings, activities and site grounds will be designed with energy-saving considerations. The Project will also be consistent with the State objective to promote cost-effective energy conservation through the adoption of energy-efficient practices and technologies. The Hawai'i County Energy Code will be consulted, as will HELCO for demand-side management programs offering rebates for installation of energy-efficient technologies. Energy-saving design practices and technologies could include the following:

a) Use of natural ventilation to increase comfort of occupants;
b) Maximum use of natural lighting without heat gain;
c) Use of high efficiency compact fluorescent lighting;
d) Use of insulation/radiant barrier for an equivalent R-19 value in ceiling;
e) Use of ceiling fans;
f) Use of landscaping for dust control and to minimize area heat gain

The Project will also meet the requirements of Administrative Directive Number 98-03, "Policy Governing the Use of Solar Water Heating Systems for State Facilities":

> *All plans and designs for new or renovated facilities using State funds or located on State land and incorporating the use of hot water shall include a comparative analysis to determine the cost-benefit of using a conventional water heating system or a solar water heating system. The analysis shall be based on the projected life-cycle analysis is positive, the facility shall incorporate solar water heating. If water heating entirely by solar is not cost-effective, the analysis shall also evaluate the life-cycle, cost-benefit of solar water heating for preheating water. Each Department shall be responsible for conducting an analysis for every facility that provides hot water.*

As recommended by the University of Hawai'i Environmental Center (Chapter 15.0), the installation of renewable energy systems (i.e., solar water heating, photovoltaic systems) should be considered where feasible.

Roadway Lighting System

Roadway, walkway, and landscape lighting will be provided and designed in conformance with Hawai'i County's Outdoor Lighting Ordinance No. 88-122 to prevent lighting impacts on the Mauna Kea Observatory and astronomical research. The roadway lighting system will also be designed in accordance with the standards and recommendations of the *Illuminating Engineering Society Handbook.*

The roadway lighting system will consist of steel roadway lighting standards (30 feet high), low-pressure sodium luminaire, and underground secondary feeders. Each

roadway luminaire will be equipped with a photocontrol switch and cut-off distribution. HELCO pad-mounted transformers and service equipment will be provided for the roadway lighting system and other lighting and power systems along the roadway right-of-way.

7.1.3 EXISTING COMMUNICATION FACILITIES

Telephone System

Verizon Hawaii provides telephone service to the area near the Project site from its switching station at the corner of Nowelo Street and South Aohōkū Street. Telephone lines are located on HELCO's overhead distribution line along Komohana Street.

Cable Television System

~~Jones Spacelink~~Hawaiian Cablevision provides cable television service from Komohana Street.

Communications System

A centralized communications system exists at University Park.

7.1.4 EFFECTS ON COMMUNICATION FACILITIES

Telephone System

Connection to the existing telephone system would be required for this Project. According to Verizon Hawaii, existing facilities are adequate to serve the UHH Mauka Lands. As required by Verizon Hawaii, the proposed duct system will be connected to the existing switching station through an existing manhole in Nowelo Street, on the east side of Komohana Street and will consist of concrete-encased ducts and reinforced concrete manholes and handholes.

The specific communication and telecommunication systems required would be developed as part of each facility's design. Coordination would be conducted with Verizon Hawaii to determine necessary site improvements and connection requirements. As a result, the Project is not expected to have a significant impact on communication facilities.

Other developments planned to occur in the vicinity would coordinate their electrical and communication requirements with HELCO and Verizon Hawaii as part of their design.

Cable Television System

The existing cable television service provided by ~~Jones Spacelink~~Hawaiian Cablevision may be adequate to serve the UHH Mauka Parcel; however, the signal strength may need to be upgraded within the site. As required, amplifiers will be located in cable television handholes to boost the signal strength.

The proposed duct system will be connected to existing cable television wiring through an existing cable television handhole in Nowelo Street, on the east side of Komohana Street. The new system will consist of concrete-encased ducts and reinforced concrete handholes~~, as required by Jones Spacelink~~.

Communications System

As part of an overall UHH master communications system, connection to the communications system at the existing University Park is proposed through an existing cable television handhole on the west corner of the Nowelo Street and South Aohōkū Street intersection. The system will consist of concrete-encased ducts and reinforced concrete handholes.

7.2 *RECREATIONAL FACILITIES*

7.2.1 EXISTING RECREATIONAL FACILITIES

The town of Hilo is a major urban center in East Hawai'i with numerous recreational facilities. Within the town area, there are eight neighborhood parks (with playfields), ranging in size between 3.0 and 7.7 acres, and additional playfields provided by nine schools. The Ho'olulu Complex, which includes an auditorium, stadium, swimming pool, outdoor tennis courts, covered tennis stadium, and baseball fields, is the major regional recreational center in Hilo town and consists of 56 acres of land. It is generally located a couple miles northeast of the Project site, between Waiākea Pond and the Hilo International Airport.

Five miles south of Hilo, the County maintains the Pana'ewa Recreation Complex located on a 173-acre parcel. This complex includes the Rainforest Zoo and the Equestrian Center, consisting of a racetrack, rodeo arena, and other equestrian facilities.

Within the immediate Project vicinity, there are a few County parks associated with existing residential subdivisions. Mohouli Park is located northeast of the Project and University Heights Park is located to the east. Within the UHH campus is the University's athletic complex on West Kāwili Street, which includes a multi-purpose field, softball and baseball fields, and tennis complex.

7.2.2 EFFECTS ON RECREATIONAL FACILITIES

Construction of the Hawai'i CC campus and the University Park expansion facilities would occur over several years, and construction-related activities are not expected to have an impact on existing recreational facilities. Development of the project could result in the in-migration of students, faculty, and staff, although most are expected to be current Hawai'i County residents. Other planned developments may attract non-resident employees, students, and their families. Any increase in residents would occur over several years (2004 to 2020) with the completion of various Project phases. An increase in the resident population of East Hawai'i could increase the demand for recreational facilities; however, this relatively small increase is not expected to have a significant effect on existing recreational facilities. Furthermore, the Hawai'i CC has no athletic or intramural programs, thus no need for playfields is anticipated. Research facilities included in the University Park Expansion should not impact recreational facilities either. The commercial and research-related facilities for the proposed Project are not expected to stress existing recreational facilities in any way.

7.3 *MEDICAL FACILITIES*

7.3.1 EXISTING MEDICAL FACILITIES

Current medical facilities in the Hilo area include the Hilo Medical Center, Life Care Center of Hawai'i, and Hale 'Ānuenue Care Center. The Hilo Medical Center is located about two miles northwest of the Project along Waiānuenue Avenue. This medical center is the largest on the island with a total of 164 beds for acute care services, 113 beds for medical/surgical and critical care, and 108 beds within skilled nursing and intermediate care facilities. For the year 2000, the Hilo Medical Center had 79 percent occupancy for medical/surgical beds with an average length of stay of 6.5 days. Critical care beds had only 39 percent occupancy, obstetric had 33 percent, and pediatric had 16 percent.

7.3.2 EFFECTS ON MEDICAL FACILITIES

Construction of the Project is not expected to impact existing medical facilities in the Hilo town area, as the proposed developments are located a considerable distance away.

Although small, there is potential for additional medical services required by researchers, students, faculty, and staff involved in accidents or emergencies on the property. These situations are expected to be rare or infrequent due to the type of activities conducted (research and education) at these facilities. Additional residents brought to Hilo by the Project could also increase the demand for medical services. However, as previously discussed, the number of additional residents generated by the

Project would be small in comparison with the entire East Hawai'i population and would only slightly increase demand for medical services such as obstetric, pediatric, and medical/surgical care. Other developments planned to occur within the vicinity of the Project, particularly the PBARC/IPIF complex, could generate a fair amount of new residents and students to the Hilo town area. However, the Hilo Medical Center should be able to accommodate this increased service demand given, the relatively low occupancy of beds for obstetric and pediatric care.

7.4 EDUCATIONAL FACILITIES

7.4.1 EXISTING EDUCATIONAL FACILITIES

The Project is situated within an area that includes educational facilities associated with both the North Hilo Complex and the Central Hilo Complex of the State Department of Education (DOE) school system. The North Hilo Complex consists of eight elementary schools and two intermediate schools, which feed into Hilo High School. The Central Hilo Complex is comprised of two elementary schools and one intermediate school, which feed into Waiākea High School. Other schools in the vicinity include the UHH and St. Joseph's Junior-Senior High School.

Of the North Hilo Complex, Chiefess Kapi'olani Elementary is the only school situated in the general vicinity of the Project. It is located on Kilauea Avenue about one mile to the northeast of the property. Within the Central Hilo Complex, Waiākea High School, Waiākea Intermediate School, and Waiākea Elementary School are located within the Project vicinity. All three of these schools are situated along West Pū'ainakō Street, west of the UHH campus, approximately one mile from the Project site.

The existing UHH campus is located east of the Project along Komohana Street. The campus is divided into two distinct areas by the Wailoa Flood Control Channel. The eastern/makai portion is referred to as the "main campus" and includes the UHH/Hawai'i CC Manono campus. The western portion is referred to as "University Park" and includes research and technology facilities, along with currently undeveloped vacant lots. Student enrollment in 1994 was 3,111, or a full-time equivalent (FTE) of 2,328 students. Student enrollment was projected to grow at an annual rate between three and four percent, with a projected FTE enrollment of 2,854 in 2001 and 2,940 in 2002.

The majority of UHH students are from the State of Hawai'i, particularly residents of the Big Island. Students from the Pacific Rim and Pacific Islands compose a secondary clientele. The University focuses on a liberal arts undergraduate education with some high quality professional programs. Hawai'i CC separated from UHH in 1991, yet the schools continue to share facilities and services.

7.4.2 EFFECTS ON EDUCATIONAL FACILITIES

Construction of the Project is not expected to have any short-term impact on public educational facilities in the Hilo town area, given their distance from the property.

Over the long term, the Project will provide educational and employment opportunities that may result in non-residents migrating to the island from either O'ahu or outside of the State. However, this increase in residents would be relatively minor in comparison with the entire population of East Hawai'i. The in-migration would occur gradually between 2004 and 2020. Declining enrollments experienced at Hilo schools within the State DOE may reflect Hilo's aging population, which would offset the Project-related population increase. The long-term impact of new students and residents on educational facilities within the Project area would be, if any, gradual and minimal.

The Project would be a great advantage to educational programs at UHH. The University Park Expansion would enhance existing internships, graduate work, and programs. The proposed agricultural and astronomical facilities could use UHH students for research work and their staff could cooperate with professors to teach related courses.

7.5 POLICE PROTECTION

7.5.1 EXISTING POLICE FACILITIES

The County of Hawai'i Police Department is divided into several districts and beats, with their central headquarters located in Hilo town. The Project is located within the Police Department's South Hilo District. This district includes the department's central headquarters in the Public Safety Building and police mini-stations located at Clem Akina Park, Richardson Beach Park, and Mo'oheau Bus Terminal.

The South Hilo District includes three foot-patrol beats, five motorcycle beats, and 25 motor-patrol beats (Beats 130 to 154). Foot-patrol beats generally guard the Bayfront shoreline area and will not cover the Project site. However, a motorcycle beat (M/C-3) covers the section from Komohana Street to the shoreline between Mohouli Street and Pū'ainakō Street, and Motor Patrol Beat 134 watches over the University campus area, from Kino'ole Street westbound to the Kūkūau Forest between Mohouli and Pū'ainakō Streets.

7.5.2 EFFECTS ON POLICE FACILITIES

Short-term construction activities associated with the Project may require temporary lane closures at Komohana Street. Off-duty police officers may be hired to assist with

traffic control during such construction activities. However, utilizing off-duty officers is not expected to negatively impact the Police Department's operations.

The Project is not expected to have a significant impact on the Police Department's ability to continue providing protective services for the area residents and general public. The new developments may include a camera security system as part of their respective facilities, and on-site security personnel may be employed to monitor activities and assist visitors. Daily patrols of the area should not be disrupted or negatively impacted by the Project. After reviewing the EISPN, the County of Hawai'i Police Department provided suggestions/comments concerning the Project (Chapter 14.0). These comments are discussed in Section 4.6 Air Quality and Section 6.5 Transportation.

7.6 FIRE PROTECTION

7.6.1 EXISTING FIRE FACILITIES

The Hawai'i County Fire Department presently has 14 regular fire stations, 18 volunteer fire stations, and two federal fire stations located throughout the island. In the South Hilo District, there are four 24-hour full-time fire stations, which are the Central, Waiākea, Kaūmana, and Kawailani substations. Between these four stations there are a total of between 22 and 26 personnel on every shift. The Kawailani Fire Station, referred to as Station #3, is a fire and EMS operation that is the closest station to the Project. It would provide primary service for the Project if needed. The other three stations would provide any necessary back-up services.

The County has contracted emergency medical ambulance services with the State DOH. All fire department personnel who provide basic and advanced life support are licensed or certified, as required by State law. In general, emergency medical services account for 75 percent of all incidents, fire fighting comprises another five percent, and rescue, hazardous substances, special services, and natural disasters account for the remainder.

7.6.2 EFFECTS ON FIRE FACILITIES

The Project is not expected to have a significant impact on the Fire Department's ability to continue providing protective services for area residents and the general public. Various complexes within the Project would be designated to meet fire code requirements and design plans would be coordinated with the Fire Department. Emergency and fire vehicle access will be provided to all lots from entries and internal roadways. The estimated water demand for the Project included the fire flow requirement for school and commercial areas. Based on the Department of Water Supply Water System Standards, the fire flow requirement is 2,000 gallons per minute for two hours. The fire hydrant spacing of 300 feet was also incorporated into the

preliminary engineering report. After reviewing the EISPN, the County of Hawai'i Fi Department had no comments to offer concerning the Project. In response to comments on the DEIS (Section 15.0), fire apparatus access roads shall be designed a constructed in accordance with the Uniform Fire Code, Section 10.207. The access ro to the Project has been designed to meet the Water System Standards, and each tena of the University Park Expansion will be subject to review by the Fire Department order to obtain a building permit. In addition, water infrastructure shall be design and installed in accordance with the Uniform Fire Code, Section 10.301.

7.7 *CUMULATIVE AND SECONDARY IMPACTS ON PUBLIC FACILITIES AND UTILITIES*

7.7.1 ELECTRICAL AND COMMUNICATION FACILITIES

Any increase in demand for electricity not generated by renewable resources will ha an indirect impact on air quality, as emissions are generated by HELCO-owned stea units, diesel units, and gas turbines. All new projects increasingly incorporate energ saving features in the design of projects. These features include: 1) use of natu ventilation to increase comfort of occupants; 2) maximum use of natural lighti without heat gain; 3) use of high efficiency compact fluorescent lighting; 4) use insulation/radiant barrier for an equivalent R-19 value in ceiling; 5) use of ceiling fa and 6) use of landscaping for dust control and to minimize area heat gain. Ne buildings are likely to increase the demand for communications services (i.e., CA and telephone service), but are unlikely to have an adverse effect on existi communications systems.

7.7.2 RECREATIONAL FACILITIES

The proposed development will serve research and educational purposes and are expected to have a substantial impact on population or existing recreation facilities. T Student Life and Event Complex will include a multi-purpose facility for spo recreation, and conference activities, as well as a swimming pool, however, as the resid population in Hilo increases, there will be a greater demand for recreational faciliti Casual observance of parks and active play courts in and around Hilo would indic that existing facilities do not experience overuse, except maybe for school-aged soc league play.

7.7.3 MEDICAL FACILITIES

Accidents requiring medical attention are unavoidable and will occur at some ti during the development or operation of the proposed buildings. These situations expected to be infrequent; however, as the defacto population in Hilo increases, so w

the demand on Hilo's medical facilities. The Hilo Medical Center is the only hospital in Hilo but is not currently at capacity.

7.7.4 EDUCATIONAL FACILITIES

All of the planned developments in the Project area are related to education in some way. As such, each development will provide additional educational facilities and opportunities to meet the needs of residents.

7.7.5 POLICE PROTECTION

Incidents requiring police protection or service are unavoidable, but are expected to be infrequent, as on-site security systems or personnel are likely to be employed. Although no significant impacts to population are anticipated, as the defacto population in Hilo increases, additional officers and staff may be needed.

7.7.6 FIRE PROTECTION

Unavoidable fires and emergency situations would require protective service from the Fire Department. To prevent fires, all facilities would be designed to meet fire code requirements and design plans would be coordinated with the Fire Department. Emergency and fire vehicle access would also be provided. Although no significant impacts to population are anticipated, as the defacto population in Hilo increases, additional fire fighters and staff are may be needed.

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UNIVERSITY OF HAWAI'I HILO

8.0 Relationship to Plans and Policies

8.0 RELATIONSHIP TO PLANS AND POLICIES

The Project will conform to the State of Hawai'i Land Use District regulations, the County of Hawai'i *General Plan* goals, policies, and standards, and the Zoning District standards.

8.1 STATE LAND USE DISTRICT

The State Land Use Commission's Land Use District Boundary Maps for Hilo (H-66) indicate that the Project site and immediately surrounding areas are designated as "Agricultural District".

8.2 CHAPTER 344, STATE ENVIRONMENTAL POLICY

The Project is consistent with the following goals, policies, and guidelines described in Chapter 344, HRS, State Environmental Policy.

Environmental Policy

1. *Conserve the natural resources, so that land, water, mineral, visual, air and other natural resources are protected by controlling pollution, by preserving or augmenting natural resources, and by safeguarding the State's unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain condition under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of the people of Hawaii.*

Discussion: The Project will comply with this policy by protecting natural resources through conservation, pollution control, and preservation. Natural vegetation will remain as a buffer area surrounding the Project site, which will incorporate existing and natural landscape. The largest concentration of historical features will remain at a preservation site. Project buildings, activities, and site grounds will be designed with energy-saving considerations. *Guidelines for Sustainable Building Design in Hawaii: A planner's checklist*, was provided to both the UHH and Engineering Concepts, Inc. (project engineers). Project designers and contractors will be instructed to provide a job-site recycling plan for construction wastes and to use products with recycled content, where feasible. The Project will protect natural resources and provide the people of Hawai'i with social and economic benefits. The proposed expansion of the University Park represents a job-generating use that does not produce pollution (as compared to heavy industry) or is not overly automobile-dependent (such as delivery trucks).

2. *Enhance the quality of life by:*
   a. *Setting population limits so that the interaction between the natural and artificial environments and the population is mutually beneficial.*
   b. *Creating opportunities for the residents of Hawaii to improve their quality of life through diverse economic activities which are stable and in balance with the physical and social environments.*
   c. *Establishing communities which provide a sense of identity, wise use of land, efficient transportation, and aesthetic and social satisfaction in harmony with the natural environment which is uniquely Hawaiian.*

Discussion: Population increase due to the proposed Project would be gradual and is not expected to significantly impact physical and social environments. The Project would create opportunities for the residents of Hawai'i to improve their quality of life through economic and social benefits without resorting to heavy industrial use (and their attendant environmental impacts) or car-dependant activities. The new Hawai'i CC campus and the University Park Expansion would enhance the sense of identity within the college/university community and the Hilo area. Project lands would be used wisely and would incorporate natural vegetation to establish an aesthetic and social harmony with the natural Hawaiian environment. Transportation improvements such as extensions of existing roads and new bicycle lanes and paths would be implemented by the Project, which would ultimately enhance the quality of life for residents of the area, County, and State.

Guidelines

1. ***Population***
   a. *Recognize population impact as a major factor in environmental degradation and adopt guidelines to alleviate this impact and minimize future degradation.*

Discussion: Anticipated impacts of a population increase due to the Project include higher use of utilities, infrastructure facilities, and public facilities. Increased usage of such utilities and facilities is not expected to hinder the provision of services, as the population increase would be gradual, occurring over several years. Population is not expected to significantly increase with the relocation of the Hawai'i CC, and declining enrollments in Hilo schools and Hilo's aging population may even offset the Project-related increase in population.

2. ***Land, water, mineral, visual, air, and other natural resources***
   a. *Encourage management practices which conserve and fully utilize all natural resources.*
   b. *Promote irrigation and wastewater management practices which conserve and fully utilize vital water resources.*
   c. *Encourage management practices which conserve and protect watersheds and water sources, forest, and open spaces.*
   d. *Establish and maintain natural area preserves, wildlife preserves, forest reserves, marine preserves and unique ecological preserves.*

e. *Maintain an integrated system of state land use planning which coordinates the state and county general plans.*
f. *Promote the optimal use of solid wastes through programs of waste prevention, energy resource recovery, and recycling so that all our wastes become utilized.*

Discussion: Management practices that conserve and fully utilize natural resources would be implemented during construction and operation of the Project. Natural areas would serve as a buffer to maintain views into the property and preserve land resources. Project design would coordinate with state and county general plans and selected contractors will be instructed to provide a job-site recycling plan for construction waste and to use products with recycled content, where feasible.

3. ***Flora and fauna***
   a. *Protect endangered species of indigenous plants and animals and introduce new plant or animals only upon assurance of negligible ecological hazard.*
   b. *Foster the planting of native as well as other trees, shrubs, and flowering plants compatible to the enhancement of our environment.*

Discussion: Surveys of botanical resources and wildlife identified no endangered or threatened species within the property of the Project. Surrounding areas and landscaped areas using native plant species would provide a suitable habitat to the non-native avian and mammalian species that were identified by the survey and would be temporarily displaced during construction of the Project.

4. ***Parks, recreation and open space***
   a. *Establish, preserve and maintain scenic, historic, cultural, park and recreation areas, including the shorelines, for public recreational, educational and scientific uses.*
   b. *Protect the shorelines of the State from encroachment of manmade improvements, structures and activities.*
   c. *Promote opens space in view of its natural beauty not only as a natural resource but as an ennobling, living environment for its people.*

Discussion: The Project is not expected to significantly impact scenic, historic, cultural, or park and recreation areas. View planes toward the site and important public viewing points and visual resources should not be adversely impacted with the planned provision of natural vegetation buffer areas around the perimeter of the Project. New views of Mauna Kea, Mauna Loa, and the coastline may be created from within the Project site, as the property is currently inaccessible to the public. Cultural impacts are not anticipated, as a cultural impact assessment was unable to identify significant traditional or cultural practices within the site. The largest concentration of historical features within the property would be preserved in their natural state. Park and recreational areas should not be significantly impacted by the Project, which includes the development of research facilities and the relocation of the Hawai'i CC, which has no intramural activities requiring playfields. The *UHH University Park Expansion Master Plan (Draft)* (Appendix G) and the *Hawai'i Community College LRDP ~~Update~~*(Appendix

H) establish naturally landscaped open spaces to create a campus-like environment in which users can socialize outdoors. Shorelines would not be affected by the Project, as the nearest shoreline is a significant distance from the site.

5. *Transportation*
   a. *Encourage transportation systems in harmony with the lifestyle of the people and the environment of the State.*
   b. *Adopt guidelines to alleviate environmental degradation caused by motor vehicles.*
   c. *Encourage public and private vehicles and transportation systems to conserve energy, reduce pollution emission, including noise, and provide safe and convenient accommodations for their users.*

Discussion: Transportation improvements are proposed for access to the Project. Extensions of existing streets as well as pedestrian and bicycle paths will be in harmony with the lifestyle of the college/university community. Encouraged non-motor vehicular transportation will conserve energy, reduce pollution emission, reduce noise, provide safety and convenience, and alleviate environmental degradation by motor vehicles.

6. ***Citizen participation***
   a. *Provide for expanding citizen participation in the decision making process as it continually embraces more citizens and more issues.*

Discussion: The environmental review process for the Project enables public and government agencies to comment on how the Project may affect their services. Opportunities for public consultation include pre-assessment consultation and review of the Environmental Impact Statement Preparation Notice (EISPN) and ~~this~~ DEIS.

8.3 CHAPTER 205A – COASTAL ZONE MANAGEMENT

This section discusses the relationship of the proposed Project to applicable objectives and policies of the Coastal Zone Management Program in Chapter 205A-2, Hawaii Revised Statutes.

Objectives

1. *Provide coastal recreational opportunities accessible to the public.*
2. *Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.*
3. *Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.*
4. *Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.*

5. *Provide public or private facilities and improvements important to the State's economy in suitable locations.*
6. *Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.*
7. *Improve the development review process, communication, and public participation in the management of coastal resources and hazards.*
8. *Stimulate public awareness, education, and participation in coastal management.*
9. *Protect beaches for public use and recreation.*
10. *Promote the protection, use, and development of marine and coastal resources to assure their sustainability.*

Discussion: The Project would provide benefits important to the State's economy and would be suitably located near the existing UHH University Park. Neither access to beach areas nor the quality of coastal scenic and open space resources should be impacted by the Project, which would be consistent with these objectives for coastal zone management.

Policies

1. ***Recreational resources***

Discussion: The policies for recreational resources discuss proper management of and access to shoreline areas and coastal resources. Since the Project is located several miles from the Hilo shoreline area, these policies are not applicable.

2. ***Historic resources***
   a. *Identify and analyze significant archaeological resources.*
   b. *Maximize information retention through preservation of remains and artifacts or salvage operations.*
   c. *Support state goals for protection, restoration, interpretation, and display of historic resources.*

Discussion: An archaeological survey identified and analyzed significant archaeological resources in the Project area. No pre-Contact sites were identified, as prior land uses and the Lava Flow of 1881 likely destroyed them long ago. Seventeen sites required no mitigation and two sites were recommended for Data Recovery to maximize information retention. Certain sites at the intersection of Komohana Street and Pū'ainakō Street Extension are located such that plans for the Hawai'i CC may be adjusted to preserve the largest concentrations of historical features.

3. *Scenic and open space resources*
   a. *Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.*
   b. *Encourage those developments that are not coastal dependent to locate in inland areas.*

Discussion: The Project is not coastal dependent and would be suitably located inland. Project design would minimize the alteration of existing visual resources, important public viewing points, and view planes toward the site. New views of Mauna Kea, Mauna Loa, and the coastline may be created from the property, which is currently inaccessible to the public. Landscaping and a buffer area would incorporate existing and natural plants to minimize the alteration of natural landforms.

4. *Coastal ecosystems*
   a. *Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs.*

Discussion: The Project would not require stream diversions or the channelization of water systems that impact coastal water ecosystems. Water needs would be provided by the County DWS, which anticipates the ability to provide water service to the Project. Final determination of the DWS water service ability will consider competing water demands within the Project area and a calculated water usage for the completed Project.

8.4 COUNTY OF HAWAI'I GENERAL PLAN

This section discusses the relationship of the Project with pertinent goals, policies, and standards of the County of Hawai'i *General Plan* (1989) along with proposed revisions under the present *General Plan Update* (December 2001).

Economic

1. *Goals*
   a. *Provide residents with opportunities to improve their quality of life through economic development that enhances the County's natural and social environments.*
   b. *Economic development and improvement shall be in balance with the physical, social, and cultural environments of the island of Hawaii.*
   c. *Provide an economic environment that allows new, expanded, or improved economic opportunities that are compatible with the County's cultural, natural and social environment.*
   d. *Strive for an economic climate that provides its residents an opportunity for choice occupation.*
   e. *Strive for diversification of the economy by strengthening existing industries and attracting new endeavors.*
   f. *Promote and develop the island of Hawaii into a unique scientific and cultural model, where economic gains are in balance with social and physical amenities. Development should be reviewed on the basis of total impact on the residents of the County, not only in terms of immediate short run economic benefits.*

2. ***Policies***
   a. *Assist in the expansion of the agricultural industry through the protection of important agricultural lands, development of marketing plans and programs, capital improvements, and continued cooperation with appropriate State and Federal agencies.*
   b. *Encourage the expansion of the research and development industry by working with and supporting the University of Hawaii at Hilo and West Hawaii, the Natural Energy Laboratory at Hawaii Authority, and other agencies' programs that support sustainable economic development in the County of Hawaii.*
   c. *Require a study of the significant cultural, social and physical impacts of large developments prior to approval.*
   d. *Support all levels of educational, employment and training opportunities and institutions.*
   e. *Continue to encourage the research, development and implementation of advanced technologies and processes.*
   f. *Support the development of high technology industries.*
   g. *Continue to encourage development and utilization of by-products from alternate energy conversion projects.*
   h. *Support research and development that would lead to the removal of marketing restrictions on Hawaiian fruits and other perishables.*
   i. *Encourage new industries that provide favorable benefit-cost relationships to the people of the County. Benefit-cost relationships include more than fiscal considerations.*
3. ***Standards***
   a. *The island of Hawaii should be developed into a unique scientific and cultural model. The island should become a model of living where economic gains are in balance with social and physical amenities. Development should be reviewed on the basis of total impact on the residents of the County, not only in terms of immediate short run economic benefits.*
   b. *New industries which provide favorable benefit-cost relationships to the people of the County should be encouraged. Benefit-cost relationships as used here include more than fiscal considerations.*
4. ***South Hilo Courses of Action***
   a. *Encourage the State to provide the necessary funds for the development of the university complex and airport facilities. Provide necessary support services and facilities to aid the development of these complexes.*
   b. *Support the development of a master plan for the lands within the vicinity of the University of Hawaii at Hilo to incorporate a "college town" concept utilizing an appropriate mixture of residential, commercial and other land uses to complement the university's infrastructure.*

Discussion: The Project is consistent with these goals, policies, standards, and courses of action, and would provide significant economic benefits to the Island of Hawai'i. This EIS includes studies of the cultural, social, physical, and economic impacts of the Project to ensure a proper balance amongst all environments. Employment opportunities would enable residents to improve their quality of life, and industries supporting construction or servicing construction workers of the Project would also

benefit. The County of Hawai'i as a whole would experience increased income and tax revenues. The Project complies specifically with the policies to support educational and employment opportunities and institutions and to encourage the expansion of the research and development industry by supporting the UHH.

Energy

1. *Policies*
   a. *Provide incentives that will encourage the use of new energy sources and promote energy conservation.*
   b. *Coordinate energy research and development efforts of both the government and private sectors.*
   c. *Encourage energy-saving design in the construction of buildings.*

Discussion: Project buildings, activities, and site grounds will be designed with energy-saving considerations, and selected designers and contractors will be instructed to provide a job-site recycling plan for construction waste and to use products with recycled content, where feasible. *Guidelines for Sustainable Building Design in Hawaii: A planner's checklist*, was provided to both the UHH and Engineering Concepts, Inc. (project engineers). The Project will promote cost-effective energy conservation through the adoption of energy-efficient practices and technologies.

Environmental Quality

1. *Goals*
   a. *Define the most desirable use of land within the County that achieves an ecological balance providing residents and visitors the quality of life and an environment in which the natural resources of the island are viable and sustainable.*
   b. *Maintain and, if feasible, improve the existing environmental quality of the island.*
   c. *Control pollution.*
2. *Policies*
   a. *Take positive action to further maintain the quality of the environment.*
   b. *Reinforce and strengthen established standards where it is necessary, principally by initiating, recommending, and adopting ordinances pertaining to the control of pollutants that affect the environment.*
   c. *Encourage the concept of recycling agricultural, industrial, and municipal waste material.*
3. *Standards*
   a. *Pollution shall be prevented, abated, and controlled at levels that will protect and preserve the public health and well being, through the enforcement of appropriate Federal, State and County standards.*
   b. *Federal and State environmental regulations shall be adhered to.*

Discussion: Mitigation measures of the Project will help to control pollution and maintain the existing environmental quality of the island. Appropriate Federal, State, and County standards will be upheld, and construction waste will be recycled and products with recycled content will be used, where feasible.

Flood Control and Drainage

1. *Goals*
   a. *Protect human life.*
   b. *Prevent damage to man-made improvements.*
   c. *Control pollution.*
   d. *Prevent damage from inundation.*
   e. *Reduce surface water and sediment runoff.*
   f. *Maximize soil and water conservation.*
2. *Policies*
   a. *Any development within the Federal Emergency Management Agency designated flood plain must be in compliance with Chapter 27.*
   b. *Development-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works and in compliance with all State and Federal laws.*
   c. *The County and the private sector shall be responsible for maintaining and improving existing drainage systems and constructing new drainage facilities.*
   d. *Develop drainage master plans from a watershed perspective that considers non-structural alternatives, minimizes channelization, protects wetlands that serve drainage functions, coordinates the regulation of construction and agricultural operation, and encourages the establishment of floodplains as public green ways.*
   e. *Encourage and provide incentives for agricultural operators to participate in Soil and Water Conservation District Programs.*
   f. *Consider natural hazards in all land use planning and permitting.*
   g. *Discourage intensive development in areas of high volcanic hazard.*
3. *Standards*
   a. *"Storm Drainage Standards," County of Hawaii, October, 1970, and as revised.*
   b. *Applicable standards and regulations of Chapter 27, "Flood Control," of the Hawaii County Code.*
   c. *Applicable standards and regulations of the Federal Emergency Management Agency (FEMA).*
   d. *Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawaii County Code.*
   e. *Applicable standards and regulations of the Natural Resources Conservation Service and the Soil and Water Conservation Districts.*

Discussion: Existing drainage systems within the property would be responsibly maintained and improved to control pollution, protect human life, prevent damage, and reduce runoff. The onsite storm drainage system will be designed in accordance with the Storm Drainage Standards of the County of Hawai'i and other applicable regulations. The Project shall comply with rules and regulations of the National Flood Insurance Program (NFIP), whenever work is required within a flood zone.

Historic Sites

1. *Goals*
   a. *Protect, restore, and enhance the sites, buildings, and objects of significant historical and cultural importance to Hawaii.*
   b. *Appropriate access to significant historic sites, buildings, and objects of public interest should be made available.*

2. *Policies*
   a. *Require both public and private developers of land to provide historical and archaeological surveys and cultural assessments, where appropriate, prior to the clearing or development of land when there are indications that the land under consideration has historical significance.*
   b. *Public access to significant historic sites and objects shall be acquired, where appropriate.*
   c. *Collect and distribute historic sites information of public interest and keep an inventory of sites.*
   d. *Recognize the importance of certain natural features in Hawaiian culture by incorporating the concept of "cultural landscapes" in land use planning.*
3. ***Standards***
   a. *Sites of traditional and cultural significance.*

Discussion: An archaeological survey and cultural impact assessment was performed for the Project site. Although no significant archaeological or cultural impacts were identified, a site preservation area will be provided with appropriate access. Where possible, the largest concentration of historical features will be incorporated into a buffer area and the landscape of the Project.

Land Use – Agriculture

1. *Policies*
   a. *In order to minimize the potential conflicts between agricultural and non-agricultural uses, standards and guidelines for the establishment of well defined buffer areas as part of new, non-agricultural developments that are located adjacent to important agricultural lands shall be developed.*
2. ***South Hilo Course of Action***
   a. *Encourage buffer zones or compatible uses between agricultural and urban/residential areas.*
   b. *Support the University of Hawaii at Hilo and Hawaii Community College aid in their development of programs that assist agriculture.*

Discussion: The Project is consistent with the aforementioned, as the Project site surrounds the PBARC site and will provide a buffer zone between agricultural (PBARC) and residential (Sunrise Estates Subdivision) areas to minimize potential conflict between land uses. A perimeter natural vegetation buffer zone concept for the Hawai'i CC will create edges to reinforce a sense of identity and define campus boundaries.

Land Use – Open Space and Public Land

1. *Policies*
   a. *Encourage uses of public lands that will satisfy specific public needs, such as housing, recreation, open space and education.*
   b. *A sub-classification, University use, shall continue to be utilized, permitting the primary institutional and numerous supportive and accessory uses required for*

establishing and/or expanding a public university. Its designation shall continue to be shown on the Land Use Pattern Allocation Guide map.

Discussion: The Project will use public lands to satisfy public educational needs. The "University" sub-classification will permit the institutional, supportive, and accessory uses required for expanding a public university.

Natural Beauty

1. ***Goals***
   a. *Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.*
   b. *Protect scenic vistas and view planes from becoming obstructed.*
   c. *Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.*
2. ***Policies***
   a. *Increase public pedestrian access opportunities to scenic places and vistas.*
   b. *Access easement to public or private lands that have natural or scenic value shall be provided or acquired for the public.*
   c. *Develop standard criteria for natural and scenic beauty as part of design plans.*
   d. *Protect the views of areas endowed with natural beauty by carefully considering the effects of proposed construction during all land use reviews.*
   e. *Do not allow incompatible construction in areas of natural beauty.*
3. ***Standards***
   a. *Natural or native vegetation attractive to a particular area.*
   b. *Areas that are harmoniously developed and enhanced by man to appear natural.*

Discussion: As the Project is located several miles from the shoreline, the quality of coastal scenic resources should not be affected. Because of the zoning height restriction, the generally gentle slope and topography of the property, and the existing buildings and structures in Hilo Town obstructing views, the coastal views from mauka residential areas or mauka views from shoreline areas should not be altered by the Project. Buffer areas would further screen the Project from nearby residential areas. Views of Mauna Kea, Mauna Loa, and the coastline may be created from the property when it is made publicly accessible, enabling future generations to enjoy natural and scenic beauty.

Natural Resources and Shoreline

1. ***Goals***
   a. *Protect and conserve the natural resources from undue exploitation, encroachment and damage.*
   b. *Provide opportunities for recreational, economic, and educational needs without despoiling or endangering natural resources.*
   c. *Protect and promote the prudent use of Hawaii's unique, fragile, and significant environmental and natural resources.*
   d. *Protect rare or endangered species and habitats native to Hawaii.*

e. *Protect and effectively manage Hawaii's open space, watersheds, shoreline, and natural areas.*
f. *Ensure that alterations to existing land forms, vegetation, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of an earthquake.*

2. ***Policies***
   a. *Require users of natural resources to conduct their activities in a manner that avoids or minimizes adverse effects on the environment.*
   b. *Maintain the shoreline for recreational, cultural, educational, and/or scientific uses in a manner that is protective of resources and is of the maximum benefit to the general public.*
   c. *Protect the shoreline from the encroachment of man-made improvements and structures.*
   d. *Encourage public and private agencies to manage the natural resources in a manner that avoids or minimizes adverse effects on the environment and depletion of energy and natural resources to the fullest extent.*
   e. *Encourage an overall conservation ethic in the use of Hawaii's resources by protecting, preserving, and conserving the critical and significant natural resources of the County of Hawaii.*
   f. *Encourage the protection of watersheds, forest, brush, and grassland from destructive agents and uses.*
   g. *The installation of utility facilities, highways and related public improvements in natural and wildland areas should avoid the contamination or despoilment of natural resources where feasible by design review, conservation principles, and by mutual agreement between the County and affected agencies.*
   h. *Encourage the use of native plants for screening and landscaping.*
   i. *Establish a system of pedestrian access trails to places of scenic, historic, cultural, natural, or recreational values.*
   j. *Ensure that activities authorized or funded by the County do not damage important natural resources.*

3. ***Standards***
   a. *Lands with a general slope of 20 percent or more that provide open space amenities or possess unusual scenic qualities.*
   b. *Lands with topographic, locational, soils, climate or other environmental factors that may not be normally adaptable or required for urban, rural, agricultural or public use.*

Discussion: As discussed throughout this ~~DEIS~~FEIS, mitigative measures would ensure that alterations to existing landforms and vegetation and construction of structures cause minimal adverse effects. Project design would incorporate conservation and recycling practices to prevent environmental degradation and natural resource exploitation. The shoreline should not be affected by the Project, due to the distance from the coastline. The Project would use native vegetation for landscaping and screening. Open spaces and pedestrian paths proposed throughout the Project would provide scenic views and pedestrian access to places of value, such as the proposed site preservation area.

Public Facilities

1. *Goals*
   a. *Encourage the provision of public facilities that effectively service community and visitor needs and seek ways of improving public service through better and more functional facilities in keeping with the environmental and aesthetic concerns of the community.*
2. *Policies*
   a. *Continue to seek ways of improving public service through the coordination of service and maximizing the use of personnel and facilities.*
   b. *Coordinate with appropriate State agencies for the provision of public facilities to serve the needs of the community.*
3. *Standards*
   a. *In proposed communities, sufficient acreage shall be reserved for school facilities. Sites shall be free from flooding and drainage problems, excessive slope and shall incorporate appropriate street and driveway design and location to minimize traffic interference, pedestrian hazard, and enable safe and easy access for vehicles, bicycles and pedestrians.*
4. *South Hilo Courses of Action*
   a. *Provide pedestrian walkways to and around all school complexes.*
   b. *Support the continued expansion of the University system and the University of Hawaii at Hilo and Hawaii Community College campus and encourage the continuing education programs throughout the community. The transfer of State lands to the University should be actively pursued.*
   c. *Encourage continual improvements to existing educational facilities.*
   d. *Support and encourage the strengthening of the University of Hawaii at Hilo through the transfer of appropriate colleges and departments from the University of Hawaii at Manoa to the University of Hawaii at Hilo.*
   e. *Encourage the implementation of existing State and University of Hawaii plans for the continued development of the "Research and Technology Park" on the campus of the University of Hawaii at Hilo.*

Discussion: Project design will coordinate with appropriate public agencies for the provision of public facilities to serve the needs of the community. The Project site shall be free from flooding and drainage problems and shall incorporate appropriate street and driveway design and location to minimize traffic interference. Safe and easy access for vehicles, bicycles, and pedestrians is discussed in the UHH *University Park Expansion Master Plan (Draft)* (Appendix G) and the *Hawai'i CC LRDP* (Appendix H), as well as Section 2.6 of this ~~DEIS~~FEIS. Pedestrian walkways will be provided throughout the proposed campus and facilities. The courses of action support the transfer of State lands to the University and the development of the Project.

Public Utilities

1. *Goals*
   a. *Ensure that properly regulated, adequate, efficient and dependable public and private utility services are available to users.*
   b. *Maximize efficiency and economy in the provision of public utility services.*

2. *Policies*
   a. *Improvement of existing utility services shall be encouraged to meet the needs of users.*
   b. *Encourage the clustering of developments in order to reduce the cost of providing utilities.*
3. *Water Policies*
   a. *Water system improvements shall correlate with the County's desired land use development pattern.*
   b. *All water systems shall be designed and built to Department of Water Supply standards.*
   c. *Improve and replace inadequate systems.*
   d. *A coordinated effort by County, State and private interests shall be developed to identify sources of additional water supply and be implemented to ensure the development of sufficient quantities of water for existing and future needs of high growth areas and agricultural production.*
4. *Water Standards*
   a. *Public and private water systems shall meet the requirements of the Department of Water Supply and the Subdivision Control Code.*
5. *Telecommunications Policies*
   a. *Encourage underground telephone lines where they are economically and technically feasible.*
   b. *Work closely with the telephone company to provide all users with efficient service.*
6. *Telecommunications Standards*
   a. *In the development and placement of telephone facilities, such as lines, telecommunications and cellular towers, poles, and substations, the design of the facilities shall consider the existing environment, and scenic view and vistas shall be considered and preserved where possible.*
7. *Electricity Policies*
   a. *Power distribution shall be placed underground when and where practical. Encourage developers of new urban areas to place utilities underground.*
   b. *Route selection for high voltage transmission lines should include consideration for setbacks from major thoroughfares and residential areas. Where feasible, delineate energy corridors for such high voltage transmission lines.*
   c. *Conform to safety standards as established by appropriate regulatory authorities.*
8. *Electricity Standards*
   a. *There shall be minimal obstruction of scenic view and vistas by electrical facilities.*
9. *Sewer Policies*
   a. *Require major developments to connect to existing sewer treatment facilities or build their own.*
10. *Sewer Standards*
   a. *Sewerage systems shall be designed for a particular area, depending on topography, geology, density of population, costs, and other considerations of the specific area.*
   b. *Applicable standards and regulations of the State Department of Health, Chapter 23 "Underground Injection Control."*
   c. *Applicable standards and regulations of the State Department of Health, Chapter 54 "Water Quality Standards."*
   d. *Applicable standards and regulations of the State Department of Health, Chapter 55 "Water Pollution Control."*

e. *Applicable standards and regulations of the State Department of Health, Chapter 62, HRS, "Wastewater Systems."*
f. *Applicable standards and regulations of Chapter 342, HRS; Act 282, Session Laws of Hawaii 1985; and Act 302, Session Laws of Hawaii 1986, Relating to Environmental Quality.*
g. *All wastewater disposal systems shall conform to the applicable provisions of Chapter 11-62, Hawaii Administrative Rules for the Department of Health to ensure proper treatment and disposal of wastewater and to prevent further contamination of waterways, underground water sources, and the coastal waters.*

11. ***South Hilo Courses of Action***
    a. *Encourage the State Department of Health to monitor the wastewater received to provide sufficient base line data regarding the need for any future extension or expansion of wastewater collection systems.*

Discussion: The Project is consistent with relevant public utilities goals, policies, standards, and courses of action. The proposed facilities are clustered to reduce the cost of providing utilities. Water systems would be designed and built to the County Department of Water Supply standards and meet the requirements of the Subdivision Control Code. Coordination with Verizon Hawaii and HELCO would take place to provide all users with efficient service, and the existing environment and views would be considered in the placement of telephone and electrical facilities. The Project would conform to the electricity safety standards established by appropriate regulatory authorities. The Project would be required to either connect to the existing sewer treatment facilities or build its own. The Project would also comply with applicable DOH standards and regulations.

Transportation

1. ***Goals***
    a. *Provide a transportation system whereby people and goods can move efficiently, safely, comfortably and economically.*
2. ***Standards***
    a. *Transportation systems shall meet the requirements of the U.S. Department of Transportation, State Department of Transportation and the County of Hawaii.*
    b. *Transportation facilities and systems shall conform to the requirements of the Americans with Disabilities Act (ADA).*
    c. *Transportation systems shall conform with design guidelines established by the American Association of State Highway and Transportation Officials (AASHTO).*
3. ***Roadways Goals***
    a. *Provide a system of roadways for the safe, efficient and comfortable movement of people and goods.*
    b. *Provide an integrated State and County transportation system so that new major routes will complement and encourage proposed land policies.*
4. ***Roadways Policies***
    a. *Encourage the programmed improvement of existing roadways by both public and private sectors.*

b. *Consider the development of alternative means of transportation, such as mass transit, bicycle and pedestrian systems, as a means to increase arterial capacity.*
c. *There shall be coordinated planning of Federal, State, and County street systems to meet program goals of the other elements such as historic, recreational, environmental quality, and land use.*
d. *Transportation and drainage systems shall be integrated where feasible.*
e. *Encourage the development of walkways, jogging, and bicycle paths within designated areas of the community.*
f. *Explore means and opportunities to enhance the shared use of the island's roadways by pedestrians and bicyclists, in coordination with appropriate government agencies and organizations.*
g. *Develop short and long range capital improvement programs and plans for transportation that are consistent with the General Plan.*

5. ***Roadways Standards***
   a. *Primary Arterial: Includes major highways, parkways, and primary arterials that move vehicles in large volumes and at higher speeds from one geographic area to another; highest traffic volume corridor. Designed as a limited access roadway. Primary arterials shall have a minimum right-of-way of 120 feet.*
   b. *Secondary Arterial: A street of considerable continuity that is primarily a traffic artery between or through large areas; interconnect with and augment primary system. Designed as a limited access roadway. Secondary arterials shall have a minimum right-of-way of 80 feet.*
   c. *Major Collector: Any street supplementary to the arterial street system that is a means of transit between this system and smaller areas; used to some extent for through traffic and to access abutting properties; collect and distribute traffic between neighborhood and arterial system. Major collectors shall have a minimum right-of-way of 60 feet.*
   d. *Local Streets-commercial/industrial: Local streets within commercial and industrial areas shall have a minimum right-of-way of 60 feet.*
   e. *Minor Collector and Local Streets: Minor collectors are used at times as through-streets and for access to abutting properties. The principal purpose of a local street is to provide access to property abutting the public right-of-way.*
   f. *These standards shall apply to new construction. The County shall determine standards for the dedication and upgrade of existing roads.*
6. ***South Hilo Courses of Action***
   a. *An extension of Pū'ainakō Street east of Kanoelehua should be the main route from the airport terminal for direct access to the business district.*

Discussion: The Project will provide a transportation system to enable people and goods to move efficiently and safely. This system will meet the requirements of the ADA and appropriate federal, state, and county agencies and comply with the AASHTO design guidelines. Proposed major routes will complement and encourage proposed land policies. Bicycle and pedestrian systems are proposed by the Project to encourage means of transportation other than by motorized vehicles. Bicycle lanes would be provided at Nowelo Street and the Nowelo Street Entry to the University Park Expansion. A bicycle route/pedestrian circulation would enable efficient and safe

transportation within the University Park Expansion and to the Hawai'i CC and other research facilities.

8.5 HILO COMMUNITY DEVELOPMENT PLAN

The County of Hawai'i *Hilo Community Development Plan* was adopted in May 1975 by the Hawai'i County Planning Commission. The *Hilo Community Development Plan* recommends that the Project site be developed for single-family housing with lots a minimum of 10,000 square feet. This recommendation was consistent with the *General Plan* at the time; however, the *General Plan* LUPAG map has since been updated to designate the site for "University Use" (*The General Plan*, County of Hawai'i, 1989). The *Hilo Community Development Plan* has not been updated since being adopted and its recommendation for the Project site is outdated and inconsistent with the *General Plan*.

8.6 COUNTY ZONING DISTRICT

The Project is situated in a property zoned A-1a, Agricultural. The height limit in the Agricultural district is 35 feet for any residential structure and 45 feet for all other structures. Based on the size and scope of the Project, a State Land Use Boundary Amendment from Agricultural to Urban is required. Upon approval from the State Land Use Commission, an application for a Change of Zone from Agricultural (A-1a) to a non-agricultural zoning district can be submitted to the Hawai'i County Planning Commission. Final decision of the Change of Zone is made after a recommendation from the Planning Commission is forwarded to the Mayor's Office. With a Change of Zone, the height limit may change and Plan Approval would be required prior to the construction or installation of any new structure or development.

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UNIVERSITY OF HAWAI'I HILO

9.0 Alternatives to the Proposed Action

9.0 ALTERNATIVES TO THE PROPOSED ACTION

In compliance with the provisions of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 11-200-17(f), the "known feasible" alternatives to the proposed Project are limited to those that would allow the objectives of the Project to be met, while minimizing potential adverse environmental impacts.

9.1 "NO-ACTION" ALTERNATIVE

The "no-action" alternative would involve no changes to the existing vacant property in the foreseeable future. The "no-action" alternative would not be consistent with stated governmental policies (*General Plan*, Land Use Pattern Allocation Guide Map) of establishing the property for University Use and as an Urban Expansion area. The "no-action" alternative would not create the overall positive economic impacts to the Hilo area, East Hawai'i, and the County of Hawai'i. Under this scenario, the Project site would remain undeveloped and essentially retain its existing environmental setting, and future development at the Hawai'i CC Manono Campus would continue to be constrained by the size and configuration of the site.

9.2 ALTERNATIVES REQUIRING ACTIONS OF A SIGNIFICANTLY DIFFERENT NATURE WHICH WOULD PROVIDE SIMILAR BENEFITS WITH DIFFERENT ENVIRONMENTAL IMPACTS

Two main objectives essentially drive the proposed Project. In order to build upon the economic and educational synergy created between the University, the research facilities at University Park, and the community, the UHH is planning to expand University Park onto currently undeveloped State lands mauka of the existing University Park. The other objective is to build a permanent campus for Hawai'i CC. There are no known actions of a significantly different nature that could provide similar benefits, other than expanding University Park on State land elsewhere in Hilo or rebuilding Hawai'i CC at Manono Campus. These alternatives are unacceptable, as facilities scattered around Hilo would be inconvenient to UHH students and faculty, and the Hawai'i CC Manono Campus sits on a significantly smaller property than is proposed by the Project.

9.3 *ALTERNATIVES RELATED TO DIFFERENT DESIGNS OR DETAILS OF THE PROPOSED ACTIONS WHICH WOULD PRESENT DIFFERENT ENVIRONMENTAL IMPACTS*

Originally, the proposed new Hawai'i CC campus site was selected during the course of the *Hawai'i Community College Long Range Development Plan* (LRDP) (~~1996~~Appendix H). Various locations within the State property were studied and the southern portion was selected in the LRDP, leaving the northern portion for the University Park Expansion. The University Park Expansion is easily accessible by the extension of Nowelo Street, which is the main collector for the existing University Park and connects further east to the UHH campus.

9.4 *ALTERNATIVE OF POSTPONING ACTION PENDING FURTHER STUDY*

While further study is often advantageous, the expansion of University Park and relocation of Hawai'i CC onto the subject property is logical and consistent with stated governmental policies (*General Plan*, Land Use Pattern Allocation Guide Map) of establishing the property for University Use and as an Urban Expansion area.

9.5 *ALTERNATIVE LOCATIONS FOR THE PROPOSED PROJECT*

~~As previously noted, a~~Alternative locations for the proposed Project were considered and, following extensive analysis, have been rejected. Expanding University Park on State land elsewhere in Hilo would be inconvenient for students and faculty at UHH. Rebuilding Hawai'i CC at Manono Campus is ~~probably~~ not ~~be~~ feasible, as the site is too small~~er~~ and would ~~likely~~ require construction of multi-story buildings and on-site parking structures to accommodate off-street parking.

In June 1997, the Hawai'i County Council adopted Resolution No. 75-97 in support of the relocation of Hawai'i CC to Downtown Hilo. The State of Hawai'i Legislature then appropriated funds to the University of Hawai'i for a feasibility study on the downtown relocation proposal. The *Hawaii Community College Downtown Relocation Analysis* (1998) evaluated downtown building conditions (i.e., construction type, age, parking facilities, building accessibility to meet ADA requirements, general current use, and ownership) and infrastructure facilities. The report provided a recommended plan and studied the impacts of the plan and required infrastructure improvements. It also identified alternative plans, including increasing the density of development at the Hilo Hotel site or using more remote sites (i.e., the old supermarket site at the corner of Ponahawai and Kilauea Streets).

However, the University of Hawai'i decided not to relocate Hawai'i CC to Downtown Hilo due to the cost of renovating old facilities not designed for educational programs. While the study found that there is more than adequate square footage in Downtown Hilo to accommodate the needs of the future campus, many of the buildings would have to either be renovated (for structural, educational, fire protection, or ADA accessibility reasons) or demolished and replaced with new buildings (and the land under these buildings would have to be acquired). The study found that 277,999 square feet distributed among 17 buildings were usable but would need to be renovated, and 14 buildings would have to be demolished and replaced with approximately 10 new buildings providing approximately 191,383 square feet.

In addition, parking in the old Downtown area would be heavily impacted. While the introduction of students to the area would generate more business to this commercial area, many businesses would suffer because they do not provide off-street parking and their customers rely on on-street parking. As a result of the lack of parking, the study recommended that five, two-story parking structures and one three-story parking structure would need to be built to accommodate the off-street parking requirements of the Hawai'i CC campus in Downtown Hilo. An additional three surface parking lots would also have to be constructed. The plan indicated that there are traffic circulation issues that would require the installation of two new traffic signals and modifications at these intersections.

Due to these findings, and the fact that the Hawai'i CC campus would be located away from the synergy created by UHH and University Park, the Hawai'i CC decided that relocation to the proposed Komohana Campus site would be more advantageous to the institution.

9.6 ALTERNATIVES THAT DO NOT MEET THE PROJECT OBJECTIVE

Alternative land uses, including residential, commercial, industrial, agricultural, park, open space, and resort, do not meet the Project objectives of expanding University Park and building a new Hawai'i CC campus.

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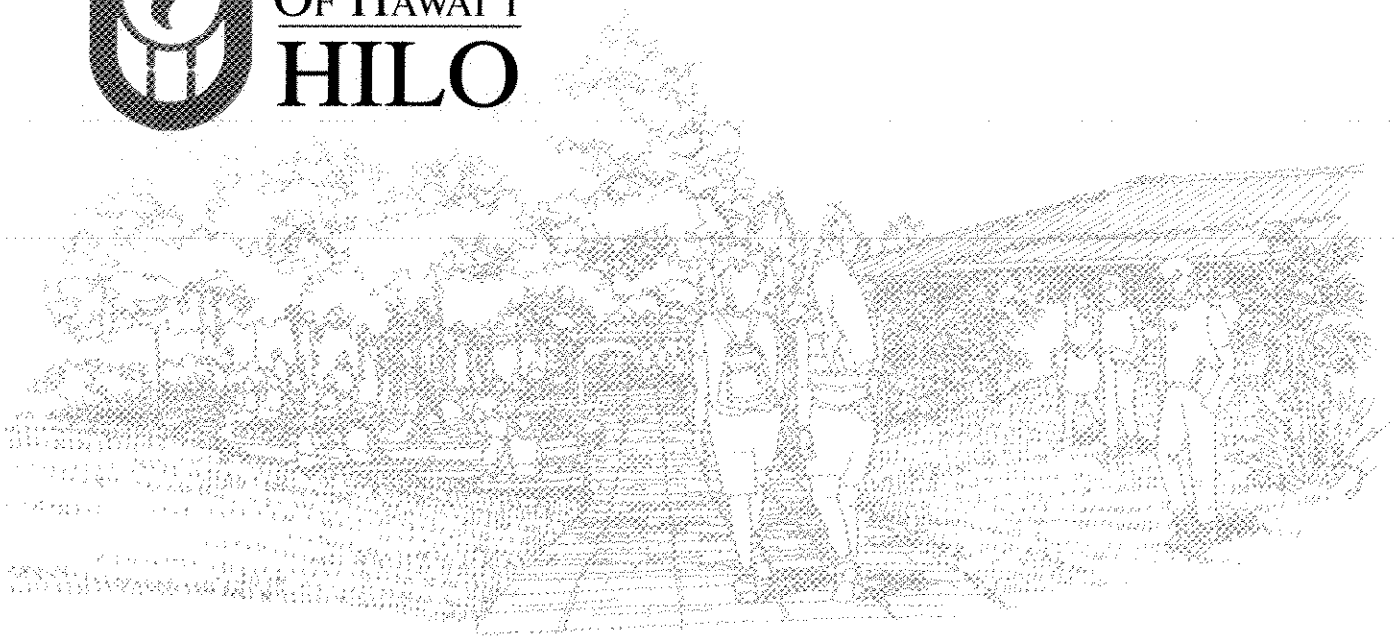
UNIVERSITY OF HAWAI'I HILO



10.0 Relationship Between Local Short-Term Uses of Humanity's Environment and the Maintenance of Long-Term Productivity

10.0 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF HUMANITY'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

As discussed in previous sections of this ~~D~~EIS, the Project area consists entirely of vacant land. Other than the development proposed by the Project, no changes to the property's current use are in the foreseeable future. Allowing the property to remain as vacant land (the "No Action" alternative) would not be consistent with the State policies (*General Plan*, Land Use Pattern Allocation Guide Map) to establish the land as an Urban Expansion area for University Use. Long-term productivity would be minimal if the property continued as vacant land, and the Hilo area, East Hawai'i, and the County of Hawai'i would not experience the overall positive economic impacts discussed throughout this ~~D~~EIS.

Long-term impacts from continuing the vacancy of the property include the UHH University Park remaining at its current size and the Hawai'i CC remaining at its current locations, the Manono Campus and sharing facilities at the UHH campus. The Hawai'i CC would continue to share facilities and services with the UHH, although the Hawai'i CC LRDP separated the schools into two distinct entities. Without the Project, shared facilities and services would be further strained with student enrollments expected to increase. Students and faculty would continue to study and work in facilities unaccommodating to the size of their programs. Research facilities would not be constructed and therefore would not provide employment and economic benefits to students and Hawai'i residents. Short-term construction of the Project would not occur and construction-related jobs would not be created. Subsequently, industries supporting construction or servicing construction workers (restaurant and retail industries) would not benefit economically.

Studies performed in preparation of this ~~D~~EIS indicate that the Project would not adversely affect the existing environment. The physical attributes of the property are appropriate for the land uses proposed. Short-term construction impacts can be mitigated as they occur, and long-term land uses will generate substantial economic benefits and environmental effects that can be positive if proposed mitigation measures are implemented.

The Project is expected to have significant fiscal and economic impacts on both the County and State of Hawai'i. Short-term uses of environmental resources to develop and construct the Project would promote long-term productivity through employment and increased income and tax revenues. The Project will not foreclose future options, narrow the range of beneficial uses, or pose long-term risks to health or safety.

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UNIVERSITY OF HAWAI'I HILO

11.0 Unavoidable Environmental Impacts and Rationale for Proceeding with the Project

11.0 UNAVOIDABLE ENVIRONMENTAL IMPACTS AND RATIONALE FOR PROCEEDING WITH THE PROJECT

11.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The implementation of the proposed *University of Hawai'i at Hilo University Park Expansion Master Plan (Draft)* (Appendix G) and the *Hawai'i Community College Long Range Development Plan ~~Update~~*(Appendix H) would result in the irreversible and irretrievable commitment of certain natural and fiscal resources.

Major resource commitments include the 267-acre property and State funds for construction materials, labor, non-renewable resources, and energy to complete the Project. Operation and maintenance of the Project would increase the use of public infrastructure, including water, wastewater collection and treatment, drainage, solid waste collection and disposal, and transportation facilities. Electrical and communication facilities would experience an increase in use, and the Project also has the potential to indirectly impact recreational, medical, and educational facilities by creating jobs and slightly increasing the Hilo area population. The additional students and employees brought by the Project may at times require police and fire protection services.

The irreversible and irretrievable commitments of resources discussed above do not reflect the positive social and economic benefits offered by the Project and the consequences of leaving the property in its current state. Due to the policies of establishing the property as an Urban Expansion area for University Use, the property cannot remain in its current unused condition. The "no-action" alternative is inconsistent with the objectives of the Project. Alternatives to siting the Project elsewhere on the Island of Hawai'i are inefficient. Although the Project would require a commitment of fiscal resources, it would also generate fiscal resources through employment opportunities and increased income and tax revenues.

11.2 PROBABLE ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

As with any development, soil erosion from wind and rain would likely occur during construction of the Project. Noise levels would increase above current conditions due to traffic volumes, mechanical equipment, and human activities on the property. Levels of water, energy, solid waste, and wastewater would also increase with the Project;

however, probable unavoidable environmental impacts can be mitigated through careful planning.

Land Use Character
Past land uses of the property include sugarcane, agriculture, and pasture activities. The property is currently designated by the State Land Use Commission for agricultural land use, and the Project would require a SLUDBA to allow for urban land use, in keeping with the County General Plan designation for the property (University, Urban Expansion).

Visual Resources
In the immediate vicinity of the Project, views of proposed research facilities would inevitably create a visual impact. However, an area surrounding the property would be left undeveloped to serve as a buffer between facilities and surrounding streets. Normally, outdoor lighting could unavoidably generate increased light sources, possibly affecting the astronomical observatories on Mauna Kea. The design of facilities would be developed in compliance with County Ordinance Number 88-122 and include measures to minimize potential undesirable light effects. The Project is not expected to alter either coastal views from mauka residential areas or mauka views from shoreline areas. Views of Mauna Kea, Mauna Loa, and the coastline may be created from within the property, which is currently inaccessible to the public.

Transportation
The Project proposes the extension of Nowelo and Pū'ainakō Streets, as well as the construction of entries, internal roads, and pedestrian and bicycle paths for the University Park Expansion facilities and the Hawai'i CC campus. Construction of the Project would create short-term traffic impacts by increasing the number of vehicles on roadways. Traffic generated by the Project would be accommodated by transportation improvements occurring over several years as various phases of the Project are completed. Pedestrian and bicycle paths between proposed facilities would encourage alternatives to vehicular transportation.

Solid Waste
The Project would inevitably generate solid waste during construction and operation. Selected designers and contractors will be instructed to provide a job-site recycling plan for construction wastes and to use products with recycled content, where feasible. The Project will incorporate provisions for recycling similar to those implemented at the UHH. Solid waste that cannot be recycled will be disposed in the County's landfills.

Electrical Power
New research facilities and a new campus developed for the Project would increase the demand for electrical power. HELCO currently has adequate generation capacity to serve the proposed developments; however, the Komohana Substation transformation capacity must be increased to accommodate this demand. An additional 69- to 12.47-kV

substation transformer and associated equipment must be added at Komohana Substation. Plans for the development will consider energy efficient and conservation features to reduce peak electrical demands, as discussed in Section 7.1.

Air Quality
Short-term construction activities would inevitably create fugitive dust. Exhaust emissions from stationary and mobile construction equipment, traffic disruption, and workers' vehicles may occur to a lesser extent. Construction would comply with Hawaii Administrative Rules on fugitive dust, and a dust control management plan would be developed to mitigate these impacts.

Noise
Short-term noise impacts would occur during the construction phase of the Project as a result of excavation, grading, and construction activities. Potential long-term impacts on the acoustical environment are associated with traffic and on-site equipment. Design of the Project would include measures to mitigate noise during construction and operation, which should not pose a significant noise impact due to the nature of the research and academic activities involved.

11.3 RATIONALE FOR PROCEEDING WITH THE PROJECT

In light of the aforementioned unavoidable environmental effects, the Project should be developed as the relatively minor negative impacts will be offset by the following substantial positive impacts.

- The Project will comply with County policies to establish the land as an Urban Expansion area for University Use.

- No threatened or endangered species, or species of concern, have been identified on the property. Botanical resources present on the property can be found elsewhere in Hilo and Puna districts. Existing and other native plants will be transplanted and/or incorporated in the landscape wherever possible. A natural area surrounding the property will serve as a buffer to preserve views of the site.

- No threatened or endangered species or native forest birds have been identified on the property. Most of the species present have been introduced and are harmful to native species. Nearby natural and on-site landscaped areas will provide a similar habitat for the displaced species.

- Although the assessment of archaeological resources made no recommendations for site preservation, a preservation area will be designated to enable the largest concentration of historical features to remain in place.

- Assessments have not identified impacts to traditional and cultural practices.

- Bicycle lanes around and within the Project will encourage the use of bicycles as an alternate mean of transportation.

- Development and construction of the Project are expected to have significant positive fiscal and economic impacts. Construction-related and operational employment opportunities will increase County and State income and tax revenues as jobs are filled by Hawai'i residents. The Project will support industries related to construction and those servicing its laborers (retail and restaurant).

- Specific measures would be employed to mitigate potential adverse environmental impacts in the design, construction, and long-term operation of the Project.

11.4 UNRESOLVED ISSUES

Presently, there are no known unresolved issues associated with the Project.

UNIVERSITY OF HAWAI'I
HILO

12.0 List of Preparers

12.0 LIST OF PREPARERS

This ~~DEIS~~FEIS has been prepared by PBR HAWAII, 1001 Bishop Street, ASB Tower, Suite 650, Honolulu, Hawai'i, 96813. The following lists the staff involved in the preparation of this document.

Vincent Shigekuni	Principal
Lacey Kazama	Planner
Etsuyo Kila	Planner/GIS Analyst
Vivaswan Verawudh	Planner/GIS Analyst
Kanai'a Nakamura	Graphic Designer
Chris Chavez	Graphic Designer
Dionne Talia	Administrative Assistant
Gretchen Tomas	Administrative Assistant
Jeanne Sumait	Administrative Assistant

Several key technical consultants were employed to provide specific assessments of environmental factors for this project. These consultants, their company affiliation, and their specialty are listed below.

Name	Firm	Area of Expertise
Winona P. Char	Char & Associates	Botanical Studies
Glenn Escott	Scientific Consultant Services, Inc.	Archaeological Studies
James E. Hallstrom, Jr.	The Hallstrom Group, Inc.	Economic/Fiscal Research
Thomas W. Holliday	The Hallstrom Group, Inc.	Economic/Fiscal Research
Julian Ng	Julian Ng, Inc.	Traffic Impact Assessment
Tim J. Ohashi		Faunal Studies
Doraine Young	Engineering Concepts, Inc.	Civil Engineering

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UNIVERSITY OF HAWAI'I HILO

13.0 REFERENCES

13.0 REFERENCES

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UNIVERSITY OF HAWAI'I
HILO

14.0 Comments on the Environmental Impact Statement Preparation Notice and Responses

14.0 COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE AND RESPONSES

Consultation with various government agencies has been conducted for this Project in preparation for ~~this~~the DEIS. Solicitation letters were distributed to several agencies in order to obtain their input and comments on the Project and to identify issues that should be addressed.

~~*14.1 DEIS CONSULTATION*~~

~~Consultation with various Federal, State, and County government agencies was conducted to obtain comments and concerns associated with the Project as part of the environmental impact statement process.~~ The EISPN was sent to the following parties for review in September 2003 and/or they obtained a copy through other means (libraries, etc.). The public comment period was from September 23, 2003 to October 23, 2003. Those providing written responses are identified in bold. Comments from and responses to these agencies follow.

Federal Agencies

- Army Corps of Engineers
- Department of the Interior, Fish and Wildlife Service

State of Hawai'i Agencies

- Department of Business, Economic Development & Tourism
- **Department of Business, Economic Development & Tourism, ~~Energy, Resources & Technology~~Strategic Industries Division**
- Department of Business, Economic Development & Tourism, Office of Planning
- ~~Department of Education~~
- Department of Health
- **Department of Health, Solid and Hazardous Waste Branch**
- **Department of Health, Wastewater Branch**
- **Department of Health, Noise, Radiation & IAQ Branch**
- Department of Land and Natural Resources
- Department of Land and Natural Resources, Historic Preservation Division
- **Department of Land and Natural Resources, Engineering Division**
- **Department of Land and Natural Resources, Division of Forestry and Wildlife**

- **Department of Land and Natural Resources, Commission on Water Resource Management**
- Department of Land and Natural Resources, Office of Conservation and Coastal Lands
- **Department of Land and Natural Resources, Land Division~~—Hawai'i District Office~~**
- **Department of Transportation**
- Office of Environmental Quality Control
- ~~**Office of Hawaiian Affairs**~~
- ~~Office of Planning~~
- University of Hawai'i Environmental Center

County of Hawai'i Agencies

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

Elected Officials

- U.S. Senator Daniel Inouye
- U.S. Representative Ed Case
- State Representative Jerry Chang
- State Representative Dwight Takamine
- State Representative Eric Hamakawa
- State Senator Russell Wayne
- Hawai'i County Councilmember James Arakaki

Private

- Hawaii Electric Light Company, Inc.
- Hawaii Tribune Herald
- Honolulu Advertiser
- Honolulu Star-Bulletin
- Verizon Hawaii
- West Hawaii Today
- Sunrise Estates Subdivision Community Association
- GMO-Free Maui

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ECONOMIC DEVELOPMENT & TOURISM

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FAX: (808) 587-3828

October 23, 2003

Mr. Vicent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop St.
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

Subject: University of Hawaii at Hilo Mauka Lands Master Plan
South Hilo, Hawaii
Tax Map Key: 2-4-001: 122

Thank you for the opportunity to provide comments on the Environmental Impact Statement Preparation Notice (EISPN for the expansion of UHH University (Research) Park and proposed Hawaii Community College Komohana campus. We would like to call your attention to: (1) State energy conservation goals, (2) energy saving design practices and technologies, and (3) recycling and recycled-content products.

1. **State energy conservation goals.** Project buildings, activities, and site grounds should be designed 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.

We would also like to call your attention to Administrative Directive No. 98-03 "Policy Governing the Use of Solar Water Heating Systems for State Facilities." This Directive requires that:

> All plans and designs for new or renovated facilities using state funds or located on state land and incorporating the use of hot water shall include a comparative analysis to determine the cost-benefit of using a conventional water heating system or a solar water heating system. The analysis shall be based on the projected life-cycle costs to purchase and operate the water heating systems. If the life-cycle analysis is positive, the facility shall incorporate solar water heating. If water heating entirely by solar is not cost-effective, the analysis shall also evaluate the life-cycle, cost-benefit of solar water heating for preheating water. Each Department shall be responsible for conducting an analysis for every facility that provides hot water.

We recommend that you consult the Hawaii County Energy Code early on in your project. Hawaii Electric Light Co., Inc may also have demand-side management programs that offer rebates for installation of energy efficient technologies.

2. **Energy saving design practices and technologies.** We recommend that energy efficient design practices and technologies be specifically addressed. Some of the methods and technologies that could be considered, as appropriate, include:

- Use of natural ventilation to increase comfort of occupants;
- Maximum use of natural lighting without heat gain;
- Use of high efficiency compact fluorescent lighting;
- Use of insulation/radiant barrier for an equivalent R-19 value in ceiling; use of ceiling fans; and
- Us of landscaping for dust control and to minimize heat gain to area.

3. **Recycling and recycled-content products.**

- Develop a job-site recycling plan for construction and recycle as much construction and demolition waste as possible;
- Incorporate provisions for recycling into the project – a collection system and space for bins for recyclables; and
- Specify and use products with recycled content such as: steel, concrete aggregate fill, drywall, carpet and glass tile.

Please refer to the enclosed *Guidelines for Sustainable Building Design In Hawaii: A planner's checklist* and *A Contractor's Waste Management Guide"* for additional information.

Sincerely,

Maurice H. Kaya
Chief Technology Officer

Enclosures

C: OEQC
Lo-Li Chih, UHH

PBR HAWAII

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LANDSCAPE ARCHITECTURE
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October 6, 2004

Mr. Maurice H. Kaya
Chief Technology Officer
State of Hawaii
Department of Business, Economic Development & Tourism
Strategic Industries Division
235 South Beretania Street
Leiopapa A Kamehameha Building, Fifth Floor
Honolulu, Hawaii 96813

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Kaya:

Thank you for your letter dated October 23, 2003. We are providing the following responses to your comments concerning energy conservation and recycling:

1. State Energy Conservation Goals:

   a. The project will comply with applicable provisions of Hawaii Revised Statutes, Chapter 344 "State Environmental Policy" and Chapter 226 "Hawaii State Planning Act". Project buildings, activities, and site grounds will be designed with energy-saving considerations, and the project will be consistent with the State objective to promote cost-effective energy conservation through the adoption of energy-efficient practices and technologies.

   b. Requirements of Administrative Directive Number 98-03, "Policy Governing the Use of Solar Water Heating Systems for State Facilities" will be met by the project.

      A discussion of the project's compliance with these provisions will be included in the Draft Environmental Impact Statement (DEIS).

   c. The Hawai'i County Energy Code will be consulted, and recommendations for consultation with HELCO for demand-side management programs offering rebates for installation of energy efficient technologies will be seriously considered.

2. Energy-Saving Design Practices and Technologies:

   Recommendations for discussion of energy-efficient design practices and technologies will be included in the DEIS. Suggested methods and technologies include:
   - Use of natural ventilation to increase comfort of occupants;
   - Maximum use of natural lighting without heat gain;
   - Use of high efficiency compact fluorescent lighting;
   - Use of insulation/radiant barrier for an equivalent R-19 value in ceiling;
   - Use of ceiling fans;

   - Use of landscaping for dust control and to minimize heat gain to area.

3. Recycling and Recycled-Content Products:

   The selected contractors will be instructed to provide a job-site recycling plan for construction waste and to use products with recycled content, where feasible. The project will incorporate provisions for recycling.

4. *Guidelines for Sustainable Building Design in Hawaii: A planner's checklist*, and *A Contractor's Waste Management Guide* enclosed with your letter has been provided to both the UHH and Engineering Concepts, Inc.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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LINDA LINGLE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
EMD/SHWB

October 31, 2003 S1030LO

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Dear Mr. Shigekuni:

SUBJECT: EISP Notice for University of Hawaii at Hilo
Mauka Lands Master Plan, TMK: 2-4-001:122

Thank for the opportunity to offer comments on the above cited document. Your request has been reviewed by the Hazardous Waste, Underground Storage Tank, and Solid Waste Programs within the Solid and Hazardous Waste Branch.

We have no comments to offer at this time.

Sincerely,

STEVEN Y.K. CHANG, P.E., CHIEF
Solid and Hazardous Waste Branch

c: Office of Environmental Quality Control

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

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Executive Vice-President

VINCENT SHIGEKUNI
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JAMES LEONARD, AICP
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Hilo Office

GRANT MURAKAMI, AICP
Senior Associate

TOM SCHNELL, AICP
Associate

RAYMOND T. HEIA, ASLA
Associate

KEVIN NISHIKAWA, ASLA
Associate

Honolulu Office
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813-3484
Tel: (808) 521-5631
Fax: (808) 523-1402
E-Mail: vshigekuni@pbrhawaii.com

Hilo Office
101 Aupuni Street
Hilo Lagoon Centre, Suite 310
Hilo, Hawaii 96720-4262
Tel: (808) 961-3333
Fax: (808) 961-3065
E-Mail: jleonard@pbrhawaii.com

Wailuku Office
2145 Kaohu Street
Wailuku, Hawaii 96793-1609
Tel: (808) 242-1955
Fax: (808) 242-1956
E-Mail: pbrwailuku@pbrhawaii.com

October 6, 2004

Mr. Steven Y.K. Chang, P.E.
Chief
State of Hawaii
Department of Health
Solid and Hazardous Waste Branch
P.O. Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Chang:

Thank you for your letter dated October 31, 2003 (your reference number S1030LO). We note that the EISPN has been reviewed by the Hazardous Waste, Underground Storage Tank, and Solid Waste programs, and we acknowledge that the Solid and Hazardous Waste Branch has no comments to offer at this time.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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LINDA LINGLE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
EMD / WB

October 6, 2003

H2 4 001 122 eispn.wpd
WP9 030872

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

Subject: Environmental Impact Preparation Notice (EISPN)
University of Hawaii at Hilo
Mauka Lands Master Plan
Hilo, Hawaii
TMK: (3) 2-4-001: 122 267.030 acres

We have reviewed the subject EISPN document which proposes to expand the University Park research facilities in Hilo, Hawaii. The proposed expansion of the University Park encompasses approximately 118 acres of the 267-acre site.

As the project is located within the County sewer service system, we have no objections to the proposed project as long as the project is connected to the Hilo Wastewater Treatment Plant.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at 586-4294.

Sincerely,

HAROLD K. YEE, P.E., CHIEF
Wastewater Branch

LNK:erm

c: Office of Environmental Quality Control

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

WM. FRANK BRANDT, FASLA
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EXECUTIVE VICE-PRESIDENT

VINCENT SHIGEKUNI
PRINCIPAL

JAMES LEONARD, AICP
PRINCIPAL
HILO OFFICE

GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

RAYMOND T. HIGA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

HONOLULU OFFICE
1001 BISHOP STREET
ASB TOWER, SUITE 650
HONOLULU, HAWAII 96813-3484
TEL: (808) 521-5631
FAX: (808) 523-1487
E-MAIL: [illegible]

HILO OFFICE
[illegible]

WAILUKU OFFICE
[illegible]

October 6, 2004

Mr. Harold K. Yee, P.E.
Chief
State of Hawaii
Department of Health
Wastewater Branch
P.O. Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Yee:

Thank you for your letter dated October 6, 2003 (your reference number WP9 030872). We note that the Wastewater Branch has no objections to the proposed project, so long as it is connected to the Hilo Wastewater Treatment Plant. We appreciate your comments regarding wastewater plans in conformance to the Department of Health Administrative Rules. Please be assured that the Draft Environmental Impact Statement will include:

1. Discussion of the project site's connection to the Hilo Wastewater Treatment Plant;
2. Acknowledgement of the Department of Health's right to review the detailed wastewater plans for conformance with these rules.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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LINDA LINGLE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
File:

October 2, 2003

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Dear Mr. Shigekuni:

SUBJECT: **Comments to the Environmental Impact Statement Preparation Notice University of Hawaii at Hilo Mauka Lands Master Plan South Hilo, Hawaii Tax Map Key 2-4-001: 122**

Our comments should be printed as follows:

"Project activities shall comply with the Administrative Rules of the Department of Health:

- Chapter 11-46 Community Noise Control.

Should there be any questions, please contact me at 586-4701.

Sincerely,

Russell S. Takata
Program Manager
Noise, Radiation & IAQ Branch

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

WM. FRANK BRANDT, FASLA
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PRINCIPAL

JAMES LEONARD, AICP
PRINCIPAL
HILO OFFICE

GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

RAYMOND T. HIGA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

HONOLULU OFFICE
[illegible]

HILO OFFICE
[illegible]

PORTLAND OFFICE
[illegible]

October 6, 2004

Mr. Russell S. Takata
Program Manager
State of Hawaii
Department of Health
Noise, Radiation & IAQ Branch
P.O. Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Takata:

Thank you for your letter dated October 2, 2003. Please be assured that the Draft Environmental Impact Statement will include the following statement:

> "During the EISPN public review period, the State Department of Health, Noise, Radiation and IAQ Branch wrote that project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46, Community Noise Control."

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

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LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 24, 2003

UHHIOPR.RCM

LD-NAV

Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

Subject: Draft Environmental Assessment - TMK: (3) 2-4-001: 122
University of Hawaii at Hilo Mauka Lands Master Plan

Thank you for the opportunity to review and comment on the subject matter.

The Department of Land and Natural Resources' (DLNR) Land Division made available or distributed a copy of the document pertaining to the subject matter to the following DLNR Divisions for their review and comment:

- Division of Forestry and Wildlife
- Engineering Division
- Commission on Water Resource Management
- Office of Conservation and Coastal Lands
- Land-Hawaii District Land Office

Attached is a copy of the Commission on Water Resource Management and Engineering Division comments. The Department of Land and Natural Resources has no other comment to offer.

If you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 1-808-587-0384.

Very truly yours,

DIERDRE S. MAMIYA
Administrator

C: HDLO

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

ERNEST Y.W. LAU
DEPUTY DIRECTOR - WATER

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COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
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LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 22, 2003

LD/NAV
Ref.: UHHILOPBR.CMT

Suspense Date: 10/15/03

MEMORANDUM:

TO:
- Division of Aquatic Resources
- XXX Division of Forestry & Wildlife
- Na Ala Hele Trails
- Division of State Parks
- XXX Engineering Division
- Division of Boating and Ocean Recreation
- XXX Commission on Water Resource Management
- XXX Office of Conservation and Coastal Lands
- XXX Land-Hawaii District Land Office

RECEIVED
LAND DIVISION
2003 OCT -7 A 8:43
DEPT OF LAND & NATURAL RESOURCES
STATE OF HAWAII

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment
Project: University of Hawaii at Hilo Mauka Lands Master Plan
Consultant: PBR Hawaii
TMK: (3) 2-4-001: 122

Please review the attached document pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date.

If you have any questions, please contact Nicholas A. Vaccaro at ext.: 7-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Division: Engr.

Signed: Eric Hirano

Date: 10/3/03

Name: Eric Hirano

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/NAV

Ref.: UHHILOPBR-CMT

COMMENTS

(✓) We confirm that the project site is located in Zones X and A.

( ) Please note that the project site is located in Zone _____.

( ) Please note that the correct Flood Zone designation for the project site is _____.

(✓) Please note that the project must comply with rules and regulations of the National Flood Insurance Program (NFIP), whenever work is required within a flood zone. If there are questions regarding the NFIP, please contact the State Coordinator, Mr. Sterling Yong, of the Department of Land and Natural Resources at 587-0248. If there are questions regarding flood ordinances, please call the applicable County coordinators below:

( ) Mr. Robert Sumimoto at (808) 523-4254 or Mr. Mario Siu Li at (808) 523-4247 of the City and County of Honolulu, Department of Planning and Permitting.

(✓) Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works.

( ) Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning..

( ) Mr. Wallace Kudo at (808) 241-6620 of the County of Kauai, Department of Public Works

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

(✓) The applicant should provide the water demands and calculations to the Engineering Division. The water demands will be included in the State Water Projects Plan update.

( ) Additional Comments: _____

Should you have any questions, please call Mr. Andrew Monden of the Planning Branch at 587-0229.

Signed: Eric T. Hirano
ERIC T. HIRANO, CHIEF ENGINEER

Date: 10/3/03

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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DEPUTY DIRECTOR - WATER

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STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 22, 2003

LD/NAV
Ref.: UHHILOPBR.CMT

Suspense Date: 10/15/03

MEMORANDUM:

TO:
- Division of Aquatic Resources
- XXX Division of Forestry & Wildlife
- Na Ala Hele Trails
- Division of State Parks
- XXX Engineering Division
- Division of Boating and Ocean Recreation
- XXX Commission on Water Resource Management
- XXX Office of Conservation and Coastal Lands
- XXX Land-Hawaii District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

RECEIVED
LAND DIVISION
2003 OCT -3 P 4:15
DEPT OF LAND & NATURAL RESOURCES
STATE OF HAWAII

SUBJECT: Draft Environmental Assessment
Project: University of Hawaii at Hilo Mauka Lands Master Plan
Consultant: PBR Hawaii
TMK: (3) 2-4-001: 122

Please review the attached document pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date.

If you have any questions, please contact Nicholas A. Vaccaro at ext.: 7-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(X) We have no comments. ( ) Comments attached.

Division: _____

Date: SEP 25 2003

Signed: [signature]

Name: MICHAEL G. BUCK, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE

Ryn

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 22, 2003

LD/NAV
Ref.: UHHILOPBR.CMT

Suspense Date: 10/15/03

MEMORANDUM:

TO:
- Division of Aquatic Resources
- XXX Division of Forestry & Wildlife
- Na Ala Hele Trails
- Division of State Parks
- XXX Engineering Division
- Division of Boating and Ocean Recreation
- XXX Commission on Water Resource Management
- XXX Office of Conservation and Coastal Lands
- XXX Land-Hawaii District Land Office

03 SEP 23 P4:03

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment
Project: University of Hawaii at Hilo Mauka Lands Master Plan
Consultant: PBR Hawaii
TMK: (3) 2-4-001: 122

Please review the attached document pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date.

If you have any questions, please contact Nicholas A. Vaccaro at ext.: 7-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. (✓) Comments attached.

Division: CWRM Signed:

Date: 10/1/03 Name: Ryan Imata

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON

MEREDITH J. CHING
CLAYTON W. DELA CRUZ
JAMES A. FRAZIER
CHIYOME L. FUKINO, M.D.
STEPHANIE A. WHALEN

ERNEST Y.W. LAU
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

October 15, 2003

2003 OCT 16 A 9:39
RECEIVED
LAND DIVISION

TO: Ms. Dede Mamiya, Administrator
Land Division

FROM: Ernest Y.W. Lau, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Draft Environmental Assessment, University of Hawaii at Hilo Mauka Lands Master Plan

FILE NO.: UHHILOPBR.CMT

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[ ] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[X] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[ ] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[ ] OTHER:

If there are any questions, please contact Ryan Imata at 587-0255.

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

JM. FRANK BRANDT, FASLA
CHAIRMAN

THOMAS S. WITTEN, ASLA
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EXECUTIVE VICE-PRESIDENT

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PRINCIPAL
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GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

RAYMOND T. HIDA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

October 6, 2004

Ms. Diedre S. Mamiya
Administrator
State of Hawaii
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Ms. Mamiya:

Thank you for making the EISPN available to DLNR Divisions and for your letter dated October 24, 2003. We note that the EISPN has been reviewed by the Forestry and Wildlife and Engineering Divisions, the Commission on Water Resource Management, the Office of Conservation and Coastal Lands, and the Land Division – Hawaii District Office of the DLNR. We are providing the following responses to your comments.

1. The Division of Forestry and Wildlife is acknowledged as having no comments on the EISPN.

2. The Engineering Division's confirmation that the project site is located in Zones X and A is acknowledged. When work is required within a flood zone, the project will comply with rules and regulations of the National Flood Insurance Program (NFIP). Water demands, which will be included in the State Water Projects Plan update, and calculations will be provided to the Engineering Division.

3. As recommended by the Commission on Water Resource Management, coordination with the Land Division of the DLNR will take place to incorporate this project into the State Water Projects Plan.

4. The Land Division – Hawaii District Land Office and Office of Conservation and Coastal Lands appear to have no comments on the EISPN.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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LINDA LINGLE
GOVERNOR

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

RODNEY K. HARAGA
DIRECTOR

Deputy Director
BRUCE Y. MATSUI

IN REPLY REFER TO:
HWY-PS
2.1747

SEP 2 6 2003

Mr. Vincent Shigekuni
Principal
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Shigekuni:

Subject: University of Hawaii (UH) at Hilo Mauka Lands Master Plan Environmental Assessment (EA)

Our Highways Division has prepared the following supplement to our previous comments (STP 8.0856) for the EA.

1. A Traffic Impact Analysis Report (TIAR) should be submitted for our review and approval. The TIAR should recommend appropriate measures to mitigate traffic impacts to Puainako Street Extension intersections with Komohana Drive and the proposed main entrance to the new Hawaii Community College (HCC). The TIAR should also evaluate whether guardrails or other safety improvements are needed for UH property fronting the Puainako Street Extension.

2. The UH should coordinate with the County of Hawaii regarding plans for future connector roads.

3. The UH must provide channelization, street lighting, and signalization when warranted at the proposed HCC entrance driveway intersection with the Puainako Street Extension.

4. The EA should identify proposed improvements to accommodate safe bicycle and ADA conforming pedestrian access to and within UH property. We recommend that the UH provide appropriate bicycle and pedestrian improvements along the Puainako Street Extension fronting UH property.

HWY-PS 2.1747
SEP 8 6 2003

5. No additional surface water run-off will be allowed onto the Puainako Street Extension. Before initiating improvements that may affect surface water run-off onto our highway ROW, the UH must submit a drainage report with appropriate calculations for our review and approval.

6. Construction plans for all work within the right-of-way of the Puainako Street Extension must be submitted to our Hawaii District Office for review and approval.

If you have any questions, please contact Ronald Tauzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

for RODNEY K. HARAGA
Director of Transportation

Enclosure

HWY-P

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Acting Deputy Director
GLENN M. OKIMOTO

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

IN REPLY REFER TO:
DIR 1092
STP 8.0856

August 13, 2003

Mr. Vincent Shigekuni
Principal
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813-34384

Dear Mr. Shigekuni:

Subject: University of Hawaii at Hilo (UHH)
Mauka Lands Master Plan Environmental Assessment

Thank you for seeking our comments on the UHH Mauka Lands Plan. Our comments are as follows:

1. A Traffic Impact Analysis Report (TIAR) should be prepared covering an assessment of traffic generated from the project and on the surrounding streets. Of particular interest to us will be the impacts to State roads at the Komohana Street/Puainako Street intersection and on Puainako Street and its Extension. Traffic counts for the report should be done during and for regular UHH sessions.

2. Plans for any construction work within a State right-of-way must be submitted for our review and approval. These improvements should be at no cost to our department.

3. Our Highways Division is in the process of finalizing their comments for the subject project and we will provide those comments under separate cover as soon as they are available.

We appreciate the opportunity to provide comments.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

DS:km
c: HWY-P, STP(DS)

PBR HAWAII

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October 6, 2004

Mr. Rodney K. Haraga
Director of Transportation
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Haraga:

Thank you for your letters dated August 13 and September 26, 2003 (your reference numbers DIR 1092 STP 8.0856 and HWY-PS 2.1747). We are providing the following responses to your comments:

1. A Traffic Impact Assessment Report (TIAR) has been prepared and will be included in the Environmental Impact Statement. The TIAR recommended appropriate measures to mitigate traffic impacts on roads and intersections bordering the project. The need for guardrails and other safety improvements for the UHH property fronting the Pū'ainakō Street Extension will be determined during the design of the Hawai'i Community College (Hawai'i CC), which may not be developed until 2010. Traffic counts were conducted at the intersection of Komohana Street and Pū'ainakō Street during regular UHH sessions. The TIAR will be submitted to DOT for review and approval.

2. Plans for any construction work within the Pū'ainakō Street Extension State right-of-way will be submitted to DOT, Hawaii District Office, for review and approval.

3. UHH will coordinate with the County of Hawai'i regarding plans for future connector roads.

4. Channelization, street lighting, and signalization, when warranted, will be provided at the proposed Hawai'i CC entrance driveway intersection with the Pū'ainakō Street Extension.

5. The EIS will identify proposed accommodations for safe bicycle and ADA-conforming pedestrian access to and within the UHH property. Appropriate bicycle and pedestrian improvements along the Pū'ainakō Street Extension fronting the proposed Hawai'i CC campus will also be considered at the appropriate stage of the campus development.

6. No additional surface water run-off will be allowed onto the Pū'ainakō Street Extension. A drainage report with appropriate calculations will be submitted to DOT for review and approval before improvements that may affect surface water run-off onto highway ROW are initiated.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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Harry Kim
Mayor

Patricia G. Engelhard
Director

Pamela N. Mizuno
Deputy Director

County of Hawai'i
DEPARTMENT OF PARKS AND RECREATION
101 Pauahi Street, Suite 6 • Hilo, Hawai'i 96720
(808) 961-8311 • Fax (808) 961-8411

October 22, 2003

Vincent Shigekuni, Principal
PBR Hawai'i
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawai'i 96813-3484

Subject: University of Hawai'i at Hilo Mauka Lands Master Plan
Environmental Impact Statement Preparation Notice (EISPN)
TMK: 2-4-01:122

Dear Mr. Shigekuni

Thank you for allowing us the opportunity to review and comment on the proposed master plan pursuant to the EISPN and for inclusion of information in the EISPN to address the concerns sent you in response to the Environmental Assessment.

In direct response to the information provided in Section 7.2 RECREATIONAL FACILITIES, we offer the following. The development of the new campus and expansion of the University Park will undoubtedly result in the "in-migration of students, faculty and staff" as well as visitors and support personnel beyond that served by current University of Hawai'i facilities. That the persons expected to fill these roles are current residents of the County of Hawai'i is not necessarily germane to our concerns over the absence in the master plan of new, active recreational facilities. The two public parks located closest to the subject area and mentioned in the EISPN (Mohouli and Univeristy Heights) are, as identified by yourself, neighborhood parks. According to the County of Hawai'i's Recreation Plan (1974), neighborhood parks are intended to offer "minimum recreation facilities for the surrounding neighborhood area". The nine school sites referenced in the EISPN should not be considered opportunities for active public recreation as the State generally restricts their use to school related functions. The Ho'olulu Complex serves all residents of East Hawai'i (as well as the entire island) and is generally utilized for larger events and organized sports competitions. Additionally, the proposed development is further from the Ho'olulu Complex than the current Community College campus.

Our primary concern is the impact that the new development will have due to the expected influx and concentration of related users and the re-centralization of the University's development in closer proximity to existing neighborhood areas and how these will affect park sites, amenities and programs under the purview of our department. As mentioned in our response to the EA, we would be specifically interested in understanding the purpose and scope of the community college, its target enrollment, projected demographics, etc. and receiving similar information for the University Park expansion.

We strongly support the development of the "bicycle link", referenced in section 2.5 and depicted in Figure 3, connecting the pedestrian court in the proposed University Park expansion to the proposed campus site and the PBARC site. However, there is no reference made to developing bicycle paths or bicycle related amenities in the development of the proposed campus, the interior roadway improvements or in linking the new developments with the existing campus and University Park. The bicycle link appears to be strictly internal to the proposed University Park expansion site. It is our recommendation that sincere consideration be applied to the development of bicycle paths linking internal facilities/sites with external sites and routes. We also recommend investigating the County of Hawai'i's, The Bikeway Plan (1979) and referencing the Bike Plan Hawai'i (2003) master plan for the State of Hawai'i, currently in draft form, developed by the Department of Transportation, Highways Division for useful information in developing bicycle-friendly routes. Also, we recommend a copy of the EIS be sent for review of the Hawai'i County Bicycle/Pedestrian Advisory Committee (Attn: Ron Reilly, Chairman), an advisory committee to the Mayor of the County of Hawai'i, in care of our department.

Please call our Staff Planner, James Komata at 961-8531 should you have any questions or wish to discuss our concerns in more detail.

Respectfully,

Patricia G. Engelhard
Director

Copy: Office of Environmental Quality Control
Mr. Lo-Li Chih, University of Hawai'i at Hilo

PBR HAWAII

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October 6, 2004

Ms. Patricia G. Engelhard
Director
County of Hawai'i
Department of Parks and Recreation
101 Pauahi Street, Suite 6
Hilo, Hawaii 96720

Attn: Mr. James Komata

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Ms. Engelhard:

Thank you for your letter dated October 22, 2003. We are providing the following responses to you comments:

1. The nine (9) school sites referenced in the EISPN will not be considered opportunities for active public recreation. Hawai'i Community College (Hawai'i CC) has no athletic or intramural programs, thus no need for playfields is anticipated. The nature of the development at the Hawai'i CC campus site and the expansion of University Park will be further discussed in the EIS to reflect their commercial and research-related facilities and unanticipated need for recreational facilities.

2. Information such as the purpose, scope, target enrollment, and projected demographics of Hawai'i CC and the expanded University Park will be provided in the EIS.

3. The development of bicycle paths linking internal facilities with external sites and routes, as well as bicycle-related amenities, will be addressed in the EIS. The County of Hawaii Bikeway Plan will be consulted and a copy of the EIS will be sent to the Hawaii County Bicycle/Pedestrian Advisory Committee.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact James Leonard in our Hilo office (961-3333) or myself at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: 0813.1345.12 EISPN\Responses to EISPN\Letter to DPR.doc

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

345 KEKUANAOA STREET, SUITE 20 • HILO, HAWAII 96720

TELEPHONE (808) 961-8050 • FAX (808) 961-8657

December 5, 2003

Mr. Vincent Shigekuni, Principal
PBR Hawaii
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, HI 96813

WATER AVAILABILITY
UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN
ENVIRONMENTAL ASSESSMENT
TAX MAP KEY 2-4-01:122

We have reviewed your letter of July 22, 2003, and have the following comments and conditions.

We anticipate that we will be able to provide water service to the subject development. However, we will need to know the calculated water usage for the completed project before final determination. Water usage calculations shall include all potential uses by the development. The calculated information should be prepared and submitted by an engineer, registered within the State of Hawai'i.

The new 1.0-million gallon tank (O/F elev. = 579.5 ft.) located near the subject property, close to the end of Puloku Street, will have to be online before your project is completed. The tank going online is dependent upon completion of the dedication and conveyance of all facilities and necessary easements to the Water Board of the County of Hawai'i from the State of Hawai'i.

Even when this new tank is on-line, some areas of your planned development may remain outside of our service zone. This would occur primarily at the higher elevations of the subject property area and would be most likely to happen during periods of high water demand. The new 1.0-million gallon tank mentioned above will add to system storage and based on available pressure from the tank, extend the service zone to an approximate elevation of 480 feet. Even so, during high-usage/high-flow conditions, water pressure at the upper elevations may be diminished. An Elevation Agreement with the Department acknowledging this condition will be required.

The proposed 1.0-million gallon Halekole tank (O/F elev. = 838 ft.), which is located at the current end of Halekole Street off Akolea Road, will eventually improve conditions. It will help extend the service zone to areas below an elevation of 738 feet and should boost the robustness of the water system in the project area.

Should you have any questions, please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at 961-8070.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

... Water brings progress...

PBR HAWAII

LAND PLANNING
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Raymond A. Young, ASLA
Associate Principals
Jesse K. Souki, AICP
Director
Thomas E. Schnell, AICP
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October 6, 2004

Mr. Milton D. Pavao, P.E.
Manager
County of Hawai'i
Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, Hawaii 96720

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Pavao:

Thank you for your letter dated December 5, 2003. We are providing the following responses to your comments:

1. A calculated water usage for the completed project will be submitted to DWS for its final determination of water service ability. Water usage calculations will include all potential uses by the development and will be prepared and submitted by an engineer registered within the State of Hawai'i.

2. An Elevation Agreement with DWS will acknowledge that even some areas of the development (primarily higher elevations during periods of high water demand) may remain outside of DWS' service zone.

3. We also understand that the proposed 1.0-million gallon Halekole tank will eventually improve diminished water supplies at higher elevations during high usage periods, extend the service zone to areas below an elevation of 738 feet, and boost the strength of the water system in the project area.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact James Leonard from our office in Hilo (961-3333) or myself at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Desmond K. Wery
Deputy Fire Chief

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 961-8297 • Fax (808) 961-8294

October 2, 2003

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Dear Mr. Shigekuni:

RE: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN
SOUTH HILO, HAWAII
TAX MAP KEY: 2-4-001: 122

This responds to your request for comments regarding the Environmental Impact Statement Preparation Notice for the above-referenced project.

We have no comments to offer at this time concerning this proposal.

Thank you for the opportunity to participate in the planning stages of the project.

Sincerely,

DARRYL OLIVEIRA
Fire Chief

RK:lk

cc: Office of Environmental Quality Control
University of Hawaii at Hilo

PBR HAWAII

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October 6, 2004

Mr. Darryl Oliveira
Fire Chief
Fire Department
County of Hawai'i
25 Aupuni Street, Suite 103
Hilo, Hawaii 96720

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Chief Oliveira:

Thank you for your letter dated October 2, 2003. We note that the Fire Department has no comments to offer at this time.

Thanks again for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact James Leonard from our office in Hilo (961-3333) or myself at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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Harry Kim
Mayor

Lawrence K. Mahuna
Police Chief

Harry S. Kubojiri
Deputy Police Chief

County of Hawaii
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September 30, 2003

Mr. Vincent Shigekuni, Principal
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
TAX MAP KEY: 2-4-001:122

This responds to your request for comments on the above-referenced environmental impact statement preparation notice. Staff offers the following suggestions/comments:

- Implementation of dust and debris control measures during all phases of development, more so during construction.
- Measures to control traffic during the construction phase with ingress/egress limited to one specific area to mitigate impact to traffic.
- Consideration for a left turn lane on Pu'ainako Street for traffic heading makai (east) that want to turn left into the main campus entry.
- Consideration for a right turn (deceleration) lane off Pu'ainako Street for vehicles turning right into the main campus entry.
- Consideration for traffic signal lights at Nowelo Street with Komohana Street, once developed.
- No left turn from Komohana Street into the secondary entry labeled as a "minor access."

- We also suggest the developer actively communicate with residents of Sunrise Ridge to mitigate their concerns.

Thank you for allowing us the opportunity to comment.

Should you require further assistance, please contact our South Hilo Patrol commander, Captain Larry Weber, at 961-2214.

Sincerely,

LAWRENCE K. MAHUNA
POLICE CHIEF

DAK:lll

PBR HAWAII

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October 6, 2004

Mr. Lawrence K. Mahuna
Police Chief
County of Hawai'i
Police Department
349 Kapiolani Street
Hilo, Hawaii 96720-3998

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Chief Mahuna:

Thank you for your letter dated September 30, 2003. We are providing the following responses to your comments:

1. Dust and debris control measures will be implemented during all phases of development, especially during construction.

2. The contractor(s) of major roadways within the proposed development will be instructed to limit ingress/egress to one specific area during construction.

3. A Traffic Impact Assessment Report (TIAR) has been conducted and will be included in the Environmental Impact Statement. The TIAR recommended a median left turn lane off Pū'ainakō Street for traffic heading makai into the main campus entrance.

4. At this time, it does not appear that a right turn deceleration lane off Pū'ainakō Street is warranted for traffic heading into the main campus entrance.

5. The TIAR determined that traffic signals at the intersection of Komohana Street and Nowelo Street will be warranted by peak hour traffic volumes.

6. The TIAR recommended that left turns in and out of the secondary entry at Komohana Street be prohibited.

7. A copy of the EISPN has been sent to the Sunrise Estates Community Association for their review and comment.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact James Leonard from our office in Hilo (961-3333) or myself at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
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August 29, 2003

Mr. Vincent Shigekuni
Principal
PBR Hawaii
1001 Bishop Street
ASB Tower, Suite 650
Honolulu HI 96813-3484

Dear Mr. Shigekuni:

Pre-Consultation on Environmental Assessment for
University of Hawaii at Hilo Mauka Lands Master Plan
TMK: 2-4-1:122 & 169

In response to your letter dated July 22, 2003, we have the following to offer for both parcels:

1. The Mauka Lands Master Plan consists of TMK: 2-4-1:122, containing 267.030 acres, and TMK: 2-4-1:169, containing 30.000 acres.

2. According to the General Plan Land Use Pattern Allocation Guide Map, the subject parcels are designated University, which allows for University and support community services.

3. The State Land Use designation is Agricultural.

4. County zoning is Agricultural (A-1a).

5. These parcels are not located within the County's Special Management Area.

The master plan consists of the USDA Pacific Basin Agricultural Research Center (PBARC) and the proposed University Park Expansion area, a new Hawaii Community College Campus and other future UHH expansion needs.

Based on the size and scope of the project, a State Land Use Boundary Amendment from Agricultural to Urban is required. Since the project area is over 15 acres in size, a petition for reclassification would be forwarded to the State Land Use Commission in Honolulu for their review.

Upon their approval, an application for a change of zone from Agricultural (A-1a) to an appropriate zoning, which would allow for all proposed uses can then be submitted to the Hawaii County Planning Commission. A recommendation from the Planning Commission is then forwarded through the Mayor's Office to the County Council for final decision.

Should you have questions, please feel free to contact Esther Imamura or Larry Brown of our Department at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

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Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
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September 28, 2003

Mr. Vincent Shigekuni
Principal
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu HI 96813-3484

Dear Mr. Shigekuni:

Environmental Impact Statement Preparation Notice
University of Hawaii at Hilo Mauka Lands Master Plan
TMK: 2-4-1:122

In response to the above referenced document submitted for our review, we have the following to offer:

1. In our letter dated August 29, 2003, we stated that the General Plan designation is University Use. We inadvertently did not include the Urban Expansion area along the western portion of the subject parcel. We apologize for this oversight.

2. The project site is zoned Agricultural (A-1a) by the County. The height limit in the Agricultural district is 35 feet for any residential structure and 45 feet for all other structures. With a Change of Zone to a non-agricultural zoning district, the height limit may also change. For example, the height limit in a commercial zone may be 30, 40 or 45 feet.

3. With a Change of Zone to a non-agricultural zoning district, Plan Approval would be required prior to the construction or installation of any new structure or development.

4. We note that public participation was limited to government agencies and public utility companies. Community groups and organizations should also be consulted.

We appreciate the opportunity to comment on the proposed project. If you have questions, please feel free to contact Esther Imamura or Larry Brown of our Department at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

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xc: Office of Environmental Quality Control w/copy of August 29, 2003 letter

PBR HAWAII

LAND PLANNING
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JAMES LEONARD, AICP
PRINCIPAL
HILO OFFICE

GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

RAYMOND T. HIGA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

October 6, 2004

Mr. Christopher J. Yuen
Planning Director
County of Hawai'i
Planning Department
101 Pauahi Street, Suite 3
Hilo, Hawaii 96720-3043

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Yuen:

Thank you for your letters dated August 29 and September 28, 2003. We are providing the following responses to your comments:

1. A State Land Use District Boundary Amendment from Agricultural to Urban is required and will be obtained.

2. The structural height limit for a non-agricultural zoning district will be followed.

3. Prior to the construction or installation of any new structure or development, Plan Approval will be obtained from the County of Hawai'i Planning Department.

4. A copy of the EISPN was distributed to the Sunrise Estates Community Association.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact James Leonard from our office in Hilo (961-3333) or myself at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

O:\JOB13\1345 12\EISPN\Responses to EISPN\Letter to HI County Planning Dept.doc

Hawaii Electric Light Company, Inc. • PO Box 1027 • Hilo, HI 96721-1027

October 17, 2003

PBR Hawaii
Attn: Mr. Vincent Shigekuni
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Gentlemen:

Subject: University of Hawaii at Hilo Mauka Lands
TMK: 2-4-001:122

Thank you for the opportunity to review the subject plans.

We do not have any objections to the subject application; however, have the following comments and requirements:

1. Section 7.1.1 Existing Electrical and Communication Facilities:

Paragraph 1 - HELCO's current system peak load is 177,900 KW and our total generation system capability is 233,700 KW. Our reserve margin is 31% and has adequate generation to serve the project.

Paragraph 2 - There are three levels of transmission voltages on the island of Hawaii, 69 kV, 34.5 kV, and 13.8 kV. The cross-island transmission lines are all energized at 69 kV however, one of the Kaumana to Keamuku transmission lines was constructed for 138 kV.

Paragraph 3 - 12.47 kV distribution lines are located along Komohana Street. In 1996, HELCO added a 10 Mva substation transformer at Komohana substation to increase the substation capacity to 17.5 Mva to serve existing loads in the area because the original 7.5 Mva transformer was overloaded. The Komohana substation was not upgraded to accommodate the load growth anticipated by the subject expansion. Currently the Komohana 10 Mva and the 7.5 Mva transformers are close to its rated capacity.

2. Section 7.1.2 Effects On Electrical and Communication Facilities:

Paragraph 1 - Although HELCO has adequate generation capacity to serve the subject loads the Komohana substation transformation capacity must be increased to accommodate the subject loads. An additional 69 Kv to 12.47 Kv substation transformer and associated equipment must be added at Komohana substation. In

addition, 12.47 Kv distribution lines are required to connect the new substation transformer to the subject new loads.

3. The project consultants and engineers are urged to contact HELCO's Engineering Department as soon as practicable to open a service request to insure timely procurement of long lead equipment. The service request include the calculation of the anticipated electrical demand and phasing schedule that are required to determine the final electrical requirements for this project. Hawaii Public Utilities Commission approval is required before the long lead items are ordered due to the anticipated HELCO expenditures exceeding $500,000.

4. Distribution line easements will be required from the substation to the project on-site and within the project location.

5. We strongly recommend that energy efficient and conservation features suitable to reduce the peak electrical demand are part of the development's plans. We recommend that this development take full advantage of waste heat recovery equipment to recycle and reuse the waste heat rejected by air conditioning and refrigeration equipment. If this equipment is incorporated in the development's original design, the amount of energy required will be substantially reduced.

6. A remote meter reading option is now available using the electrical lines as communication medium to a central master receiver at the substation. This option will require additional equipment in the HELCO meters and the substation. A cost estimate for this option may be requested from the Engineering Department.

Should you have any questions, please contact me at (808) 969-0321 or Hal Kamigaki at (808) 969-0322.

Sincerely,

Clyde H. Nagata, P.E.
Manager, Engineering Department

CHN:HK:ln

CC: Office of Environmental Quality Control
H. Kamigaki
M. Yamaki

PBR HAWAII

LAND PLANNING
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ASSOCIATE

RAYMOND T. HIGA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

HONOLULU OFFICE
1001 BISHOP STREET
ASB TOWER, SUITE 650
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TEL: (808) 521-5631
FAX: (808) 523-1402
E-MAIL: pbrhawaii@pbrhawaii.com

MAUI OFFICE
305 HIGH STREET
SUITE 104
WAILUKU, HAWAII 96793-2307
TEL: (808) 244-9069
FAX: (808) 244-9599
E-MAIL: pbrmaui@pbrhawaii.com

KAUAI OFFICE
4334 RICE STREET
SUITE 202
LIHUE, HAWAII 96766-1326
TEL: (808) 246-1932
FAX: (808) 246-1933
E-MAIL: pbrkauai@pbrhawaii.com

October 6, 2004

Mr. Clyde H. Nagata, P.E.
Manager
Engineering Department
Hawaii Electric Light Company, Inc.
P.O. Box 1027
Hilo, Hawaii 96721-1027

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Mr. Nagata:

Thank you for your letter dated October 17, 2003. We note that HELCO has no objections to the proposed project and provide the following responses to your comments:

1. Section 7.1.1 Existing Electrical Facilities will be revised according to your letter and the *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel* by Engineering Concepts, Inc. (September 2004). The following information will be incorporated into this section:

   a) Peak electrical demand is currently 186,700 KW.
   b) Total generation system capability is 255,100 KW.
   c) HELCO's reserve margin is currently at 27% for the entire island and has adequate generation at Komohana Substation to serve the first phase of this development.
   d) There are three levels of transmission voltages to transfer power between areas on Hawai'i Island: 69 KV, 34.5 KV, and 13.8 KV. Four cross-island transmission lines are energized at 69 KV; however, one of the Kaumana to Keamuku transmission lines was constructed for 138 KV.
   e) 12.47-KV distribution lines are located along Komohana Street.
   f) In 1996, HELCO added a 10-MVA substation transformer at Komohana Substation to increase the substation capacity to 17.5 MVA to serve existing loads in the area because the 7.5-MVA transformer was overloaded.
   g) This upgrade is not enough to accommodate the load growth anticipated by the proposed project.
   h) Currently, the Komohana 10-MVA and the 7.5-MVA transformers are close to its rated capacity.

2. Section 7.1.2 Effects on Electrical Facilities will be revised to include the following:

   a) Although HELCO currently has adequate generation capacity to serve the subject loads in Phase 1, the Komohana Substation transformation capacity must be increased.
   b) An additional 69- to 12.47-KV substation transformer and associated equipment must be added at the Komohana Substation.
   c) Additional 12.47-KV distribution lines will also be required to connect the new substation transformer to the new subject loads.

3. UHH and its consulting civil engineers, Engineering Concepts, Inc., will contact HELCO's Engineering Department to open a service request to ensure timely procurement of long lead equipment. The service request will include calculation of the anticipated electrical demand and the phasing schedule required to determine the final electrical requirements for the project. Hawaii Public Utilities Commission approval will be obtained before the long lead items are ordered, due to the anticipated HELCO expenditures exceeding $500,000.

4. Distribution line easements will be arranged from the Komohana Substation to the project, on-site and within the project location. The proposed electrical system will be discussed in the Environmental Impact Statement.

5. Development plans will consider energy-efficient and conservation features suitable to reduce peak electrical demands. Recommendations for the development to take advantage of the waste heat recovery equipment to recycle and reuse the waste heat rejected by air conditioning and refrigeration equipment will be considered.

6. UHH and Engineering Concepts, Inc. have been informed to contact the HELCO Engineering Department for a cost estimate for a remote meter reading option.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact James Leonard from our office in Hilo (961-3333) or myself at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

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Vincent Shigekuni, Principal
PBR Hawaii
1001 Bishop St., Pacific Tower, Ste. 650
Honolulu, HI 96813

Subject: University of Hawaii at Hilo Mauka Lands Master Plan
Environmental Assessment

Dear Mr. Shigekuni,

Thank you for the opportunity to comment on the University of Hawaii at Hilo Mauka Lands Master Plan Environmental Assessment.

As a local non-profit of concerned citizens and farmers working to protect our islands from the dangers of genetically engineered plants and foods, we feel compelled to comment on the environmental impacts we anticipate from the Pacific Basin Agricultural Research Center (PBARC).

The current and stated agenda of this compilation of ARS & USDA agricultural research projects has its primary focus on genetically engineered agricultural crops. We are concerned that this land will be used to test these novel crops in the open air. Any outdoor tests, make Hawaii Island's farmers' livelihoods vulnerable to cross-pollination from wind, bees and birds. For some farmers, such as niche crop Kona coffee or organic farmers, it would put them out of business. The Big Island is a bio-diversity hotspot on the planet.
Risking our unique, fragile, and endangered environment to test these genetically engineered plants imposes risks that do not outweigh any possible benefits. Previous experience in this region with the GMO Papaya, shows that the chaotic human element is the most likely way of spreading pollen, seeds, and plants before they are completely tested or legally approved for release.

We recommend that any genetically engineered plants be confined to greenhouse testing. However, here we still have the concerns and risks of run-off for soil and water as well as the disposal of plant tissues after tests are completed. Genetically engineered plants are not static. They reproduce themselves and cross with other relatives.

Research also indicates that horizontal gene transfer allows these novel genes to move between unlike organisms in several ways. Thus, any plant material, soil or water leaving the facility must be sterilized or it could contaminate local soil, water, plants and animals with novel gene cassettes that could cause great harm. Clean up for these escaped genes would be virtually impossible and the liability expenses would fall on the state (and taxpayers) as the researcher could not be traced.

Dec 21 03 03:44p Postal Shop Makawao 808-572-3671 p.1

It would be wise for Dr. Gonsalves to expand his Sustainable Agriculture research as these outdoor tests will pose no threat to the local environment or economy. There is a mushrooming world wide movement against genetically engineered foods, and market trends show consumers world wide prefer not to consume gmo's. If you have further questions on these concerns, please call or e-mail me.

Sincerely,

Eloise Engman
GMO-FREE Maui
22 Auoli Drive
Makawao, Hi. 96768
gmofreemaui@hawaii.rr.com
1-808-572-5831

Oct 21 03 03:44p Postal Shop Makawao 808-572-3671 p.2

PBR HAWAII

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PRINCIPAL
HILO OFFICE

GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

RAYMOND T. HIJA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

October 6, 2004

Ms. Eloise Engman
GMO-Free Maui
22 Auoli Drive
Makawao, Hawaii 96768

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

Dear Ms. Engman:

Thank you for your letter emailed on October 21, 2003. Please note that we received an email on October 20, 2003 from Hawaii-GEAN Hawaii Genetic Engineering Action Network, but the letter did not appear to be complete. However, what was received from Hawaii-GEAN (four paragraphs) was very nearly verbatim with the first four paragraphs from your letter. When we left a voice message at (808) 328-8888 (the phone number on the Hawaii-GEAN letterhead), we received two faxes from the "Postal Shop Makawao": another incomplete letter and your letter. We are assuming that Hawaii-GEAN and GMO-FREE Maui are related and thus, will carbon copy Hawaii-GEAN with this response.

Your organization's letter will be forwarded to the Pacific Basin Agricultural Research Center. In addition, your concerns will be noted in the botanical resources section of the Draft Environmental Impact Statement.

Thank you for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact James Leonard in our Hilo office (961-3333) or myself at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

Enclosure

CC: Hawaii-GEAN
P.O. Box 999
Captain Cook, Hawai'i 96704

Pacific Basin Agricultural Research Center
P.O. Box 4459
Hilo, Hawai'i 96720

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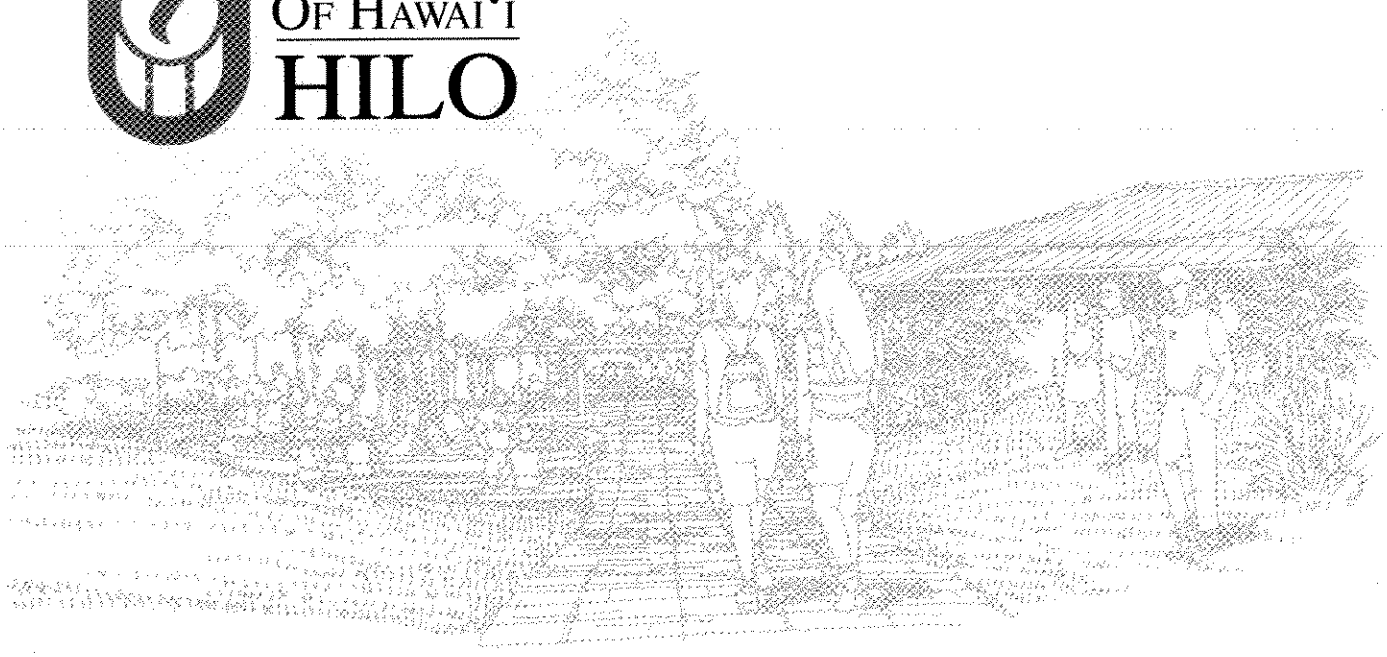
UNIVERSITY OF HAWAI'I HILO



15.0 Comments on the Draft Environmental Impact Statement and Responses

15.0 COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND RESPONSES

The DEIS was sent to the following parties for review in October 2004 and/or they obtained a copy through other means (libraries, etc.). The public comment period was from October 23, 2004 to December 7, 2004. Those providing written responses are identified in bold. Comments from and responses to these agencies and individuals follow.

Federal Agencies

- Department of the Interior, Fish and Wildlife Service

State of Hawai'i Agencies

- **Department of Accounting and General Services**
- Department of Agriculture
- Department of Business, Economic Development & Tourism
- Department of Business, Economic Development & Tourism, Energy, Resources & Technology Division
- Department of Business, Economic Development & Tourism, Office of Planning
- Department of Defense
- Department of Hawaiian Home Lands
- Department of Health, Environmental Planning Office
- **Department of Health, Clean Water Branch**
- **Department of Health, Wastewater Branch**
- Department of Land and Natural Resources
- Department of Land and Natural Resources, Historic Preservation Division
- Department of Land and Natural Resources, Engineering Division
- **Department of Land and Natural Resources, Division of Forestry and Wildlife**
- **Department of Land and Natural Resources, Commission on Water Resource Management**
- Department of Land and Natural Resources, Office of Conservation and Coastal Lands
- **Department of Land and Natural Resources, Land Division**
- Department of Transportation
- **Office of Environmental Quality Control**
- **Office of Hawaiian Affairs**
- University of Hawai'i, Water Resources Research Center
- **University of Hawai'i, Environmental Center**

County of Hawai'i Agencies

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

Elected Officials

- U.S. Senator Daniel Akaka
- U.S. Representative Ed Case
- State Representative Jerry Chang
- State Senator Lorraine Inouye
- Hawai'i County Councilmember James Arakaki

Private

- Hawaii Electric Light Company, Inc.
- Hawaii Tribune Herald
- Verizon Hawaii
- West Hawaii Today
- **Ron Reilly**
- **Herbert Soloway**

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GOVERNOR OF HAWAII

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LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 5, 2004
UHHIOPR.DEISR.RCM2

LD-NAV

Vincent Shigekuni
PBR Hawaii, ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

Subject: Draft Impact Statement - TMK: (3) 2-4-001: 122
University of Hawaii at Hilo Mauka Lands Master Plan

Thank you for the opportunity to review and comment on the subject matter.

The Department of Land and Natural Resources' (DLNR) Land Division made available or distributed a copy of the document pertaining to the subject matter to the following DLNR Divisions for their review and comment:

- Division of Forestry and Wildlife
- Engineering Division
- Commission on Water Resource Management
- Office of Conservation and Coastal Lands
- Land-Hawaii District Land Office

Enclosed please find a copy of the Commission on Water Resource Management comments.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer. If you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 1-808-587-0384.

Very truly yours,

DIERDRE S. MAMIYA
Administrator

C: HDLO

LINDA LINGLE
GOVERNOR OF HAWAII

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CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
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2004 OCT 27 P 3:25

October 20, 2004

LD/NAV
Ref.: UHHILOPBRDEIS.CMT

Suspense Date: 11/3/04

MEMORANDUM:

TO: XXX Division of Forestry & Wildlife
XXX Engineering Division
XXX Commission on Water Resource Management
XXX Office of Conservation and Coastal Lands
XXX Land-Hawaii District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Impact Statement
Project: University of Hawaii at Hilo Mauka Lands Master Plan
Consultant: PBR Hawaii
TMK: (3) 2-4-001: 122

Please review the attached document pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date.

If you have any questions, please contact Nicholas A. Vaccaro at 587-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(X) We have no comments. ( ) Comments attached.

Division: _____

Signed: Paul J. Conry

Date: OCT 21 2004

Name: ~~PAUL J. CONRY, ADMINISTRATOR~~
DIVISION OF FORESTRY AND WILDLIFE

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GOVERNOR OF HAWAII

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2004 NOV -3 A 10:19

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CHIYOME L. FUKINO, M.D.
LAWRENCE H. MIIKE, M.D., J.D.
STEPHANIE A. WHALEN

YVONNE Y. IZU
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

November 1, 2004

TO: Ms. Dede Mamiya, Administrator
Land Division

FROM: Yvonne Y. Izu, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Draft Environmental Impact Statement – UH Hilo Mauka Lands Master Plan

FILE NO.: UHHILOPBRDEIS.CMT

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[ ] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[x] We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[ ] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[x] OTHER:

The demand for the project of 575,900 gallons per day appears low. Average daily demands according to the County Water System Standards indicate that demand would be on the order of 1.07 million gallons per day.

If there are any questions, please contact Ryan Imata at 587-0255.

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DAN DAVIDSON
DEPUTY DIRECTOR - LAND

YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

2004 OCT 21 P1:34

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

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LAND
STATE PARKS

October 20, 2004

LD/NAV
Ref.: UHHILOPBRDEIS.CMT Suspense Date: 11/3/04

MEMORANDUM:

TO: XXX Division of Forestry & Wildlife
XXX Engineering Division
XXX Commission on Water Resource Management
XXX Office of Conservation and Coastal Lands
XXX Land-Hawaii District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Impact Statement
Project: University of Hawaii at Hilo Mauka Lands Master Plan
Consultant: PBR Hawaii
TMK: (3) 2-4-001: 122

Please review the attached document pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date.

If you have any questions, please contact Nicholas A. Vaccaro at 587-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments. (X) Comments attached.

Division: CWRM Signed:

Date: 10/29/04 Name: Ryan Imata

LINDA LINGLE
GOVERNOR OF HAWAII

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2004 OCT 29 A 10:21

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DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
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CHAIRPERSON
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COMMISSION ON WATER RESOURCE MANAGEMENT

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YVONNE Y. IZU
DEPUTY DIRECTOR - WATER

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STATE PARKS

October 20, 2004

LD/NAV
Ref.: UHHILOPBRDEIS.CMT Suspense Date: 11/3/04

MEMORANDUM:

TO: XXX Division of Forestry & Wildlife
XXX Engineering Division
XXX Commission on Water Resource Management
XXX Office of Conservation and Coastal Lands
XXX Land-Hawaii District Land Office

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Impact Statement
Project: University of Hawaii at Hilo Mauka Lands Master Plan
Consultant: PBR Hawaii
TMK: (3) 2-4-001: 122

Please review the attached document pertaining to the subject matter and submit your comments (if any) on Division letterhead signed and dated by the suspense date.

If you have any questions, please contact Nicholas A. Vaccaro at 587-0384.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(✓) We have no comments. ( ) Comments attached.

Division: LAND Signed:

Date: 10-25-04 Name: Harry Yada

PBR HAWAII
LAND PLANNING
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EXECUTIVE VICE-PRESIDENT

VINCENT SHIGEKUNI
PRINCIPAL

JAMES LEONARD, AICP
PRINCIPAL
HILO OFFICE

GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

RAYMOND T. HIGA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

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HONOLULU, HAWAI'I 96813-3484
TEL: (808) 521-5631
FAX: (808) 523-1402
E-MAIL: sysadmin@pbrhawaii.com

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February 7, 2005

Ms. Dierdre S. Mamiya, Administrator
State of Hawaii
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Ms. Mamiya:

Thank you for your letter dated November 5, 2004 (your file: UHHIOPR.DEISR.RCM2). We understand that the UHH Mauka Lands Master Plan Draft EIS was distributed to the following divisions:

1. Division of Forestry and Wildlife (no comments);
2. Engineering Division (no comments);
3. Commission on Water Resource Management (see responses to comments below);
4. Office of Conservation and Coastal Lands (no comments); and
5. Land – Hawaii District Land Office (no comments).

In response to the CWRM comments:

1. The projected average daily water demand for the project was based on 2,000 gallons per acre per day. *Section 6.1.2 Effects on Water Facilities* of the Final EIS has been revised as follows:

   The CWRM also stated that the Project's water demand of 575,900 gallons per day appeared low, as, according to the County Water System Standards, demand would be on the order of 1.07 million gallons per day. Although the County Water System Standards indicate that the water consumption guidelines for schools and light industry are to be 4,000 gallons per acre per day, the actual meter readings for the existing University Park are much lower. The projected average daily water demand for the Project was based on 2,000 gallons per acre per day. Project engineers have discussed the use of an average daily demand of 2,000 gallons per acre per day with the DWS, which has not expressed any objection. The DWS is currently reviewing the Preliminary Engineering Report, including the design criteria.

   Please refer to the enclosed water usage chart, which compares the average daily water demand based on water meter readings (equivalent to approximately 266 gallons per acre per day) with that based on 2,000 gallons per acre per day.

2. *Section 6.1.2 Effects on Water Facilities* of the Final EIS has been revised as follows:

> *After reviewing the DEIS, the CWRM recommended coordination with the Engineering Division of the DLNR to incorporate this Project into the State Water Projects Plan (Chapter 15.0).*

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

Encl. (Water Usage Chart)

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

LOT NO.	AREA (AC)	TENANT	NO. OF EMPLOYEES	EMPLOYEES/AC (INCL. PART-TIME EMPLOYEES)	AVE. DAILY DEMAND (BASED ON WATER METER READING) (GPD)	AVE. WWF EXPECTED BASED ON 40 CPA AND 30 GPCD	AVE. WATER DEMAND BASED ON 2,000 GAL/AC/DAY
1	7.9	UH Agriculture Complex	41	5	1,831.0	9,480	15,800
6	2.3	CalTech Submillimeter Observatory	5	2	51.7	2,760	4,600
7	2.3	Gemini Observatory	68	30	882.0	2,760	4,600
8	4.4	Joint Astronomy Centre	68	15	446.0	5,280	8,800
9	3.8	NAOJ (Subaru)	79	21	3,190.0	4,560	7,600
10	8.5	UH Institute for Astronomy	58	7	2,046.0	10,200	17,000
12	2.5	Smithsonian Institute	40	16		3,000	5,000
TOTAL	31.7		359	96	8,447	38,040	63,400

NOV-09-2004 10E 04:27 PM ENGINEERING CONCEPTS, INC FAX NO. 808 591 8010 P. 05

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Desmond K. Wery
Deputy Fire Chief

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 961-8297 • Fax (808) 961-8296

October 29, 2004

Vincent Shigekuni
PBR HAWAII
ASB Tower, Ste 650
1001 Bishop Street
Honolulu, HI 96813

RE: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN
SOUTH HILO, HAWAII
TAX MAP KEY: 2-4-01:122

This responds to your request for comments on the above-referenced project. We offer the following comments:

Fire apparatus access roads shall be in accordance with UFC Section 10.207:

"Fire Apparatus Access Roads

"**Sec. 10.207.** (a) **General.** Fire apparatus access roads shall be provided and maintained in accordance with the provisions of this section.

"(b) **Where Required.** Fire apparatus access roads shall be required for every building hereafter constructed when any portion of an exterior wall of the first story is located more than 150 feet from fire department vehicle access as measured by an unobstructed route around the exterior of the building.

"**EXCEPTIONS:** 1. When buildings are completely protected with an approved automatic fire sprinkler system, the provisions of this section may be modified.

"2. When access roadways cannot be installed due to topography, waterways, nonnegotiable grades or other similar conditions, the chief may require additional fire protection as specified in Section 10.301 (b).

"3. When there are not more than two Group R, Division 3 or Group M Occupancies, the requirements of this section may be modified, provided, in the opinion of the chief, fire-fighting or rescue operations would not be impaired.

Hawai'i County is an Equal Opportunity Provider and Employer.

"More than one fire apparatus road may be required when it is determined by the chief that access by a single road may be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

"For high-piled combustible storage, see Section 81.109.

"(c) **Width.** The unobstructed width of a fire apparatus access road shall meet the requirements of the appropriate county jurisdiction.

"(d) **Vertical Clearance.** Fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches.

"**EXCEPTION:** Upon approval vertical clearance may be reduced, provided such reduction does not impair access by fire apparatus and approved signs are installed and maintained indicating the established vertical clearance.

"(e) **Permissible Modifications.** Vertical clearances or widths required by this section may be increased when, in the opinion of the chief, vertical clearances or widths are not adequate to provide fire apparatus access.

"(f) **Surface.** Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with a surface so as to provide all-weather driving capabilities." (20 tons)

"(g) **Turning Radius.** The turning radius of a fire apparatus access road shall be as approved by the chief." (45 feet)

"(h) **Turnarounds.** All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with approved provisions for the turning around of fire apparatus.

"(i) **Bridges.** When a bridge is required to be used as access under this section, it shall be constructed and maintained in accordance with the applicable sections of the Building Code and using designed live loading sufficient to carry the imposed loads of fire apparatus.

"(j) **Grade.** The gradient for a fire apparatus access road shall not exceed the maximum approved by the chief." (15%)

"(k) **Obstruction.** The required width of any fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Minimum required widths and clearances established under this section shall be maintained at all times.

"(l) **Signs.** When required by the fire chief, approved signs or other approved notices shall be provided and maintained for fire apparatus access roads to identify such roads and prohibit the obstruction thereof or both."

Water supply shall be in accordance with UFC Section 10.301:

> "(c) **Water Supply.** An approved water supply capable of supplying required fire flow for fire protection shall be provided to all premises upon which buildings or portions of buildings are hereafter constructed, in accordance with the respective county water requirements. There shall be provided, when required by the chief, on-site fire hydrants and mains capable of supplying the required fire flow.
>
> "Water supply may consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow.
>
> "The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be protected as set forth by the respective county water requirements. All hydrants shall be accessible to the fire department apparatus by roadways meeting the requirements of Section 10.207."

Thank you for the opportunity to comment.

Sincerely,

DARRYL OLIVEIRA
Fire Chief

NA:cmj

cc: Office of Environmental Quality Control
University of Hawaii at Hilo

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

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February 7, 2005

Mr. Darryl Oliveira, Chief
County of Hawaii
Fire Department
25 Aupuni Street, Suite 103
Hilo, Hawaii 96720

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Chief Oliveira:

Thank you for your letter dated October 29, 2004. We offer the following responses to your comments:

1. Fire apparatus access roads shall be designed and constructed in accordance with the Uniform Fire Code, Section 10.207.

2. Water infrastructure shall be designed and installed in accordance with the Uniform Fire Code, Section 10.301.

3. The access road has been designed to meet the Water System Standards and each tenant of the University Park Expansion will be subject to review by the Fire Department in order to obtain a building permit.

Section 7.6.2 Effects on Fire Facilities of the Final EIS has been revised as follows:

> *In response to its comments on the DEIS (Chapter 15.0), fire apparatus access roads shall be designed and constructed in accordance with the Uniform Fire Code, Section 10.207. The access road to the Project has been designed to meet the Water System Standards, and each tenant of the University Park Expansion will be subject to review by the Fire Department in order to obtain a building permit. In addition, water infrastructure shall be designed and installed in accordance with the Uniform Fire Code, Section 10.301.*

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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LINDA LINGLE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
EMD / CWB

11024PKP.04

November 5, 2004

Mr. Vincent Shigekuni
PBR Hawaii
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

Subject: University of Hawaii at Hilo Mauka Lands Master Plan
Draft Environmental Impact Statement

The Department of Health (DOH), Clean Water Branch (CWB), has reviewed the subject document and offers the following comments:

1. The Army Corps of Engineers should be contacted at (808) 438-9258 to identify whether a Federal license or permit (including a Department of Army permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Control Act (commonly known as the "Clean Water Act"), a Section 401 Water Quality Certification is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters..."

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following activities:

   a. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).

   b. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the commencement of the construction activities.**

   c. Discharges of treated effluent from leaking underground storage tank remedial activities.

   d. Discharges of once through cooling water less than one (1) million gallons per day.

   e. Discharges of hydrotesting water.

f. Discharges of construction dewatering effluent.

g. Discharges of treated effluent from petroleum bulk stations and terminals.

h. Discharges of treated effluent from well drilling activities.

i. Discharges of treated effluent from recycled water distribution systems.

j. Discharges of storm water from a small municipal separate storm sewer system.

k. Discharges of circulation water from decorative ponds or tanks.

The CWB requires that a Notice of Intent (NOI) to be covered by an NPDES general permit for any of the above activities be submitted at least 30 days before the commencement of the respective activities. The NOI forms may be picked up at our office or downloaded from our website at:
http://www.hawaii.gov/health/environmental/water/cleanwater/index.html

3. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters and/or coverage of the discharge(s) under the NPDES general permit(s) is not permissible (i.e. NPDES general permits do not cover discharges into Class 1 or Class AA State waters). An application for the NPDES permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at:
http://www.hawaii.gov/health/environmental/water/cleanwater/index.html

4. Hawaii Administrative Rules, Section 11-55-38, also requires the applicant to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD.

If you have any questions, please contact Ms. Kris Poentis of the Engineering Section, CWB, at 586-4309.

Sincerely,

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

KP:np

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

WM. FRANK BRANDT, FASLA
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February 7, 2005

Mr. Denis R. Lau, P.E., Chief
Clean Water Branch
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801-3378

Attention: Ms. Kris Poentis, Engineering Section, CWB

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Lau:

Thank you for your letter dated November 5, 2004 (your file: 11024PKP.04). We offer the following responses to your comments.

1. A Federal license or permit (including a Department of Army permit) is not required, as there are no navigable waters within the 300-acre parcel. As such, a Section 401 Water Quality Certification is not required.

2. An NPDES general permit is required and will be obtained prior to the commencement of construction activities. A NOI will be submitted to the CWB at least 30 days prior to the commencement of construction activities.

3. An individual NPDES permit is not required, as no wastewater will be discharged from the project into State waters (the project will connect to the municipal wastewater system).

4. The SHPD has reviewed and approved an archaeological inventory survey report for the site.

Section 4.10.2 Effects on Hydrogeological Resources of the Final EIS has been revised as follows:

The DOH Clean Water Branch (CWB) provided comments to the DEIS (Chapter 15.0). In response to the CWB comments, a Federal license or permit (including a Department of Army permit) is not required, as there are no navigable waters within the parcel. As such, a Water Quality Certification is not required. However, a National Pollution Discharge Elimination System (NPDES) permit is required and will be obtained prior to the commencement of construction activities, and a Notice of Intent (NOI) will be submitted to the CWB at least 30 days prior to the commencement of construction activities. In accordance with Section 11-55-38, HAR, the State Historic Preservation Division (SHPD) has reviewed and approved an archaeological inventory survey report for the site to

be covered by the NOI. An individual NPDES permit will not be required, as no wastewater will be discharged from the Project into State waters (the Project will connect to the municipal wastewater system).

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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Harry Kim
Mayor

Lawrence K. Mahuna
Police Chief

Harry S. Kubojiri
Deputy Police Chief

County of Hawaii

POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-2389

November 16, 2004

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

SUBJECT: UNIVERSITY OF HAWAII-HILO
MAUKA LANDS MASTER PLAN
DRAFT ENVIRONMENTAL IMPACT STATEMENT
TMK: 2-4-01:122

This responds to your request for comments on the above-referenced environmental impact statement. Staff has reviewed this information and offers the following comments/suggestions in addition to those mentioned in our September 30, 2003 response:

- Consideration given to acquiring the traffic count on Puainako Extension (west leg) since it's currently in use.
- Strongly consider the right turn (deceleration) lane off Puainako Extension for those vehicles turning into the main campus entry.
- Consideration for a left turn lane on Mohouli Street for traffic heading mauka (west) that wants to turn into the roadway leading into the development intersecting with Nowelo Extension.
- Consideration given to ensuring that portions of the development occur only after roadway improvements to the lower portion of Mohouli Street and Puainako Street take place.

- Improvements to Komohana Street (lane expansion) will be necessitated by this development and consideration of this project should be in line with the development timetable for road improvement.

Thank you for allowing us the opportunity to comment.

If you need further assistance, please contact Lieutenant James Sanborn at 961-2350.

Sincerely,

ELROY T. L. OSORIO, JR.
ASSISTANT POLICE CHIEF
ACTING POLICE CHIEF

JNS/ETLO:lli

PBR HAWAII
LAND PLANNING
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February 7, 2005

Mr. Elroy T.L. Osorio, Jr.
Assistant Police Chief
Acting Police Chief
County of Hawaii
Police Department
349 Kapiolani Street
Hilo, Hawaii 96720-3998

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Chief Osorio:

Thank you for your letter dated November 16, 2004. We offer the following responses to your comments:

1. Traffic counts for Puainako Street Extension, which opened in September 2004, were not included in the Draft EIS (October 2004), as there was not enough time to incorporate them into the report and meet the project schedule.

2. A right turn deceleration lane off Puainako Street Extension for vehicles turning into the main campus entry will be considered during the design of the roadway connection.

3. A left turn lane for westbound traffic on Mohouli Street into the project roadway has been recommended and will be provided when the project roadway is constructed.

4. Roadway improvements on the lower portion of Mohouli Street and Puainako Street have been proposed by the County; however, development of the Mauka Lands will proceed independently. Please note that Section 2.7 of the Draft EIS describes full absorption of the University Park Expansion occurring over roughly 15 years (2020) and construction of the first phase of the proposed Hawaii Community College campus completed by 2010, at the earliest.

5. The TIAR acknowledged that improvements to Komohana Street would be needed to support the full build-out of the master plan. Development of the Mauka Lands will be coordinated with improvements to Komohana Street.

Section 6.5.2 Effects on Roads and Vehicular Traffic of the Final EIS has been revised as follows:

> *After reviewing the DEIS, the Hawaii County Police Department proposed traffic improvements for consideration (Chapter 15.0). Puainako Street Extension opened in September 2004 and traffic counts could not be incorporated into the DEIS. A right turn deceleration lane off Puainako Street Extension for vehicles turning into the main campus entry will be considered during the design of the roadway connection. A left turn lane for westbound traffic on Mohouli Street into the project roadway will be provided when the project roadway is constructed. Proposed roadway improvements on the lower portion of Mohouli Street and Puainako Street will be developed independently of this Project, which will be coordinated with future Komohana Street improvements.*

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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LINDA LINGLE
GOVERNOR

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

RUSS K. SAITO
COMPTROLLER

KATHERINE H. THOMASON
DEPUTY COMPTROLLER

(P)1373.4

NOV 17 2004

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

Subject: University of Hawaii at Hilo Mauka Lands Master Plan
Draft Environmental Impact Statement
South Hilo, Island of Hawaii
TMK: 2-4-01:122

Thank you for the opportunity to review the information regarding the subject project. This project does not impact any of the Department of Accounting and General Services' projects or existing facilities. Therefore, we have no comments to offer.

If there are any questions regarding the above, please have your staff call Mr. David DePonte of the Planning Branch at 586-0492.

Sincerely,

ERNEST Y. W. LAU
Public Works Administrator

DD:jp
c: Ms. Genevieve Salmonson, OEQC
Mr. Lo-Li Chih, UH Hilo

PBR HAWAII
LAND PLANNING
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February 7, 2005

Mr. Ernest Y.W. Lau
Public Works Administrator
State of Hawaii
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawaii 96810

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Lau:

Thank you for your letter dated November 17, 2004 (your reference number (P)1373.4). We acknowledge that this project will not impact any Department of Accounting and General Services projects or existing facilities, and therefore, the department has no comments to offer.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your letter will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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BICYCLE AND PEDESTRIAN ADVISORY COMMITTEE
HAWAI'I COUNTY
c/o DEPARTMENT OF PARKS AND RECREATION
101 Pauahi Street, Suite 6
Hilo, Hawai'i 96720

December 2, 2004

PBR Hawai'i
Attn: Vincent Shigekuni
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Project: University of Hawai'i at Hilo Mauka Lands Master Plan
Comments – Review of Draft Environmental Impact Statement (DEIS)

The (9) Hawai'i County Bicycle and Pedestrian Advisory Committee members have reviewed the above-referenced DEIS. Attached are individual comments received from Chairman Ron Reilly and Member Herbert Soloway. These comments are those of these individuals and not of the entire committee. Our next committee meeting will be held on Monday, December 13, 2004 at 3:00 pm at the P&R Administrative Conference Room.

Please call me at 961-8542 if you have any questions. Thank you for providing copies of CD Roms for all members and for the opportunity to review this project.

Respectfully submitted,

Pamela Mizuno
Deputy Director

Attachments
cc: Office of Environmental Quality Control
University of Hawai'i at Hilo
Hawai'i County Bicycle and Pedestrian Advisory Committee
Harry Kim, Mayor, County of Hawai'i

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County of Hawai'i is an Equal Opportunity Provider and Employer

November 29, 2004

Pamela Mizuno
Deputy Director
Department of Parks and Recreation
Hilo, HI 96720

Dear Ms. Mizuno,

Thank you for sending committee members a copy of the Hilo Mauka Lands Master Plan, Draft Environmental Impact Statement.

Also please convey our appreciation to Director Engelhard for her comments (October 22, 2003) regarding the need to develop bicycle facilities both within and without the project, and for her suggestion to include comments from the Mayoral Bicycle and Pedestrian Advisory Committee.

I fully support development of this project for its broad benefits for Hilo and east Hawaii residents, and for the thousands of students that will have the opportunity to advance their education. It is my hope that the project will make a break with past thinking that concentrates, almost exclusively, on car dominated transportation. This is ultimately unsustainable for us all, and is currently unaffordable for many students. This unaffordability is only expected to increase, with gas prices now approaching $2.50/gallon, and rising. As an island community, we understand limits and boundaries, and it would be most appropriate for the university to spend significant money on sustainable bicycle infrastructure – perhaps 25% of the money expected to be required for car based infrastructure would be a sensible amount.

With this in mind, my transportation related comments are as follows:

The proposed bicycle lanes on the extension of Nowelo St. (p. 10) are welcome and 6 ft is appropriate for the volume of bicycle use that can be expected in and around a university. However, it is not clear if the proposed 6ft bicycle lanes include or exclude a 2 ft gutter pan that is customary with gutter and curb construction. A gutter pan should not be included as part of the available bike lane width which should be 6 ft as stated.

The existing section of Nowelo St. that connects to the existing campus down-slope from Komohana should be expanded to also include 6 ft bicycle lanes (excluding any gutter pan) in each direction (at present it has two 14 ft traffic lanes in each direction with a 9 ft median). This could be achieved by reducing the two traffic lanes from 14ft to 11 ft and reducing the median width from 9ft to 3 ft.

The proposed central pedestrian and bicycle court is welcome. However, I did not find adequate maps showing the design and location of the proposed bicycle pathways within the main pedestrian walkway area. The site topography is significant, stated as 5 –10 % slope (p17) This slope can be visualized and experienced by bicycling on adjacent sections of Mohoulu St. and Puainako St. Obviously, care needs to be taken in design (via some form of separation) to minimize conflict between fast-moving, down-slope bicyclists and pedestrians and even bicyclists travelling more slowly up-slope.

I did not find maps that identify Roads A, B, and C. However these are stated as providing 8 ft parking on both sides and 12 ft traffic lanes in each direction. There is no mention of bicycle lanes, which in my opinion should be included in the design of these internal roads. This could be accomplished by removing parking from one side and reducing lane width from 12 ft to 11 ft.

Parking for cars is stated to include stalls for more than the project will require - 2,500 stalls in total (p.11). However, I did not find any mention of parking facilities for bicycles. Bicyclists may spend long hours at classes and other activities, and bicycle racks, which are appropriate for short term (<30 minutes) bicycle parking, do not provide adequate security for longer term parking (>30 mins) and this encourages theft and discourages bicycle use. I would suggest that serious consideration be given to providing weatherproof,

secure, bicycle-lockers at all sites that can be expected to require longer term (>30 mins) bicycle parking. Bicycle lockers provide security for more than just the bicycle; also protected are expensive components that can easily be removed from a locked bicycle, bike helmet, gloves, saddle bags and their contents - personal effects, books etc. Issues of permits and assignment of lockers, of locks and keys, and access by grounds management staff need to be addressed and there are many mainland locations that could provide practical policy and procedures.

Hot showers and changing lockers for bicyclists would also be welcome. Solar heated showers, and lockers could be provided free, or on a per fee bases to avoid abuse. By the way, I did not find any discussion of solar water heating as was requested by Mr. Maurice H. Kaya, Chief Technology Officer, DEBED (Oct 23, 2003), and promised by Mr. Shigekuni (October 6, 2004).

All bicycle parking (both racks and lockers) should be located under covered weatherproof areas as close as possible to the intended destination.

While there are a number of references to "encourage bicycle use", I would suggest that the two proposed bike facilities (Nowelo St. and the Central Court) are nowhere near sufficient to accommodate and encourage bicycle use for projected 2,100 employees and 4,300 students.

I suggest inclusion of specific "modal split" goals that state how the expected extra 15,000 (p 5) trip ends will be divided among the available transportation alternatives; car, bicycle, bus, and walking. If 100% of these 15,000 trips are taken by car this equals a 91% percent increase over the existing 16,500 cars per day (p3). Many of these 15,000 trips should be made by bicycle. An achievable 5-year goal might be set at 20% of all trips be by bicycle. And an achievable 10-year goal set at 40%. Numerous university towns (e.g., Davis, California where 40-50% of total trips are made by bicycle) have encouraged and accommodated bicyclists with outstanding results. Hilo has many natural advantages and could do likewise if the university were to take a proactive lead in taking bicycling seriously. By providing excellent bicycle facilities for it's staff and students, the university would, by extension, benefit the broader Hilo community and encourage bicycle use - a cost-effective, healthy, non-polluting and sustainable form of transportation.

Reference should be made to the State BikePlan Hawaii 2003, and the identification of specific direct roads that need bicycle friendly improvements to connect the project with expected Hilo destinations: Hilo library, downtown businesses, shopping malls, Bay Front, and other Hilo beaches.

Also, contact should be made with Hawaii Island Bike System Advocates – a community group formed to encourage bicycling in and around Hilo, which includes connectivity to the existing university campus. This group has developed a formal proposal with maps and a narrative description of the need and of various routes. They can be reached c/o Sandra Bonk at 1 (800) 384-7456.

The comments above are mine alone and do not reflect the benefit of committee discussion. I trust other members have contributed valuable insights and suggestions independently.

Thank you for this opportunity.

Yours sincerely,

Ron Reilly

Ron Reilly, Chair
Mayoral Bicycle and Pedestrian Advisory Committee.
PO Box 458
Volcano, HI 96785
(808) 967-8603

Comments Submitted by Herbert Soloway, Member
Hawai'i County Bicycle and Pedestrian Advisory Committee
December 1, 2004

Subject: University of Hawai'i at Hilo Mauka Lands Master Plan
Comments (Draft Environmental Impact Statement – DEIS)

Bike Lanes are often mentioned but little is specific other than bike lanes will be considered as project progresses.

Mention often made of bike lanes within project, however, little or no mention made to linking up with exterior roadways other than Nowelo Street.

Within project area 60 Foot wide roadways do not provide bike lanes. Parking is called for on both sides of the street, it could be parking on one side and bike lanes in both directions.

PBR HAWAII
LAND PLANNING
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February 7, 2005

Ms. Pamela Mizuno
Deputy Director
County of Hawaii
Department of Parks and Recreation
101 Pauahi Street, Suite 6
Hilo, Hawaii 96720

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Ms. Mizuno:

Thank you for your letter dated December 2, 2004. We understand that the Hawaii County Bicycle and Pedestrian Advisory Committee members have reviewed the Draft EIS. We have reviewed the individual comments provided by Chairman Ron Reilly and Member Herbert Soloway, and we understand that these comments are not from the entire committee. We have included a copy of our responses to Mr. Reilly and Mr. Soloway with this letter.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your letter will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

Encl. (Letter to Mr. Reilly; Letter to Mr. Soloway)

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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February 7, 2005

Mr. Ron Reilly, Chairman
County of Hawaii
Bicycle and Pedestrian Advisory Committee
c/o Department of Parks and Recreation
101 Pauahi Street, Suite 6
Hilo, Hawaii 96720

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Reilly:

Thank you for your letter dated November 29, 2004. We offer the following responses to your comments:

1. We acknowledge that the proposed 6-foot-wide bicycle lanes on Nowelo Street Extension are appropriate for the expected volume of bicycle use. These lanes include a 2-foot-wide gutter pan. We have relayed your comments to the University of Hawaii at Hilo (UHH) and they will consider whether they would like to narrow the widths of one or more of the travel lanes in order to add bike lanes. We note that this road, with the proposed bicycle lane, is currently under construction as part of the access improvements for the planned USDA facility in this area.

2. We will relay your recommendations for improvements to the existing Nowelo Street makai of Komohana Street to the UHH.

3. The proposed central pedestrian and bicycle court within the proposed University Park Expansion area was sited to take advantage of a large flat area (please compare Figures 3 and 8).

4. The Final EIS has been revised to note that current plans for the typical roadway sections for Roads A, B, and C are shown on Figure 7 of Appendix E of the Draft EIS (Preliminary Engineering Report). Currently, 8-foot-wide parking lanes are shown on both sides of these internal roads. We are not sure whether the eventual traffic pattern (cars vs. bicycles) will warrant the provision of bike lanes (in the existing University Park there is very little on-street parking within the internal roadways or even much traffic). However, as more people start biking, on-street parking could be removed from the internal roadways, and then they could be striped for bike lanes.

   Section 6.5.4 Bicycle Facilities has been added to the Final EIS and includes the following:

> *The DEIS was distributed to members of the Hawaii County Bicycle and Pedestrian Advisory Committee, and Mr. Ron Reilly (Chairman) and Mr. Herbert Soloway (Member) provided individual comments (Chapter 15.0). In response to their comments, current plans for the typical roadway sections for Roads A, B, and C are shown in Figure 7 of the Preliminary Engineering Report (Appendix E). These plans show 8-foot-wide parking lanes on both sides of the internal roadways (within the existing University Park, there is very little street parking or even much traffic on internal roadways). The eventual traffic pattern (cars versus bicycles) will determine whether or not bike lanes are warranted; however, as more people start biking, on-street parking could be removed from internal roadways, which could then be striped for bike lanes.*

5. We will relay your recommendations that both the UHH and Hawaii Community College (Hawaii CC) provide weatherproof, secure bicycle lockers at all sites that are expected to require long-term (greater than 30 minutes) bicycle parking, and that covered bicycle parking be provided as close as possible to each building. We will also relay your recommendations that both the UHH and Hawaii CC provide hot showers and changing locker facilities for bicyclists. Please refer to *Section 7.1.2 Effects on Electrical Facilities* of the Draft EIS for the discussion on solar water heating.

   Section 6.5.4 Bicycle Facilities of the Final EIS includes the following:

   > *Mr. Reilly also made recommendations that both the UHH and Hawaii CC provide weatherproof, secure bicycle lockers at all sites that are expected to require long-term (greater than 30 minutes) bicycle parking. He also recommended hot showers and changing locker facilities for bicyclists, and covered bicycle parking as close as possible to each building at UHH and Hawaii CC.*

6. We appreciate your comments on encouraging bicycle use. While there are many things the UHH and Hawaii CC can do to promote bicycle use (many of which you kindly suggested), there are also many factors outside their control including distances, the natural topography of Hilo, and the weather.

7. We definitely concur with the benefits of bicycling on health and the environment, however, we wonder why (at least from casual observations) bicycle use is not more prevalent, say in Downtown Hilo, which is flatter, more densely developed, and drier than the UHH and Hawaii CC campuses. Rightly or wrongly, it does not appear that Downtown Hilo achieves even a 5% to 95% (bike to car) modal split. Even with the above realities in mind, the UHH and Hawaii CC have supported the current plans for the UHH Mauka Lands project to accommodate bicycling and pedestrian use in its land use planning, especially the opportunities for increasing walking and biking between the proposed University Park Expansion and the proposed Hawaii CC campus. We note that UHH currently provides bicycle parking, including covered parking, on a level that is commensurate with the demand and we expect a similar commitment as part of the Hawaii CC campus planning and design.

8. *Section 6.5.4 Bicycle Facilities* of the Final EIS notes the existing and proposed facilities in the *State BikePlan Hawaii 2003*, and Figure 13 has been added to show those facilities near the project site. The following has been added to the Final EIS:

6.5.4 Bicycle Facilities

The State Department of Transportation has developed a master plan to enhancing the bicycling environment in Hawaii. Bike Plan Hawaii 2003 identifies existing and proposed bicycle facilities on all islands.

Existing Bicycle Facilities in Hilo

- *Kanoelehua Avenue Bike Lane (Kamehameha Avenue to Puainako Street)*
- *Kanoelehua Avenue Signed Shared Road (Puainako Street to Makalika)*
- *Kawili Street Bike Lane (Manono Street to Puainako Street)*
- *Kalanianaole Avenue Signed Shared Road (Kamehameha Avenue to Leleiwi Beach Park)*
- *Mohouli Street Extension Signed Shared Road (Beyond Komohana Street)*

Bicycle Facilities Currently Underway in Hilo

- *Hilo Bayfront Highway Bike Lane (Manono Street to Kanoelehua Avenue)*
- *Puainako Street Extension Signed Shared Road (Beyond Komohana Street)*

Proposed Bicycle Facilities in the Project Vicinity

Figure 13 shows the proposed bicycle facilities in the Project vicinity. The numbers correspond to those used in Bike Plan Hawaii 2003.

- *10 – Mohouli Street Bike Lane (Komohana Street to Kilauea Avenue)*
- *11 – Kumukoa Street/West Lanikaula Street/East Lanikaula Street Bike Lane (Kukuau Street to Kanoelehua Avenue)*
- *12a – Komohana Street Bike Lane (Waianuenue Avenue to Ainaola Drive)*
- *12b – Nowelo Street Bike Lane (Komohana to UH Hilo Expansion Area)*
- *23 – West Puainako Street Bike Lane (Komohana Street to Kinoole Street)*

Existing and proposed bicycle facilities will encourage bicycle use in the Hilo area and between the UHH main campus, University Park, and the Mauka Lands area, linking the bike lanes within the Project site to Puainako Street Extension, Komohana Street, and Mohouli Street Extension. As shown in Figure 5 of the Preliminary Engineering Report (Appendix E), a bicycle lane will be provided along the Nowelo Street Extension, which would be a feeder road to the Hawaii CC. Bicycle access will also be provided in a separate bikeway system within the University Park Expansion and to the Hawaii CC campus and the USDA facilities. Appropriate bicycle and pedestrian improvements along the Puainako Street Extension fronting the proposed Hawaii CC Komohana Campus will be considered when the Hawaii CC is being designed.

9. As recommended, we have met with Sandra Bonk of the Hawaii Island Bike System Advocates to discuss bicycle facilities.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

PBR HAWAII
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February 7, 2005

Mr. Herbert Soloway, Member
County of Hawaii
Bicycle and Pedestrian Advisory Committee
c/o Department of Parks and Recreation
101 Pauahi Street, Suite 6
Hilo, Hawaii 96720

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Soloway:

Thank you for your comments dated December 1, 2004. We offer the following responses to your comments:

1. Please refer to Appendix E of the Draft EIS (Preliminary Engineering Report). Figure 6 shows a typical roadway section for Nowelo Street, which will be the main feeder road to both the University Park Expansion and the proposed Hawaii Community College campus. What is shown for Nowelo Street are 6-foot-wide bike lanes on each side of Nowelo Street.

2. The Final EIS will address linking the bike lanes within the project to the Puainako Street Extension, Komohana Street, and the Mohouli Street Extension.

3. Figure 7 of Appendix E of the Draft EIS (Preliminary Engineering Report) shows a typical roadway section for other internal roads. Currently, 8-foot-wide parking lanes are shown on each side of these internal roads. We are not sure whether the eventual traffic pattern (cars vs. bicycles) will warrant the provision of bike lanes (in the existing University Park there is very little on-street parking, or even much traffic, within the internal roadways). However, as more people start biking, on-street parking could be removed from the internal roadways, and then they could be striped for bike lanes.

Section 6.5.4 Bicycle Facilities has been added to the Final EIS and includes the following:

Existing and proposed bicycle facilities will encourage bicycle use in the Hilo area and between the UHH main campus, University Park, and the Mauka Lands area, linking the bike lanes within the Project site to Puainako Street Extension, Komohana Street, and Mohouli Street Extension. As shown in Figure 5 of the Preliminary Engineering Report (Appendix E), a bicycle lane will be provided along the Nowelo Street Extension, which would be a

feeder road to the Hawaii CC. Bicycle access will also be provided in a separate bikeway system within the University Park Expansion and to the Hawaii CC campus and the USDA facilities. Appropriate bicycle and pedestrian improvements along the Puainako Street Extension fronting the proposed Hawaii CC Komohana Campus will be considered when the Hawaii CC is being designed.

The DEIS was distributed to members of the Hawaii County Bicycle and Pedestrian Advisory Committee, and Mr. Ron Reilly (Chairman) and Mr. Herbert Soloway (Member) provided individual comments (Chapter 15.0). In response to their comments, current plans for the typical roadway sections for Roads A, B, and C are shown in Figure 7 of the Preliminary Engineering Report (Appendix E). These plans show 8-foot-wide parking lanes on both sides of the internal roadways (within the existing University Park, there is very little street parking or even much traffic on internal roadways). The eventual traffic pattern (cars versus bicycles) will determine whether or not bike lanes are warranted; however, as more people start biking, on-street parking could be removed from internal roadways, which could then be striped for bike lanes.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
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E-mail: oeqc@health.state.hi.us

December 3, 2004

Dr. Lo-Li Chih
University of Hawai'i at Hilo
200 West Kawili Street
Hilo, Hawai'i 96825

Mr. Vincent Shigekuni
PBR Hawai'i
1001 Bishop Street
ASB Tower, Suite 650
Honolulu, Hawaii 96813

Dear Dr. Chih and Mr. Shigekuni:

The Office of Environmental Quality Control has reviewed your draft environmental impact statement for the UH Hilo Mauka Lands Master Plan, TMK 2-4-01-122, in the judicial district of Honolulu, and offers the following comments for your consideration and response.

1. ***UHH University Park Master Plan and Hawai'i Community College Long Range Development Plan***: Page 8 of the draft environmental impact statement "summarizes" the subject plans. Please append copies of the referenced plan and maps in the final environmental impact statements.
2. ***Consultation with Native Hawaiian Groups***: Please consult with native Hawaiian groups such as Hawaiian Civic Clubs and Community Associations.
3. ***Sustainable Building Guidelines***: Please refer to our June 2004, edition of "A Guidebook for the Hawaii State Environmental Review Process" for guidance on sustainable building.

Thank you for the opportunity to comment. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist, at (808) 586-4185.

Sincerely,

Genevieve Salmonson

GENEVIEVE SALMONSON
Director

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
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February 7, 2005

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

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Ms. Salmonson:

Thank you for your letter dated December 3, 2004. We offer the following responses to your comments.

1. The *UHH University Park Master Plan* and the *Hawaii Community College Long Range Development Plan* will be appended to the Final EIS.

2. During the pre-consultation process, the Office of Hawaiian Affairs (OHA) suggested contacting Ululani Sherlock (OHA Community Resource Coordinator), Kealoha Piscotta (Mauna Kea Anaina Hou), Geno Enocencio (Native Hawaiian Historic Preservation Council), and local members of the Royal Orders and the Hawaiian Civic Clubs (see enclosure). Each of these individuals and groups were contacted, and seven individuals (cultural specialists and instructors, in addition to the three recommended by OHA) assisted in the preparation of the cultural impact assessment for the Draft EIS. The results of these consultations were reported in Section 4.8.3 of the Draft EIS.

   Section 4.8.3 Traditional and Cultural Practices has been revised to include the following:

   The State Office of Environmental Quality Control (OEQC) reviewed the DEIS and requested that consultation with native Hawaiian groups (i.e., Hawaiian Civic Clubs and Community Associations) be conducted (Chapter 15.0). During the pre-consultation process, the Office of Hawaiian Affairs (OHA) suggested contacting Ululani Sherlock (OHA Community Resource Coordinator), Kealoha Piscotta (Mauna Kea Anaina Hou), Geno Enocencio (Native Hawaiian Historic Preservation Council), and local members of the Royal Orders and the Hawaiian Civic Clubs. Each of these individuals and groups were contacted, and seven individuals (cultural specialists and instructors, in addition to the three recommended by OHA) assisted in the preparation of the cultural impact assessment included above. After reviewing the DEIS, OHA had no substantive comments to offer other than to note that the UHH provides a much needed resource to the general population and to native Hawaiians seeking to expand their educational opportunities (Chapter 15.0).

3. As noted in a letter to Mr. Maurice H. Kaya of the State Department of Business Economic Development and Tourism (included in the Draft EIS), *Guidelines for Sustainable Building Design in Hawaii: A planner's checklist*, was provided to both the UHH and Engineering Concepts, Inc. (project engineers).

   Section 8.2 Chapter 344, State Environmental Policy and *Section 8.4 County of Hawaii General Plan* of the Final EIS have been revised to include the following:

   Guidelines for Sustainable Building Design in Hawaii: A planner's checklist, was provided to both the UHH and Engineering Concepts, Inc. (project engineers).

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

Encl. (Pre-consultation Comment Letter from OHA; Response Letter to OHA)

cc: Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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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

HRD03/1088

August 6, 2003

Vincent Shigekuni
PBR Hawaii
1001 Bishop Street
Pacific Tower, Ste 650
Honolulu, HI 96813-3484

RE: University of Hawai`i at Hilo Mauka Lands Master Plan EA

Dear Mr. Shigekuni,

OHA is in receipt of your July 22, 2003 scoping letter regarding the above referenced project. We received your letter on August 1, 2003.

The letter we received is confusing. The project heading suggests that an Environmental Assessment is what we are being asked to comment on, yet paragraph three states that "cumulative impacts of all uses included as part of the Master Plan will be addressed in the UHH Mauka Lands Master Plan Environmental Impact Statement (EIS). For the record, OHA believes that a project of this size requires an Environmental Impact Statement which assesses the cumulative impact of all proposed projects in the UHH Mauka lands.

We suggest that you contact the following individuals or groups as part of your scoping process:

Ululani Sherlock, Office of Hawaiian Affairs Community Resource Coordinator, 933-0418.

Kealoha Piscotta, Mauna Kea Anaina Hou, 934-7668, 230 Lyman Ave, Hilo, HI 96720.

Geno Enocencio, Native Hawaiian Historic Preservation Council, 152 Aikane Loop, Hilo, HI 96720.

You should also contact local members of the Royal Orders and the Hawaiian Civic Clubs.

Thank you for the opportunity to participate in your scoping process. Please call Pua Aiu at 594-1931 or e-mail her at paiu@oha.org if you have further questions.

Sincerely,

Peter L. Yee
Director
Nationhood and Native Rights

Cc: Ulu Sherlock (by e-mail)
Kealoha Piscotta (by e-mail)
Geno Enocencio (by e-mail)

PBR HAWAII

LAND PLANNING
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PRINCIPAL
HILO OFFICE

GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

[illegible]

[illegible]

[illegible]

August 11, 2003

Mr. Peter L. Yee
Director, Nationhood and Native Rights
State of Hawai'i
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawai'i 96813

Attn: Ms. Pua Aiu
Ms. Ululani Sherlock

SUBJECT: UNIVERSITY OF HAWAI'I AT HILO MAUKA LANDS MASTER PLAN ENVIRONMENTAL ASSESSMENT/EIS PREPARATION NOTICE

Dear Mr. Yee:

Thank you very much for your letter dated August 6, 2003 (your reference #HRD03/1088). We apologize if we may have caused any confusion in our letter. This is to confirm that an Environmental Impact Statement (EIS) will be prepared, but that we were seeking pre-consultation comments in order to prepare an Environmental Assessment (EA)/EIS Preparation Notice (EISPN). This is the first step of the EIS process, which will include: an EA/EISPN, a Draft EIS and a Final EIS.

We spoke with Ms. Ululani Sherlock, who is very familiar with the subject property, and who promised to assist us when we conduct our cultural impact assessment. As part of the cultural impact assessment process, we will, as suggested, contact:

- Kealoha Piscotta, Mauna Kea Anaina Hou,
- Geno Enocencio, Native Hawaiian Historic Preservation Council,
- Local members of the Royal Orders, and
- Local members of the Hawaiian Civic Clubs.

Thanks again for your participation in the Environmental Impact Statement process for this project.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

Enclosure

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Harry Kim
Mayor

Patricia G. Engelhard
Director

Pamela N. Mizuno
Deputy Director

County of Hawai`i
DEPARTMENT OF PARKS AND RECREATION
101 Pauahi Street, Suite 6 • Hilo, Hawai'i 96720
(808) 961-8311 • Fax (808) 961-8411

December 7, 2004

PBR Hawai'i
Attn: Vincent Shigekuni
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Project: University of Hawai'i at Hilo Mauka Lands Master Plan Comments – Review of Draft Environmental Impact Statement (DEIS)

We have reviewed the DEIS for the above-referenced project and have no additional comments to offer.

Thank you for including the Hawai'i County Bicycle and Pedestrian Advisory Committee as part of the review process.

Sincerely,

Patricia G. Engelhard
Director

cc: Office of Environmental Quality Control
University of Hawai'i at Hilo

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February 7, 2005

Ms. Patricia G. Engelhard, Director
County of Hawaii
Department of Parks and Recreation
101 Pauahi Street, Suite 6
Hilo, Hawaii 96720

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Ms. Engelhard:

Thank you for your letter dated December 7, 2004. We acknowledge that the Department of Parks and Recreation has reviewed the Draft EIS and has no comments to offer.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your letter will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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UNIVERSITY OF HAWAI'I

Environmental Center

December 7, 2004
RE: 0743

Mr. Lo-Li Chih
University of Hawaii at Hilo
200 West Kawili Street
Hilo, Hawai'i 96720

Dear Mr. Lo-Li Chih:

Draft Environmental Impact Statement
University of Hawai'i Hilo Mauka Lands Master Plan
South Hilo, Hawai'i

The University of Hawai'i at Hilo (UHH) is planning to expand its University Park research facilities on a 267-acre parcel in Hilo, Hawai'i (TMK: 2-4-01:122). Located west of Komohana Street, just mauka of the existing University Park, between the Moho'uli Street Extension, the Sunrise Estates Subdivision, the Pu'ainako Street Extension and the proposed USDA Pacific Basin Agricultural Research Center (PBARC), the proposed University Park Expansion project will occupy 118 acres of currently undeveloped land. The remainder of the State-owned parcel will be used to develop the proposed Hawai'i Community College Komohana Campus and other University-related uses. The proposed master plan for the University Park Expansion includes approximately 40 lots ranging in size between 1.9 acres and 5.7 acres with most lots averaging 2.5 acres. The lots will surround a pedestrian court that will be landscaped and provide outdoor areas where workers can eat their lunches or interact with other researchers in a campus-like environment. The pedestrian court would also provide a pedestrian and bicycle link to the proposed Hawai'i Community College Komohana Campus and PBARC to the south encouraging synergistic connections to neighboring research and educational facilities. The main vehicle entrance to the University Park Expansion will be from Komohana Street via an extension of Nowelo Street, just opposite the entrance to the existing University Park. A secondary vehicular entrance will be provided from the Mohouli Street Extension. The proposed Hawai'i Community College Komohana Campus would be accessed from the Pu'ainako Street Extension and the proposed Nowelo Street Extension. The project will require a State Land Use District Boundary amendment from Agricultural to Urban, and either a County Use Permit or rezoning. Anticipated impacts include: increased traffic; increases in solid waste generated; increased in electricity consumed; and short-term impacts to air quality and ambient noise levels during construction. Expected positive impacts include: the consolidation of Hawai'i Community College facilities from two campuses to one; and reinforcing the "clean" industry of research at UHH and in East Hawai'i.

2500 Dole Street, Krauss Annex 19, Honolulu, Hawaii 96822
Phone: (808) 956-7361
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This review was conducted with the assistance of Panos Prevedouros, Civil Engineering; George Curtis, UH Hilo; and Landin Johnson of the Environmental Center.

General Comments

While the Draft Environmental Impact Statement (DEIS) for UH-Hilo Mauka Lands Master Plan appears reasonably comprehensive in its preparation and touches on many important issues, our reviewers observed that some areas require further analysis and discussion.

Cumulative and Secondary Impact Assessment

The DEIS lacks a comprehensive assessment and discussion of cumulative and secondary impacts. How will the proposed development affect other projects being developed in Hilo? What are the proposed project's cumulative impacts when accounting for other projects and their irreversible and irretrievable commitments of resources? Pursuant to Hawai'i Administrative Rules (HAR) §11-200-17 (g) "*specific reference to related projects, public and private, existing or planned in the region shall also be included for purposes of examining the possible overall cumulative impacts of such actions*" and HAR §11-200-17 (i) "*The interrelationships and cumulative environmental impacts of the proposed action and other related projects shall be discussed in the draft EIS.*" If there are in fact other projects that might be considered to have cumulative impacts when accounting for this proposed project, they should have been discussed in this DEIS in a separate and distinct section for ease of assessing and reviewing.

Specific Comments

Natural Hazards (§4.2)

The DEIS has ample maps, some of which indicate the extent to which the 1881 lava flow covered the upper corner (roughly a quarter) of the property. In this light, the claim that "the area is no more susceptible to damage by natural hazard[s] than other homes and buildings in the surrounding Hilo community" (p.#20), is questionable. It appears on the basis of historical data that this property is more likely to be affected by a lava flow or flooding than many if not most portions of Hilo. The DEIS notes that part of the project is in a flood zone, stating, "a detailed study should be performed to determine the 100-year floodplain" (p.#20). Why was the study not completed prior to publishing the DEIS? The DEIS further notes that a hurricane might pass close to the island, when in fact it should state that a hurricane might pass over the island. Furthermore, the DEIS asserts that the buildings will be designed for earthquake zone 3, yet the entire island of Hawai'i was upgraded several years ago to zone 4, requiring specific building code compliance for that level of seismic zonation. The DEIS also states that the area has been one to five percent covered by lava

since 1800, yet as noted above, maps in the report show this statement to be erroneous.

Effects on Hydrogeological Resources (§4.10)

It is noted that "[t]he Hilo Aquifer System has a sustainable yield of 347 million gallons per day (mgd)" (p.#35), and the project is estimated to use "approximately 575,900 gallons per day (GPD) for the entire UHH Mauka Parcel at full occupancy" (p.#35). In order to fully assess the likely impact of the proposed action, discussion of the current level of consumption of the Hilo Aquifer System must be included in the document.

Light Pollution Effects (§4.9.2)

In order to minimize lighting impacts to the Mauna Kea Astronomical Observatory, our reviewers recommend that the project install motion activated outdoor lighting where feasible.

Solid Waste (§6.4)

Our reviewers strongly recommend that the project include a comprehensive waste management plan that emphasizes both source reduction and re-use. While the project's recycling plan to "provide for the collection of glass, aluminum, white paper, mixed paper, and newspaper" (p.#50) is commendable, the recycling plan should also include plastic containers, especially given the State's new "Bottle Bill" law and the potential for redemption funds. Will the recycling plan include plastic containers, or will there be a beverage container redemption station on campus?

Public Facilities and Utilities (§7.0)

Our reviewers strongly recommend installation of renewable energy systems, including solar water heating and photovoltaic systems to the maximum extent feasible. Photovoltaic and solar thermal systems should be evaluated not only in terms of direct cost recovery pursuant to conventional cost/benefit analysis, but also in relation to economic and environmental externalities. For instance, public benefits of renewable energy include displacement of fossil fuel imports, reduced demand on the present energy supply, and postponement of future expansion of HELCO fossil-fuel energy generation facilities. While cost is undoubtedly a legitimate concern and basis for determination of installation of such devices as discussed above, the additional positive benefits to the citizens of Hawai'i warrant consideration. As part of the State's principal institution of higher learning, UH-Hilo should offer the example of energy efficiency and sustainability that will chart a course towards a State policy of energy self-reliance.

Traffic Impact Analysis Report (§6.5 & Appendix F)

The Traffic Impact Analysis Report (TIAR) is based on limited traffic volume data and adopts a number of significant assumptions, several of which were taken from another TIAR conducted by Rowell and Associates in 2002.

The analysis and conclusions are reasonable. However, these conclusions are based on limited data collected by the Hawai'i State Department of Transportation (DOT). These daily traffic data do not include detailed turning movement counts required for a TIAR. Therefore, it is strongly recommended that an updated TIAR be conducted once the first phase of the proposed development is completed and opened for use. A future TIAR is also necessary, because the Paianako Street extension was opened in October 2004 with the expectation to reroute significant amounts of traffic from downtown Hilo. The subject TIAR does not take this situation into account.

The developer must heed to the recommendations of this TIAR (p.#11) regarding the minimum widths of lanes on the streets surrounding the project.

A major omission occurs in the transportation section. The DEIS performed a detailed vehicle traffic analysis, and there are extensive plans for all modes of transportation and circulation within the project. However, nothing was discussed regarding transportation between the project area and the main University campus and the surrounding community. Streets, walkways, bike paths, and shuttle buses for this purpose are ignored, as is public transportation.

Thank you for the opportunity to review this DEIS.

Sincerely,

John T. Harrison, Ph.D.
Environmental Coordinator

Cc: PBR Hawaii
University of Hawaii at Hilo
OEQC
James Moncur, WRRC
George Curtis
Panos Prevedouros
Landin Johnson

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February 7, 2005

Mr. John T. Harrison, Ph.D.
Environmental Coordinator
State of Hawaii
University of Hawaii
Environmental Center
2500 Dole Street
Krauss Annex 19
Honolulu, Hawaii 96822

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Dr. Harrison:

Thank you for your letter dated December 7, 2004 (your reference RE:0743). We offer the following responses to your comments.

1. The Final EIS has been revised to include a summary of cumulative and secondary impacts at the end of Chapters 4.0, 5.0, 6.0, and 7.0. These sections have been included below.

4.11 CUMULATIVE AND SECONDARY IMPACTS ON THE PHYSICAL AND BIOLOGICAL ENVIRONMENT

Several developments are planned in the Project area and may pose cumulative environmental impacts. These projects are briefly described below and their potential cumulative impacts are discussed in this section and Sections 5.4, 6.6, and 7.7.

Science and Technology Building. *A new Science and Technology Building is planned on the main UHH campus at the entry road off Lanikaula Street (east of the UHH Mauka Lands project site). The site currently houses facilities for various science programs. Design and construction of this building is planned to occur between November 2004 and May 2007.*

Student Life and Event Complex. *A new Student Life and Event Complex will be located near the existing Athletic Complex on the main UHH campus, east of the Mauka Lands project site. The complex will include a multi-purpose facility for sports, recreation, and conference activities, as well as a swimming pool.*

United States Department of Agriculture (USDA) Pacific Basin Agricultural Research Center (PBARC). *The PBARC, which is*

surrounded on three sides by the UHH Mauka Lands project, is being developed on a 30-arce parcel that is currently vacant.

Student Services/Administration Building. *Improvements are planned for the Student Services Building on 1.38 acres near the existing Student Services Building, Theatre, and Campus Center on the main UHH campus. The project will provide an addition to the existing Student Services Building to consolidate student services functions and to house the Chancellor's Office and other related administrative functions.*

International Village Center. *The International Village Center will be developed on 36 acres of land across Kawili Street and will include a student-oriented shopping plaza, dormitory housing, and classroom and cultural facilities and exhibits.*

Mauna Kea Astronomy Education Center (MKAEC). *The MKAEC, located on a 9-acre site in the existing University Park on Nowelo Street, will serve as an astronomy interpretive center providing education extension services.*

4.11.1 Climate, Topography, and Soils

Planned developments in the Project area are not expected to adversely impact regional climate, topography, and soils. Within their respective project sites, construction will impact topographic features and soils, and new buildings may affect the micro-climate; however, the overall topography, soil, and climate of Hilo are not expected to be affected.

4.11.2 Natural Hazards

It is highly unlikely that any of the proposed buildings and uses associated with the planned developments will affect the potential occurrence of earthquakes, lava flows, hurricanes, or tsunami. The proposed projects are most likely being designed to address seismic, lava flow, flood, and tsunami zone designations for the area to avoid potential damage from natural hazards.

4.11.3 Aquatic Resources and Water Quality

The Science and Technology Building, the Student Services/Administration Building, and the International Village Center are located downstream of the Waiakea Stream. The Student Life and Event Complex, the PBARC, and the MKAEC are located upstream of the Waiakea Stream. These projects should not adversely impact aquatic resources and water quality, as on-site drainage facilities such as detention basins will maintain pre-development runoff levels at each site and should prevent large runoff quantities during most storm events.

4.11.4 Botanical Resources

Impacts on botanical resources are generally limited to the planned development sites. Collectively, the projects are not expected to adversely impact botanical resources in the Hilo area.

4.11.5 Mammalian and Avian Species

Within each project site, existing species are likely to leave during construction but may return to the site, depending on the habitat provided. The Science and Technology Building, the Student Services/Administration Building, and the Student Life and Event Complex will be developed on the existing UHH main campus, which hosts only introduced species. The wildlife survey for the Mauka Lands parcel observed no threatened or endangered species, and it is generally acknowledged that lowland populations of native birds have been eliminated from most areas of Hilo.

4.11.6 Air Quality

Emissions from cars and equipment used to generate electricity can affect air quality. New buildings on currently vacant sites may affect air quality by attracting traffic and using electricity. Where development will replace existing buildings, traffic and electrical demand are not expected to significantly increase on-site. Collectively, the projects are not expected to adversely affect regional air quality, as new technologies, increasingly stringent federal air pollution control regulations, and increasing use of alternative forms of transportation (i.e., bicycles, public transportation) may offset potential increases in air pollution.

4.11.7 Noise

Although construction will increase existing on-site noise levels, the proposed educational facilities will not generate significant noise over the long term. The projects are not likely to cumulatively affect regional noise levels, as they support research, education, and other student functions.

4.11.8 Archaeological and Cultural Resources

Of the planned developments, only two will occur on undeveloped land, the PBARC and the International Village Center. These vacant sites are overgrown and may have been used for sugar cultivation and/or pasture uses, which likely destroyed many archaeological resources. The UHH campus has been extensively altered to accommodate existing facilities, and as such, archaeological resources are unlikely to be found. Any impact to such resources or to traditional and cultural practices would generally be site-specific.

4.11.9 Visual Resources

The proposed buildings on University-owned land will reinforce the visual appearance of the UHH campus and the University-related uses in this area. In two cases, the PBARC and the International Village Center will change the visual character of the sites from overgrown lots to University-type facilities.

4.11.10 Hydrogeological Resources

The source of water for all of the projects in the area is the Hilo Aquifer System, which has a sustainable yield of 347 million gallons per day (mgd). As the defacto population of Hilo grows, the water demand for the sustainable yield of the aquifer will increase. However, given the current 9.999-mgd pumpage from Hilo City wells,

the day in which the demand is equal to the supply available is unlikely to come for some time.

5.4 CUMULATIVE AND SECONDARY IMPACTS ON THE SOCIAL AND ECONOMIC ENVIRONMENT

The UHH has several developments planned in addition to this Project (UHH Mauka Lands Master Plan). These projects, as well as potential cumulative impacts, are described below.

5.4.1 Population, Housing, and Community Character

The developments planned by the UHH or other parties using UHH lands (described in Section 4.11) will help accommodate a growing demand for educational and research facilities in Hilo. No homes or residents will be displaced, as the developments will occur on currently undeveloped sites or sites already used for UHH functions. Many of the planned developments will replace existing buildings; however, development of new facilities on vacant land will provide new employment and education opportunities that may attract students, researchers, faculty, and staff to the South Hilo area. The developments, however,
should not have a significant impact on the County's resident population or housing inventory, since the population increase will represent a small percentage of the entire County population and will occur over several years. Collectively, the proposed developments will reinforce the UHH community's character of higher learning.

5.4.2 Economic Character

The proposed developments will provide numerous construction, equipment operator, and specialty trade jobs (on- and off-site) during planning and emplacement of the infrastructure and building of the improvements. Several other jobs will be offered to landscape, service, and maintain each building. Local businesses, including those constructing the improvements and those supplying the materials, will profit from the planned developments. Money spent by workers and businesses at off-site shops, restaurants, and service establishments throughout the island will benefit the County's economy. As these wages, profits, and expenditures move through the regional economy, they will have a ripple, or "multiplier," effect – increasing the amount of capital flowing to the entire community. The State's economy will also benefit from the generation of income and general excise tax revenues.

Since the developments are not expected to have a significant impact on population and housing, State and County expenses (i.e., police/enforcement, fire protection, emergency medical response, road maintenance, etc.) are not expected to be adversely affected.

6.6 CUMULATIVE AND SECONDARY IMPACTS ON INFRASTRUCTURE FACILITIES

6.6.1 Water Facilities

Although several planned developments in Hilo will occur on sites with existing buildings and associated infrastructure, improvements to the existing domestic water storage and delivery system may be needed. The County will review each project to ensure that there are no major impacts to the municipal water system.

6.6.2 Wastewater Facilities

Each proposed building may have impact on the municipal wastewater collection, treatment, and disposal system. To ensure that the wastewater system can accommodate future developments without being adversely affected, each project is reviewed by the County so that it may identify any improvements that might be required.

6.6.3 Drainage Facilities

The planned developments would increase the amount of impervious surfaces by construction of buildings, roadways, parking areas, and walkways (although most of the developments will occur on already developed sites). No significant impacts on existing drainage conditions are anticipated, as on-site storm drainage facilities will be sized to control runoff in excess of estimated pre-development runoff quantities, in accordance with the Storm Drainage Standard of the County of Hawaii, October 1970. The overflow entering the drainage systems in roadways will not be greater that pre-development quantities. Stormwater management options can be developed to minimize increases in pollutant loads.

6.6.4 Solid Waste Facilities

As the defacto population increases, the capacity of the South Hilo Landfill will decrease. Since the County's population is not expected to significantly increase with the planned developments alone, and since recycling practices are increasing, over the long term, the amount of solid waste generated directly and indirectly per capita is decreasing. However, this does not discount the County's need to address the eventual closure of the South Hilo Landfill.

6.6.5 Transportation Facilities

The Science and Technology Building is located east of the Project on the UHH main campus. Its central location makes walking to other science buildings and the Library and Media Center easy (within a five-minute walk). Vehicular traffic generated by the building is more likely to impact Lanikaula Street than Mohouli Street, Komohana Street, or Puainako Street, which border the proposed Project.

The Student Services/Administration Building and the International Village Center are more likely to generate vehicular traffic on West Kawili Street and Puainako

Street (below West Kawili Street) than Mohouli Street and Komohana Street near the proposed Project site.

Vehicular traffic generated by the Student Life and Event Complex and the MKAEC was included in the traffic estimates for the existing University Park. These traffic conditions were incorporated into the TIAR for this Project. Primary guest parking for the MKAEC will be located on the UHH main campus, and a van shuttle service will take guests to/from the MKAEC.

Vehicular traffic for the PBARC was also incorporated into the TIAR. A separate bikeway system will be provided between the PBARC and the University Park Expansion and Hawaii CC. Nearby existing and proposed bicycle facilities (Figure 13) will further encourage the use of bicycles.

7.7 CUMULATIVE AND SECONDARY IMPACTS ON PUBLIC FACILITIES AND UTILITIES

7.7.1 Electrical and Communication Facilities

Any increase in demand for electricity not generated by renewable resources will have an indirect impact on air quality, as emissions are generated by HELCO-owned steam units, diesel units, and gas turbines. All new projects increasingly incorporate energy-saving features in the design of projects. These features include: 1) use of natural ventilation to increase comfort of occupants; 2) maximum use of natural lighting without heat gain; 3) use of high efficiency compact fluorescent lighting; 4) use of insulation/radiant barrier for an equivalent R-19 value in ceiling; 5) use of ceiling fans; and 6) use of landscaping for dust control and to minimize area heat gain. New buildings are likely to increase the demand for communications services (i.e., CATV and telephone service), but are unlikely to have an adverse effect on existing communications systems.

7.7.2 Recreational Facilities

The proposed developments will serve research and educational purposes and are not expected to have a substantial impact on population or existing recreation facilities. The Student Life and Event Complex will include a multi-purpose facility for sports, recreation, and conference activities, as well as a swimming pool; however, as the resident population in Hilo increases, there will be a greater demand for recreational facilities. Casual observance of parks and active play courts in and around Hilo would indicate that existing facilities do not experience overuse, except maybe for school-aged soccer league play.

7.7.3 Medical Facilities

Accidents requiring medical attention are unavoidable and will occur at some time during the development or operation of the proposed buildings. These situations are expected to be infrequent; however, as the defacto population in Hilo increases, so will the demand on Hilo's medical facilities. The Hilo Medical Center is the only hospital in Hilo but is not currently at capacity.

7.7.4 Educational Facilities

All of the planned developments in the Project area are related to education in some way. As such, each development will provide additional educational facilities and opportunities to meet the needs of residents.

7.7.5 Police Protection

Incidents requiring police protection or service are unavoidable, but are expected to be infrequent, as on-site security systems or personnel are likely to be employed. Although no significant impacts to population are anticipated, as the defacto population in Hilo increases, additional officers and staff may be needed.

7.7.6 Fire Protection

Unavoidable fires and emergency situations would require protective service from the Fire Department. To prevent fires, all facilities would be designed to meet fire code requirements and design plans would be coordinated with the Fire Department. Emergency and fire vehicle access would also be provided. Although no significant impacts to population are anticipated, as the defacto population in Hilo increases, additional fire fighters and staff are may be needed.

2. The majority of the project site is located in Zone X, which are areas outside of the 100-year and 500-year floodplains. A portion of the site is located in Zone A, which are areas inside of the 100-year floodplain. However, drainage improvements associated with construction of the Sunrise Estates subdivision near the project site greatly reduced the Zone A floodplain. As such, the Draft EIS recommended that a detailed flood study be conducted to determine the 100-year floodplain. Typically, such studies are conducted during the design phase.

   The Draft EIS stated that between one and five percent of the area was covered by lava flows; however, the "area" was not meant to be the project site. As such, the Final EIS has been revised to explain that between one and five percent of Zone 3, which includes the Hilo area, has been covered by lava flows since 1800. *Section 4.2 Natural Hazards* of the Final EIS includes the following:

   The current USGS volcanic hazard zone map for the Island of Hawaii divides the island into zones ranked from 1 through 9 (with 1 being the area of greatest hazard and 9 being the area of least hazard) based on probability of coverage by lava flows. According to this map the entire Hilo area is within Zone 3. This hazard rating indicates that the zone is gradationally less hazardous than Zone 2 because it is a greater distance from active vents and the topography makes it less likely to be covered by lava flows. Zone 3 has had one to five percent covered by lava since 1800, and 15 to 75 percent covered in the last 750 years.

   Section 4.2 Natural Hazards of the Final EIS has been revised to include the following:

   The Island of Hawaii has historically received less threat and damage from hurricanes as compared to Kauai. However, as with other existing and future developments in the South Hilo District and island-wide, structures built on the project site could potentially be damaged by high winds and heavy rainfall from a hurricane passing over the island.

   Section 4.2.1 Effects from Natural Hazards of the Final EIS has been revised to include the following:

   Although the potential for future natural hazards of significant force is low, the Project site may be subject to damage from earthquakes, lava flows, hurricanes, and/or flooding hazards. However, the site is no more susceptible to damage by natural hazard than other homes and buildings present in the surrounding Hilo community, given that the majority of the site is outside of the 100-year and 500-year floodplains (Zone X), the entire island is designated Zone 4 for seismic hazard, and the entire Hilo area is designated Zone 3 for lava flow hazard. To minimize potential damages from earthquakes, project facilities and other accessory structures would be structurally designed and constructed in accordance with applicable County design standards for Zone 4 areas.

3. *Section 4.10.1 Existing Hydrogeological Resources* and *Section 6.1.1 Existing Water Facilities* of the Final EIS have been revised to include the following:

   The Hilo Aquifer System has a sustainable yield of 347 million gallons per day (mgd), and the current pumpage from Hilo City wells (Panaewa No. 1, 2, and 3; Piihonua No. 3A and 3B; and Saddle Road) is 9.999 mgd.

4. *Section 4.9.2 Effects on Visual Resources* has been revised to include the following:

   As recommended by the University of Hawaii Environmental Center (Chapter 15.0), the installation of motion-activated outdoor lighting will be considered to minimize lighting impacts to the Mauna Kea Astronomical Observatory.

5. We have relayed to the University of Hawaii at Hilo and Hawaii Community College your recommendation that a comprehensive waste management plan emphasizing source reduction and reuse be developed. A recycling plan will address plastic containers and a beverage container redemption station located on the proposed campus.

   Section 6.4.2 Effects on Solid Waste Facilities has been revised to include the following:

   The UH Environmental Center recommended that the recycling plan include plastic containers, especially given the State's new Bottle Bill. A beverage container redemption station is also recommended on campus. A comprehensive waste management plan emphasizing source reduction and reuse will be developed.

6. The Final EIS will recommend that consideration be given to installing renewable energy systems, including solar water heating and photovoltaic systems, where feasible.

   Section 6.4.2 Effects on Solid Waste Facilities has been revised to include the following:

Mr. John T. Harrison, Ph.D.
SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN
DRAFT ENVIRONMENTAL IMPACT STATEMENT
February 7, 2005

As recommended by the University of Hawaii Environmental Center (Chapter 15.0), the installation of renewable energy systems (i.e., solar water heating, photovoltaic systems) should be considered where feasible.

7. We have relayed to the University of Hawaii at Hilo and Hawaii Community College your recommendation for an updated TIAR to be prepared once the first phase of the proposed development is complete.

Section 6.5 Transportation of the Final EIS has been revised to include discussion of transportation between project area and the University campus and surrounding community. The Final EIS also discusses public transportation and streets, walkways, bike paths, and shuttle buses.

Section 6.5.4 Bicycle Facilities has been added as follows:

6.5.4 Bicycle Facilities

The State Department of Transportation has developed a master plan to enhancing the bicycling environment in Hawaii. Bike Plan Hawaii 2003 identifies existing and proposed bicycle facilities on all islands.

Existing Bicycle Facilities in Hilo

- *Kanoelehua Avenue Bike Lane (Kamehameha Avenue to Puainako Street)*
- *Kanoelehua Avenue Signed Shared Road (Puainako Street to Makalika)*
- *Kawili Street Bike Lane (Manono Street to Puainako Street)*
- *Kalanianaole Avenue Signed Shared Road (Kamehameha Avenue to Leleiwi Beach Park)*
- *Mohouli Street Extension Signed Shared Road (Beyond Komohana Street)*

Bicycle Facilities Currently Underway in Hilo

- *Hilo Bayfront Highway Bike Lane (Manono Street to Kanoelehua Avenue)*
- *Puainako Street Extension Signed Shared Road (Beyond Komohana Street)*

Proposed Bicycle Facilities in the Project Vicinity

Figure 13 shows the proposed bicycle facilities in the Project vicinity. The numbers correspond to those used in Bike Plan Hawaii 2003.

- *10 – Mohouli Street Bike Lane (Komohana Street to Kilauea Avenue)*
- *11 – Kumukoa Street/West Lanikaula Street/East Lanikaula Street Bike Lane (Kukuau Street to Kanoelehua Avenue)*
- *12a – Komohana Street Bike Lane (Waianuenue Avenue to Ainaola Drive)*
- *12b – Nowelo Street Bike Lane (Komohana to UH Hilo Expansion Area)*
- *23 – West Puainako Street Bike Lane (Komohana Street to Kinoole Street)*

Existing and proposed bicycle facilities will encourage bicycle use in the Hilo area and between the UHH main campus, University Park, and the Mauka Lands area. As shown in Figure 5 of the Preliminary Engineering Report (Appendix E), a bicycle lanes will be

provided along the Nowelo Street Extension, which would be a feeder road to the Hawaii CC. Bicycle access will also be provided in a separate bikeway system within the University Park Expansion and to the Hawaii CC campus and the USDA facilities. Appropriate bicycle and pedestrian improvements along the Puainako Street Extension fronting the proposed Hawaii CC Komohana Campus will be considered when the Hawaii CC is being designed.

A section on public transportation has been added as follows:

6.5.6 Existing Public Transportation

The Hawaii County Mass Transit Agency provides public transportation around the island on the Hele-On bus. Buses stop at the main entrance of the UHH campus (in front of the University Classroom Building) on routes between Downtown and Prince Kuhio Plaza. The Mass Transit Agency also offers a Shared Ride Taxi program, which provides door to door transportation for as little as $2 within the urbanized area of Hilo. The UHH provides a free van shuttle service between some apartment complexes and the UHH campus.

6.5.7 Effects on Public Transportation

In the future, when the University Park Expansion and Hawaii CC facilities are in operation and when there is sufficient demand for public transportation, the Mass Transit Agency and the UHH may consider expanding routes to provide service to the Project area.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

LINDA LINGLE
GOVERNOR OF HAWAII

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

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

RECEIVED
DEC 23 2004
PBR HAWAII

In reply, please refer to:
EMD / WB

December 17, 2004

H2 4 001 122.wpd
w12 wb041084

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
Honolulu, Hawaii 96813

Dear Mr. Shigekuni:

Subject: **Draft Environmental Impact Statement for UH Hilo Mauka Lands Master Plan Prepared & Submitted by PBR Hawaii**
South Hilo, Hawaii
TMK: (3) 2-4- 001: 122

We have done a preliminary search of our files for the above subject project. At this time, we have no wastewater records on the above subject property.

For any development, please be aware that all wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We do reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at 586-4294.

Sincerely,

HAROLD K. YEE, P.E., CHIEF
Wastewater Branch

LNKM:erm

c: EPO, Attn: Ms. June Harrigan-Lum
Office of Environmental Quality Control

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
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February 7, 2005

Mr. Harold K. Yee, P.E., Chief
State of Hawaii
Department of Health
Wastewater Branch
P.O. Box 3378
Honolulu, Hawaii 96801

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Yee:

Thank you for your letter dated December 17, 2004 (your reference number EMD/WB H2 4 001 122.wpd w12 wb041084). We offer the following responses to your comments.

1. We acknowledge that the DOH Wastewater Branch has no wastewater records on the subject property.

2. All wastewater plans will conform to applicable provisions of the DOH Administrative Rules, Chapter 11-62, "Wastewater Systems." The DOH Wastewater Branch has the right to review the detailed wastewater plans for conformance to applicable rules.

Section 6.2.2 Effects on Wastewater Facilities of the Final EIS has been revised to include the following:

After reviewing the DEIS, the Wastewater Branch stated that it had done a preliminary search of its files and had no wastewater records on the subject property (Chapter 15.0). It further stated that all wastewater plans must conform to applicable provisions of the Department of Health Administrative Rules, Chapter 11-62, "Wastewater Systems," and the Wastewater Branch reserves the right to review the detailed wastewater plans for conformance to applicable rules.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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

HRD04/1088B

December 28, 2004

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Re: Mauka Lands Master Plan, Draft Environmental Impact Statement (DEIS), University of Hawai'i at Hilo, Hawai'i Island, TMK: 2-4-01:122

Dear Mr. Shigekuni:

The Office of Hawaiian Affairs (OHA) is in receipt of the Draft Environmental Impact Statement (DEIS) from your firm regarding the proposal to expand the University of Hawaii at Hilo University Park research facilities and relocate the Hawai'i Community College to the Kōmohana Campus. This project will develop an approximately 267-acre parcel owned by the State of Hawai'i. Thank you for your patience during our review.

After reviewing the submitted materials, OHA staff have no substantive comments to offer at this time concerning this project, other than to note that the University of Hawai'i at Hilo provides a much needed resource to the general population, and to native Hawaiians seeking to expand their educational opportunities.

If you have any questions or concerns, please contact Kai Markell, Policy Advocate, at 594-1945 or kaim@oha.org. Once again, thank you for your patience during our review and assessment of this important matter.

'O wau iho nō,

for Clyde W. Nāmu'o
Administrator

c. Office of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813

Mr. Lo-Li Chih
University of Hawaii at Hilo
200 West Kawili Street
Hilo, Hawaii 96720

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February 7, 2005

Mr. Clyde W. Nāmu'o, Administrator
State of Hawaii
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Nāmu'o:

Thank you for your letter dated December 28, 2004 (your reference number HRD04/1088B). We acknowledge that the Office of Hawaiian Affairs has no substantive comments to offer at this time, other than to note that the University of Hawai'i at Hilo provides a much needed resource to those seeking to expand their educational opportunities.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your letter will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

PBR HAWAII

Vincent Shigekuni
Principal

Encl.

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

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Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

December 13, 2004

Mr. Vincent Shigekuni
PBR Hawaii
ASB Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96813

Dear Mr. Shigekuni:

Draft Environmental Impact Statement (EIS)
University of Hawaii at Hilo Mauka Lands Master Plan
Tax Map Key: 2-4-01:122, South Hilo, Hawaii

Thank you for the opportunity to review the Draft Environmental Impact Statement for the University of Hawaii at Hilo Mauka Lands Master Plan. As discussed with staff, we apologize for this delayed comments.

We have the following comments on the draft EIS:

1. The draft EIS states that the Project involves the expansion of the University of Hawai'i – Hilo University Park research facilities and the relocation of Hawai'i Community College to the Komohana Campus. It mentions that there will be a mixture of research, instructional, administrative, and support services. The EIS should further discuss the types of potential research facilities. It should also discuss what the alternative uses will be for the Hawai'i Community College Manono Campus since the entire campus is planned to relocate to the Komohana Campus. More discussion is needed to clarify what kinds of support services are planned on the proposed campus.

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2. Page 38, 5.2.2 Effects on Population and Housing. The EIS states in the first sentence that "The University Park Expansion, Hawai'i CC Komohana Campus, and other planned research facilities will likely attract researchers, additional students, faculty, and staff to the South Hilo area. The last sentence of the same paragraph states, "Population is not expected to increase with the relocation of the Hawai'i CC Campus. The new staff and families may purchase homes or lots in Hilo or other areas. However, the EIS does not address existing or proposed housing for present and/or additional student population. Discussion on student housing should be included in the EIS.

3. Figure 3 Preliminary Master Plan shows 2-3 roadway stubouts from Sunrise Estates Subdivision to the west of the project area. The EIS should discuss the potential for roadway connectivity with those roadways.

4. Page 34, 4.9.2 Effects on Visual Resources. The EIS indicates that there will be a 50-foot landscape setback buffer from the Sunrise Estates Subdivision as well as along the western edge of the UHH University Park Expansion. Were there any meetings or input on the setback buffer with that subdivision community?

5. Your discussion of alternatives on Page 88 should include a more detailed explanation of why other potential sites in Hilo were rejected, rather than just a conclusory statement that this was the site selected.

6. Figures 2, 4, 8, 9 10 and 11 should include location labels similar to Figure 7 Vicinity Map.

Should you have any questions, please feel free to contact Alice Kawaha of this department at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

AK:cd
p:\wpwin60\alicewin\LShigekuniDEISUHHExp

xc: Office of Environmental Quality Control
Long Range Division – Ms. Alice Kawaha

PBR HAWAII
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February 7, 2005

Mr. Christopher J. Yuen
Planning Director
County of Hawaii
Planning Department
101 Pauahi Street, Suite 3
Hilo, Hawaii 96720-3043

SUBJECT: UNIVERSITY OF HAWAII AT HILO MAUKA LANDS MASTER PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Mr. Yuen:

Thank you for your letter dated December 13, 2004. We offer the following responses to your comments.

1. Currently, the University of Hawaii at Hilo (UHH) does not have a detailed plan for the types of research facilities that may move into the proposed University Park Expansion area. In general, the UHH would like to see research, technology, or other functions that will be compatible with and/or enhance UHH (and Hawaii Community College).

   Since Hawaii Community College (Hawaii CC) at the Manono Campus and at the UHH Campus would eventually be relocated to the proposed Komohana Campus, we agree that this does beg the question of how the Manono Campus will be used. Although most of the major facilities at Hawaii CC will eventually be consolidated at the proposed Komohana Campus, the Manono Campus will still play an important role in the University of Hawaii system. There are no plans to "release" Manono Campus to another State agency at this time.

   The proposed Hawaii CC Komohana Campus will include areas for classrooms as well as academic and institutional support spaces.

   The *Description of the Action* in the *Executive Summary* of the Final EIS has been revised to include the following:

   At is time, the UHH does not have a detailed plan for the types of research facilities that may move into the proposed University Park Expansion, although they would likely serve research or technology functions that would be compatible with and/or would enhance the UHH and Hawaii CC. Although most of the major facilities at Hawaii CC will eventually be consolidated at the proposed Komohana Campus, the Manono Campus will still play an important role in the University of Hawaii system. There are no plans to "release" Manono Campus to another State agency at this time. The Hawaii CC Komohana Campus will include space for classrooms as well as academic and institutional support services.

2. The University of Hawaii has initiated a study on student housing needs for all of its existing campuses statewide. However, since this study is at the very preliminary stages, definitive information is not available at this time. Typically, dormitories are not provided on UH Community Colleges (with some exceptions), as the target student population is the surrounding residents. It is for this reason that there were no plans to provide student housing on the proposed Hawaii CC Komohana Campus.

   Section 5.2.2 Effects on Population and Housing of the Final EIS has been revised to include the following:

   Although it is likely that new staff and families will move to Hilo from Oahu or areas outside the State and purchase homes or lots, this relocation will occur over several years as various construction phases are completed (2005 to 2020 timeframe).

   In response to comments received from the County Planning Department regarding student housing (Chapter 15.0), typically, dormitories are not provided on UH Community Colleges (with some exceptions), as the target student population includes surrounding residents. For this reason, there are no plans to provide student housing on the proposed Hawaii CC Komohana Campus.

3. While there appears to be three potential stubouts from the Sunrise Estates Subdivision abutting the boundary with the UHH Mauka Lands property and current plans are very preliminary and could accommodate either vehicular and/or pedestrian (and bike) connections, we anticipate, perhaps incorrectly, that residents of the Sunrise Estates Subdivision would prefer to limit the number of pedestrian and/or bike connections. Greater vehicular (and bike and pedestrian) connectivity would enhance the plans for the UHH Mauka Lands property and not detract from it.

   Section 6.5.2 Effects on Roads and Vehicular Traffic of the Final EIS has been revised to include the following:

   The County Planning Department reviewed the DEIS and provided comments (Chapter 15.0) regarding three potential stubouts from the Sunrise Estates Subdivision abutting the Project boundary. While current plans are very preliminary and could accommodate either vehicular and/or pedestrian (and bicycle) connections, it is anticipated that residents of the Sunrise Estates Subdivision would prefer to limit pedestrian and/or bicycle connections. Greater vehicular (and pedestrian and bicycle) connectivity would enhance, rather than detract from, the plans for the UHH Mauka Lands property.

4. An effort was made early on to contact the Sunrise Estates Subdivision Community Association, but not specifically on the matter of the landscape setback buffer. Again, plans for development along the boundary shared with Sunrise Estates Subdivision are very preliminary at this point and could be revised if required.

   Section 4.9.2 Effects on Visual Resources of the Final EIS has been revised to include the following:

   After reviewing the DEIS, the County Planning Department asked whether any meetings were held with the Sunrise Estates Subdivision community regarding the 50-foot landscape setback buffer (Chapter 15.0). An effort was made to contact the Sunrise Estates Subdivision Community Association, but not specifically on the matter of the landscape setback buffer. Plans for development along the boundary shared with the Sunrise Estates Subdivision are very preliminary at this point and could be revised if required.

5. *Section 9.5 Alternative Locations for the Proposed Project* of the Final EIS has been revised as follows:

   Alternative locations for the proposed Project were considered and, following extensive analysis, have been rejected. Expanding University Park on State land elsewhere in Hilo would be inconvenient for students and faculty at UHH. Rebuilding Hawaii CC at Manono Campus is not feasible, as the site is too small and would require construction of multi-story buildings and on-site parking structures to accommodate off-street parking.

   In June 1997, the Hawaii County Council adopted Resolution No. 75-97 in support of the relocation of Hawaii CC to Downtown Hilo. The State of Hawaii Legislature then appropriated funds to the University of Hawaii for a feasibility study on the downtown relocation proposal. The Hawaii Community College Downtown Relocation Analysis (1998) evaluated downtown building conditions (i.e., construction type, age, parking facilities, building accessibility to meet ADA requirements, general current use, and ownership) and infrastructure facilities. The report provided a recommended plan and studied the impacts of the plan and required infrastructure improvements. It also identified alternative plans, including increasing the density of development at the Hilo Hotel site or using more remote sites (i.e., the old supermarket site at the corner of Ponahawai and Kilauea Streets).

   However, the University of Hawaii decided not to relocate Hawaii CC to Downtown Hilo due to the cost of renovating old facilities not designed for educational programs. While the study found that there is more than adequate square footage in Downtown Hilo to accommodate the needs of the future campus, many of the buildings would have to either be renovated (for structural, educational, fire protection, or ADA accessibility reasons) or demolished and replaced with new buildings (and the land under these buildings would have to be acquired). The study found that 277,999 square feet distributed among 17 buildings were usable but would need to be renovated, and 14 buildings would have to be demolished and replaced with approximately 10 new buildings providing approximately 191,383 square feet.

   In addition, parking in the old Downtown area would be heavily impacted. While the introduction of students to the area would generate more business to this commercial area, many businesses would suffer because they do not provide off-street parking and their customers rely on on-street parking. As a result of the lack of parking, the study recommended that five, two-story parking structures and one three-story parking structure would need to be built to accommodate the off-street parking requirements of the Hawaii CC campus in Downtown Hilo. An additional three surface parking lots would also have to be constructed. The plan indicated that there are traffic circulation issues that would require the installation of two new traffic signals and modifications at these intersections.

   Due to these findings, and the fact that the Hawaii CC campus would be located away from the synergy created by UHH and University Park, the Hawaii CC decided that relocation to the proposed Komohana Campus site would be more advantageous to the institution.

6. Figures 2, 4, 5, 6, 8, 9, 10, and 11 will be revised to include a Project Site label.

Thank you again for your participation in the Environmental Impact Statement process for this project. Your comments will be included in the Final EIS.

If you have any questions regarding this project, please do not hesitate to contact me at (808) 521-5631.

Sincerely,

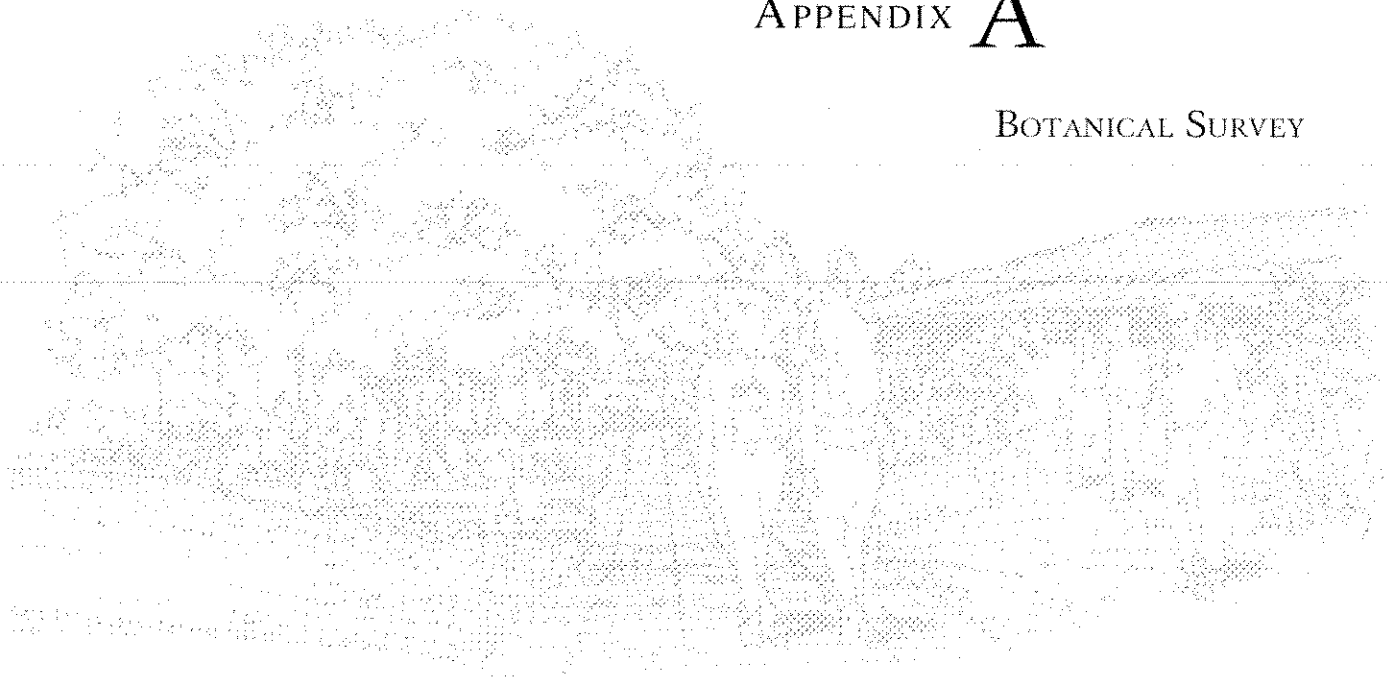
PBR HAWAII

Vincent Shigekuni
Principal

cc: Office of Environmental Quality Control
Doraine Young, Engineering Concepts, Inc.
Lo-Li Chih, University of Hawaii at Hilo

Appendix A

Botanical Survey



BOTANICAL SURVEY
UH HILO MAUKA LANDS MASTER PLAN
SOUTH HILO DISTRICT, HAWAI'I

by

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Prepared for: **PBR HAWAII**

October 2003

BOTANICAL SURVEY
UH HILO MAUKA LANDS MASTER PLAN
SOUTH HILO DISTRICT, HAWAI'I

INTRODUCTION

The approximately 267-acre project site is located mauka of the UH Hilo University Park of Science and Technology (University Park). The undeveloped State-owned property is bounded by Komohana Street to the east, the Pu'ainako Street Extension (currently under construction) to the south, the Sunrise Estates Subdivision to the west, and the Mohouli Street Extension to the north. On the eastern portion of the project site, four outparcels border Komohana Street. These are the Hawaii Electric Light Company's Komohana substation (about 0,5 acre), the Waiakea Reservoir site (2.066 acres), and an archaeological preservation area (1.4 acres) and the proposed 30-acre USDA Pacific Basin Agricultural Research Center (PBARC). An existing utility easement also crosses the project site.

In order to build upon the economic and educational synergy created between the University, the research facilities at University Park, and the community, UH Hilo is planning to expand the University Park onto the undeveloped ±267-acre parcel located mauka of the existing University Park. The proposed University Park expansion will occupy approximately 118 acres of the 267-acre site. The remainder of the parcel will be used to develop the proposed Hawai'i Community College (HCC) Komohana Campus and other University-related uses (PBR Hawaii 2003). Development of the proposed facilities will require an Environmental Impact Statement (EIS), change of land use designation, and various permits.

Field studies to assess the botanical resources on the ±267-acre project site were conducted on October 6 and

7, 2003 by a team of three botanists. The primary objectives of the field studies were to:

1) prepare a general description of the vegetation on the study site;
2) inventory the flora;
3) search for threatened and endangered species as well as species of concern; and
4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps and a colored aerial photograph were examined to determine vegetation cover patterns, terrain characteristics, access, boundaries, and reference points. The project's Environmental Impact Statement Preparation Notice (PBR Hawaii 2003) was also reviewed for additional information.

A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, disturbances, topography, drainage, exposure, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium, and for comparison with the recent taxonomic literature.

DESCRIPTION OF THE VEGETATION

At least three botanical studies have been made of the vegetation on or adjacent to the project site. Gerrish (1992) conducted a study of the vegetation along the Pu'ainako Street Extension, which delineates the

project site's south boundary. In 1996, a study was made for the 0.5 MG reservoir and water line alignment located on the west side of the project site (Char 1996); it also included a portion of the utility easement which crosses the subject parcel. The most recent study (Char 2001) was for the USDA PBARC site, which the University of Hawai'i project surrounds.

Three of the vegetation types recognized in the earlier studies occur on the project site and are described below. These are the 'ohi'a/uluhe forest, strawberry guava thicket, and ruderal vegetation. An inventory of all the plants observed within these three vegetation types is presented in the species checklist at the end of the report.

'OHI'A/ULUHE FOREST

On Hawai'i island, the 'ohi'a/uluhe forest is associated with geologically young lava flows and shallow soils on the lower, windward slopes of the Puna and Hilo districts. This lowland, wet forest is composed mostly of a thick, nearly continuous blanket of uluhe fern (Dicranopteris linearis) with tall, widely spaced 'ohi'a trees (Metrosideros polymorpha) (Cuddihy and Stone 1990). Because of the thick cover of uluhe fern, there are only a few species associated with this vegetation type.

On the project site, the dense mats of uluhe are 5 to 8 ft. tall with the tangle of fern fronds often climbing up higher onto nearby trees and shrubs. The 'ohi'a trees which emerge through the thick fern cover are 20 to 40 ft. tall on the project site. In some places, tree canopy cover can be 40 to 50 percent. Shrubs of melastoma (Melastoma candidum) and strawberry guava (Psidium cattleianum) form scattered, fairly dense thickets, 12 to 15 ft. tall, throughout the 'ohi'a/uluhe forest. Since their introduction, these two introduced shrubs have spread rapidly and invaded lowland mesic and wet forest habitats. Other woody components observed on the project site in

smaller numbers include gunpowder tree (Trema orientalis), hala (Pandanus tectorius), king palm (Archontophoenix alexandrae), mango (Mangifera indica), octopus tree (Schefflera actinophylla), guava (Psidium guajava), neneleau (Rhus sandwicensis), and melochia (Melochia umbellata).

Under the dense blanket of uluhe fern, ground cover is almost always absent. Scattered patches of blechnum fern (Blechnum appendiculatum), Glenwoodgrass (Sacciolepis indica), Hilo grass (Paspalum conjugatum), strawberry guava seedlings, star-of-Bethlehem (Hippobroma longiflora), etc., are associated with the more open areas around and under the melastoma and strawberry guava thickets.

A portion of the Lava Flow of 1881 is found along the Mohouli Street Extension boundary. The uluhe on this younger flow is about 3 ft. tall in most places and patchy -- it does not form a continuous blanket. The ʻohiʻa trees are 18 to 20 ft. tall with tree trunks about 4 to 6 inches in diameter. Open areas of barren pahoehoe lava make up roughly 30 to 40 percent of the surface. Clumps of broomsedge grass (Andropogon virginicus) are common. Young strawberry guava and melastoma shrubs are scattered here and there. Two invasive alien species which occur here are firetree (Morella faya), which is scattered throughout the flow, and downy or rose myrtle (Rhodomyrtus tomentosa), which is locally common forming fair-sized patches, 3 to 5 ft. tall.

STRAWBERRY GUAVA THICKET

Dense thickets of both the red and yellow-fruited forms of strawberry guava, 10 to 15 ft. tall, and scattered, taller trees of ʻohiʻa, 20 to 30 ft. tall, are found along the western boundary by the Sunrise Estates Subdivision, around the northeast corner of the project site, and on the southeast corner adjacent to the Puʻainako Street Extension. Soils on these areas are somewhat deeper, and the areas appear to

have been disturbed in the past, perhaps by cattle grazing. In the late 1800s and 1900s, the lands around Hilo not suitable for sugar cane production were used as pasture.

The strawberry guava shrubs grow close together with the trunks often spaced 1 to 2 ft. apart. Smaller thickets of melastoma are scattered here and there. Ground cover, for the most part, tends to be sparse due to the heavily shaded conditions under the thickets. Barren, damp soil and leaf litter typify the understory. Shade-tolerant species such as Glenwood grass, blechnum fern, niʻaniʻau fern (Nephrolepis exaltata), young plants of fiddlewood (Citharexylum caudatum), and Japanese climbing fern (Lygodium japonicum) are found sporadically, although in some places, maile-scented fern or lauaʻe (Phymatosorus grossus) is abundant.

The strawberry guava thicket on the southeast corner of the property appears to have been more recently disturbed as it supports a number of ornamental/landscape plants which include two Philodendron species, avocado (Persea americana), mango, Heliconia, Pleomele fragrans, and monstera (Monstera deliciosa). An overgrown dirt road, piles of old bottles, and an archaeological site are found here.

RUDERAL VEGETATION

Ruderal or weedy wayside vegetation occupies only a small portion of the project site and is found on the utility easement and along the peripheries of the study site. These areas are infrequently maintained.

The vegetation consists of a varied assemblage of mostly weedy, alien grasses, herbs, and shrubs. Broomsedge grass and molasses grass (Melinis minutiflora) are the most abundant components of this vegetation type. Other commonly observed species include Glenwood grass, Rib grass, hairy sword fern

(Nephrolepis multiflora), sensitive plant (Mimosa pudica), Spanish clover (Desmodium incanum), owi (Stachytarpheta australis), California grass (Brachiaria mutica), yellow foxtail (Setaria parviflora), bamboo orchid (Arundina graminifolia), and three Crotalaria species. Wedelia (Sphagneticola trilobata), a commonly planted ground cover plant, is found on the utility easement where it borders the USDA PBARC property.

Scrubby vegetation composed of mats of uluhe fern interspersed with young trees of melochia and gunpowder tree, and shrubs of lantana (Lantana camara), strawberry guava, melastoma, and sourbush (Pluchea carolinensis) borders these disturbed areas. A few native plants which prefer the more open, sunny sites are found here. These include trees of neneleau, pala'a fern (Sphenomeris chinensis), small shrubs of 'uhaloa (Waltheria indica), and four sedge species: Fimbristylis dichotoma, Cyperus polystachyos, Scleria testacea, and kuolohia (Rhynchospora chinensis).

DISCUSSION AND RECOMMENDATIONS

Three vegetation types are recognized on the ±267-acre UH Hilo Mauka Lands Master Plan project site. 'Ohi'a/uluhe forest covers the majority of the project site. This vegetation type, which is found on geologically young lava flows and shallow soils, is fairly common in the Puna and Hilo regions. Although the native 'ohi'a tree and uluhe fern make up the primary components of this vegetation type, there are very few other native species associated with this vegetation type. The 'ohi'a/uluhe forest represents a fairly early stage in plant succession on wet lava flows and does not support a rich diversity of native plant species. Two introduced species, melastoma and strawberry guava, are commonly encountered within this vegetation type.

Strawberry guava thicket with scattered 'ohi'a trees is found on places with somewhat deeper soils. Areas

with strawberry guava thickets appear to have been disturbed in the past, and may have been used for pasture.

Ruderal vegetation covers only a small portion of the project site and is periodically, although infrequently, maintained. It is characterized by a mixed assemblage of various grasses, herbs, and shrubs, most of them introduced species. A few native plants which prefer the more open, sunny areas occur here.

A total of 126 species were inventoried on the project site. Of these, 99 (79%) are introduced or alien species; introduced species are all those plants which were brought to the islands by humans, intentionally or accidentally, after Western contact, that is, Cook's arrival in the Hawaiian Islands in 1778. Most of these introduced species are associated with the ruderal vegetation. A few represent ornamental/landscape material which have escaped cultivation and established populations in the wild. These include fiddlewood, downy rose myrtle, Alstonia macrophylla, Hilo holly (Ardisia crenata), and Japanese climbing fern.

Twenty-three (23) native species were inventoried on the project site. Of these, 17 are indigenous, that is, they are native to the Hawaiian Islands and elsewhere, and six (6) are endemic, that is, they are native only to the Hawaiian Islands. The endemic plants are: 'ohi'a, 'ama'u (Sadleria cyatheoides), hapu'u (Cibotium glaucum), ni'ani'au (Neprolepis exaltata ssp. hawaiiensis), neneleau (Rhus sandwicensis), and 'ahanui or 'uki (Machaerina mariscoides ssp. meyenii).

None of the plants inventoried on the project site is a threatened and endangered species or a species of concern (U.S. Fish and Wildlife Service 1999a, 1999b; Wagner et al. 1999). The native plants which were observed on the project site can be found in

'ohi'a/uluhe forests throughout the Puna and Hilo regions. The proposed development of the ±267-acre project site is not expected to have a significant negative impact on the botanical resources.

Hawai'i State law, Act 73, mandates that any new or renovated landscapes for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants wherever and whenever feasible. It is recommended that wherever possible the existing, larger 'ohi'a trees be incorporated into the landscaping plan; some of the smaller trees can be transplanted. Using existing, mature trees would provide "instant" landscaping and also reduce costs for purchase of landscaping material. Other native species which are suitable for landscaping include hapu'u, loulu palm (Pritchardia beccariana), 'ohe (Tetraplasandra), 'ama'u, ni'ani'au, neneleau, 'akiohala (Hibiscus furcellatus), and 'ahanui. Some of these plants already grow on the project site.

The UH Hilo Botany and Horticulture Departments, as well as native plant societies, should be contacted for additional suggestions of native plants suitable for landscape use. UH Hilo's Center for Conservation Research and Training (CCRT) grows native plants at its facilities and should be contacted for planting material.

An excellent example of incorporating the existing 'ohi'a trees and other native plants into a landscaped setting is found at the State's Kalopa Park. It is recommended that the landscape architect use this as a model for the campus landscape. At Kalopa Park, scattered mature stands of 'ohi'a trees and native understory trees and shrubs such as kopiko (Psychotria), kolea (Myrsine), 'olomea (Perrotetia), pilo (Coprosma), hapu'u, and papala kepau (Pisonia) have been incorporated into open lawn areas. Plantings of showy native Hibiscus as well as a few colorful, introduced ornamental species (used sparingly) provide a splash of floral color throughout the year.

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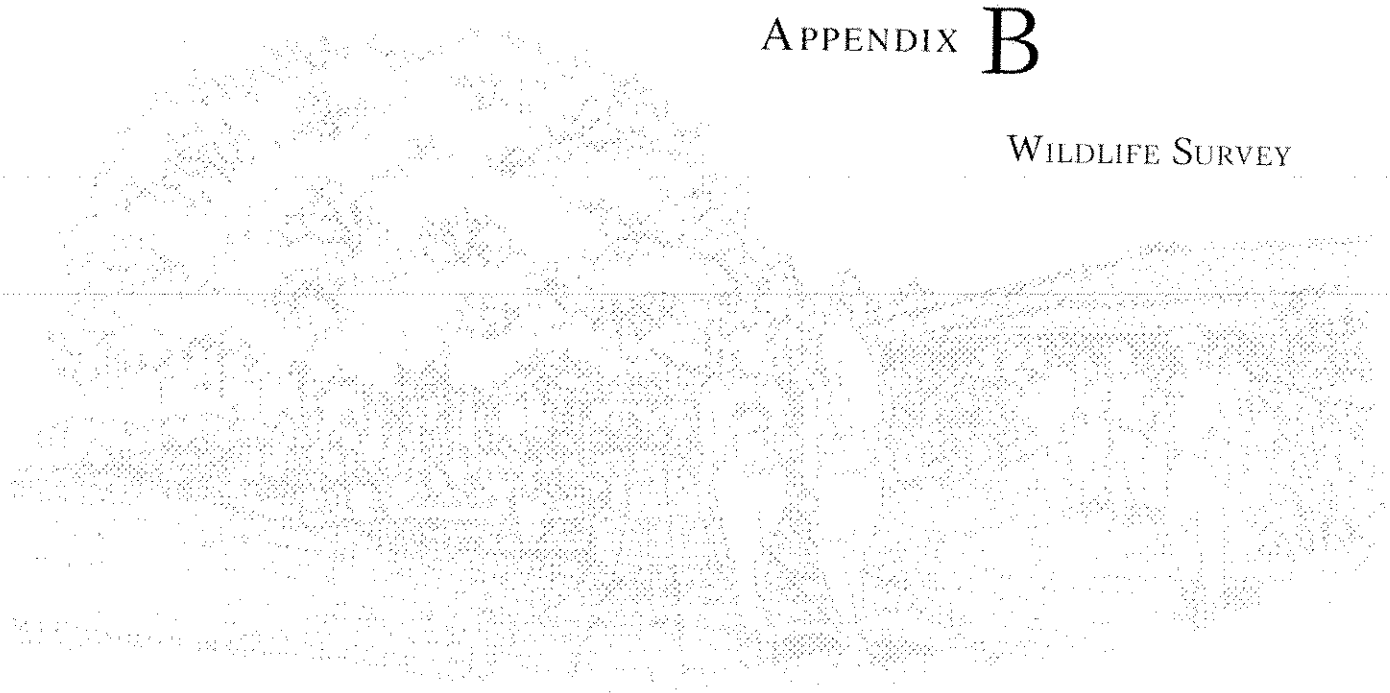
Appendix B

Wildlife Survey



Wildlife Survey
University of Hawaii at Hilo
Mauka Lands
South Hilo District
County of Hawaii, Island of Hawaii

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October 2003

INTRODUCTION

Wildlife surveys were conducted on the morning of October 11 and the evening of October 18, 2003 on a forested parcel of land where the University of Hawaii at Hilo is planning to expand their University Park research facilities in Hilo, Hawaii. The objectives of the wildlife surveys were to describe the avian and mammalian species components at each site and determine whether threatened, endangered or sensitive species were present and if present determine the impact that the project would have on these species.

DESCRIPTION OF PROPERTY

The site is located west of Komohana Street, just mauka of the existing University Park, between the Mohouli Street Extension, the Sunrise Estates Subdivision, and the proposed USDA Pacific Basin Agricultural Research Center (PBARC). The proposed expansion will occupy 118 acres of undeveloped land (PBH 2003). The elevation of the site was from about 386 ft to 472 ft. elev. The vegetation has been described by Char (2001) as ohia/uluhe (*Meterosideros polymorpha/Dicranopteris linearis*) forest with thickets of introduced strawberry guava (*Psidium cattleianum*) and melastoma (*Melastoma candidum*). Other woody components include guava (*Psidium guajava*), melochia (*Melochia umbellata*), hala (*Pandanus tectorius*), gunpowder tree (*Trema orientalis*), and albizia (*Falcataria moluccana*).

A powerline corridor ran east-west through the southern half of the property. The vegetation along the corridor was a weedy mixture of introduced grasses and herbs. Char (2001) lists hairy swordfern (*Nephrolepis multiflora*), molasses grass (*Melinis minutiflora*), sensitive plant (*Mimosa pudica*), *Despodium* sp., owi (*Stachytarpheta australis*), California grass (*Brachiaria mutica*), and broomsedge (*Andropogon virginicus*) along the corridor. A water pipeline also ran along the corridor. In two locations, water leaks created small standing pools of water.

A small patch of wetland vegetation covering an area of only about 100 sq ft, occurred along the northern boundary, just off the pavement of the Mohouli Street Extension.

METHODS

Morning and evening wildlife surveys of both avian and mammalian fauna were conducted at eight count stations and along the route to these stations on the property. Birds were counted for 3 minutes at six morning count stations (1-6) on October 11, 2003 from 07:30 to 09:00 hrs. Count stations were established along the powerline and bulldozed survey transects surrounding the PBARC. A tally of all avian species seen and heard was made at each count station during the morning survey.

An evening survey for bats and nocturnally active wildlife was made on October 18, 2003 form 16:30 to 18:10 hrs at the end of Poloku Road at the southwest corner of the parcel and at the small wetland vegetation site next to the Mohouli extension, about 100 yards from the intersection of Komohana and Mohouli. Visual detection was aided during both survey periods with a 10x32 pair of Leica binoculars.

Brief visits to a site will not yield all the faunal components for that site or habitat type, even under the best conditions. The presence and quantity of a wildlife species is influenced by many factors such as the time of day, season, and a host of environmental conditions, which include the presence of disturbances that can cause wildlife to move out of the area temporarily. These visits, however, generally reveal what can be expected, based on previous anecdotal and scientific records of similar sites and habitats. They are therefore important in verifying and checking the species components and the environmental characteristics which typify the site. Conclusions derived from these visits must, however, be interpreted conservatively.

RESULTS AND DISCUSSION

Despite the native species components of the forest there were no native forest birds at this low elevation site. Birds seen or heard on count stations, in order of abundance, were the melodious laughing thrush, Japanese white-eye, spotted dove, zebra dove, northern cardinal, house finch, common myna and the Pacific golden plover.

Introduced (Non-Native) Birds

Melodious Laughing Thrush (*Garrulax canorus*) - The melodious laughing thrush is also called the hwamei or Chinese hill robin. These birds inhabit very dense

forested lands throughout the lowlands of east Hawaii. They were detected on every station during the morning surveys.

Japanese White-eye (*Zosterops japonica*) - Japanese white-eyes were the second most abundant bird found on the parcel. White-eyes are ubiquitous and can be found in many different habitats. They are generalists and will feed on both insects, nectar and fruit and do well in just about any land use having suitable vegetative components.

Spotted Dove (*Streptopelia chinensis*) - Spotted doves were seen and heard throughout the parcel. They probably used the trees on the parcel for roosting and may use the standing water along the powerline corridor for drinking. During the survey spotted doves and other species were also found on the ground foraging in openings along the powerline corridor and the newly bulldozed transects.

Zebra Dove (*Geopelia striata*) - Zebra doves were using the cleared transects and the powerline corridor to forage on the ground. They also use the parcel as roosting and nesting habitat, foraging in nearby developments and along roads.

Northern Cardinal (*Cardinalis cardinalis*) - The northern cardinals prefer dense stands of forest and shrub. They could be seen crossing the transects and powerline corridor.

House Finch (*Carpodacus mexicanus*) - House finches are more likely to occur in grasslands, woodlands or edges of forests. Nonetheless, perhaps due to the diverse habitats surrounding the parcel and the vegetation along the powerline corridor, house finches were detected.

Common Myna (*Acridotheres tristis*) – The forest was thick and not ideally suited for common myna. Mynas probably were detected as they transited the parcel as they moved to more open areas surrounding the property. Mynas may roost within the parcel and forage in adjacent areas.

Nutmeg Mannikin (*Lonchura punctulata*) - Mannikins were observed between station counts along the powerline. The forested parcel did not provide ideal habitat for the seed eating mannikins except along the powerline corridor where grasses were present.

Migratory Species

Pacific Golden Plover (*Pluvialis dominica*) - The Pacific Golden Plover was heard flying over the parcel. They are winter residents and the only native avian species encountered. The birds migrate from northern latitudes, the adults arriving in late August and the young of the year arriving in late September and October. The winter in Hawaii and leave in late March and April for breeding grounds. The survey was conducted during the period when plovers are present in Hawaii. Dense forest is not plover habitat. Open fields and lawns provide feeding territories that the plovers require. Often, developments which provide lawns will actually increase the number of plovers using the site.

Comments on other Native Birds

No native honeycreepers (family Drepanididae) or other native forest bird species were found on the site. The current elevational range of honey creepers like the amakihi (*Hemignathus virens*), on the island of Hawaii is now generally above 2,132 ft (650 m) above sea level (Kern and Van Riper III 1984). While some of the native habitat is still present in the lowlands, it is generally accepted that stresses brought about by introduced plants, animals, diseases and parasites have eliminated lowland populations of native birds (Scott et al 1988).

Pueo or Short-eared Owl (*Asio flammeus*) - The pueo is a native short-eared owl that inhabits forests and grasslands on all the islands. Only the population on Oahu is listed as endangered by the state of Hawaii. No owls were observed during the survey, however, the habitat of the area could support foraging pueo. Pueo nest on the ground, in grasses, therefore the parcel does not have suitable nesting habitat.

Hawaiian Hawk (*Buteo solitarius*) - The Hawaiian hawk or *io* occurs only on the island of Hawaii and is currently listed as an endangered species by both state and federal governments. It has the ability to feed and nest in forests of introduced species and feed on introduced animals. It still occupies 95 percent of its historic range (Scott et al. 1988) and is commonly seen around Hilo. No *io* were observed during the wildlife survey of the parcel, however, the habitat and area are suitable for supporting Hawaiian hawks.

Shearwaters and Petrels - Hawaiian Petrels (*Pterodroma sandwichensis*) are listed as endangered species and Newell's Shearwaters (*Puffinus auricularis newelli*) are listed as threatened by the U.S. Fish and Wildlife Service and the state of Hawaii. Neither species was encountered during the current wildlife survey. It is unlikely that the parcel hosts a colony of either of these species, however, these birds are

known to transit over Hilo and its vicinity to more mauka nesting sites (Day et al 2003).

Mammals

Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) - The Hawaiian hoary bat is listed as an endangered species by both state and federal governments. The habitat in the area of the proposed site is suitable for bats. A bat was observed flying in a southwest (mauka) direction about 40 m overhead at the end of Poloku Road (538 ft elev. N 19° 41.658′, W 155° 06.307′) at dusk (18:06 hrs, sunset was at 17:55 hrs) near the southwest corner of the parcel on October 18, 2003. It made two foraging maneuvers as it flew over the house lots. Judging by the direction of its flight it passed over the proposed site. Most bat sightings occur from August to December. Bats are commonly seen below 1,640 ft (500 m) elevation and in introduced vegetation, although Jacobs (1994) found that they are more often associated with native vegetation. They are normally not present in closed canopy forests as is present on much of the parcel but they are frequently seen along edges of these forests, among exotic trees, and in orchards (Kepler and Scott 1990). Bats occur island-wide and have often been sighted in Hilo (USFWS 1997).

Feral pigs (*Sus scrofa*) were found along the powerline corridor. Two black and white adults and some piglets were observed on October 11, 2003. The pigs probably range throughout the mosaic of native and introduced vegetation.

Small Indian Mongoose (*Herpestes auropunctatus*) - The mongoose was not seen during the two site visits but they are expected on the parcel. The area is very suitable for mongoose that use dense foliage as cover.

Cat (*Felis cattus*) – Cats can also be expected within the parcel, however cats were not seen during the surveys.

Feral Dogs (*Canis familiaris*) - Free-ranging dogs can be expected in the area, but no dogs were observed on the proposed site.

Rodents - The rat (*Rattus* spp.) and house mouse (*Mus musculus*) probably occur on site. Trapping is required to verify their presence, but they are not considered important in an environmental analysis because they are typically commensal pest species.

CONCLUSIONS AND RECOMMENDATIONS

The property supports a native ohia forest, however, as expected, no native forest birds were observed on site. No threatened or endangered birds were observed. Although the pueo and the endangered Hawaiian hawk were not observed during the survey, the parcel is within current known distributions of these species populations and the habitat on site and in adjacent parcels could support the species. No Hawaiian petrels or Newell's shearwater were observed during the survey, but they have been recorded in Hilo transiting to and from more mauka locations on Mauna Kea. An endangered Hawaiian hoary bat was seen just outside the parcel flying over the residential subdivision to the southwest. Bats have a wide distribution throughout the island of Hawaii. Native forests should generally be retained if species such as the bat are to be preserved, but it is not possible, given the limited observations made during the current survey to make definitive statements regarding whether this species is dependent on this particular parcel or was merely passing over it as was actually observed.

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Appendix 1. Morning bird count results UH Hilo Expansion, October 11, 2003, South Hilo District, Hilo, Hawaii.

STATION	1	2	3	4	5	6	SUM	AVE
LATITUDE	N19° 41.733	N19° 41.722	N19° 41.780	N19° 41.805	N19° 41.965	N19° 41.970		
LONGTI	W155° 06.228	W155° 05.998	W155° 05.804	W155° 05.623	W155° 06.720	W155° 05.538		
ELEVATION	472 ft	439 ft	423 ft	404 ft	395 ft	386 ft		
TIME START	07:47	08:05	08:16	08:28	08:47	08:56		
TIME END	07:50	08:08	08:19	08:31	08:50	08:59		
Melodius Laughing Thrush	4	4	3	4	1	1	17	2.83
Japanese White eye	0	3	3	3	1	2	12	2.00
Spotted Dove	3	4	1	1	0	0	9	1.50
Zebra Dove	2	1	1	1	1	1	7	1.17
Northern Cardinal	1	1	0	2	0	0	4	0.67
House Finch	0	1	2	1	0	0	4	0.67
Common Mynah	1	0	2	0	0	0	3	0.50
Pacific Golden Plover	0	0	0	0	2	0	2	0.33

Appendix C

Archaeological Inventory Survey

SCS PROJECT 361-2

AN ARCHAEOLOGICAL INVENTORY SURVEY ON APPROXIMATELY 258 ACRES OF LAND FOR THE UNIVERSITY OF HAWAI`I-HILO *MAUKA* LANDS DEVELOPMENT WAIĀKEA AHUPUA`A, SOUTH HILO DISTRICT, ISLAND OF HAWAI`I, HAWAI`I [TMK: 3-2-4-01:122]

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TABLE OF CONTENTS

TABLE OF CONTENTS ii

LIST OF FIGURES vi

LIST OF TABLES vii

INTRODUCTION 1
- PROJECT AREA DESCRIPTION 1
- SCOPE OF WORK 1
- METHODS 1

ENVIRONMENTAL SETTING 4
- LAVA FLOWS 4
- SOILS 6
- RAINFALL AND DRAINAGE 6
- VEGETATION 6
  - I. The *Ohi`a* and *Uluhe* (*Metrosideros/Dicranopteris*) Fern Forest 7
  - II. The Closed *Ohi`a* Forest 7
  - III. Savanna 7
  - IV. The Mixed *Ohi`a* and *Waiwi* Shrubland 7

HISTORICAL AND CULTURAL CONTEXTS 8
- TRADITIONAL SETTLEMENT PATTERNS, SUBSISTENCE, AND LAND-USE 8
- THE *MĀHELE* OF 1848 AND LAND COMMISSION AWARDS 11
- CHANGING RESIDENTIAL AND LAND-USE PATTERNS (1845–1865) 12
- WAIĀKEA MILL COMPANY 12

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS 15

REGIONAL ARCHAEOLOGICAL STUDIES 20
- MCELDOWNEY (1979) 20
- SMITH (1991) 20
- KELLY *ETAL.* (1991) 20
- THRUM (1907 AND 1908), HUDSON (1932), AND STOKES AND DYE (1991) 21

INVESTIGATIONS SPECIFIC TO STUDY AREA 21
- HUNT AND MCDERMOTT (1994) 21
- BORTHWICK, COLLINS, FOLK, AND HAMMATT (1993) 23
- MALY (1996) 23
- ROBINS AND SPEAR (1996) 23
- EBLÉ, DENHAM, AND PANTALEO (1997) 24
- SPEAR (1998) 26
- MCGERTY AND SPEAR (1999) 26
- DEGA AND BENSON (1999) 29
- DEGA (2000) 29

BUSH, MCDERMOTT, AND HAMMATT (2000) 31
MCDERMOTT AND HAMMATT (2001) 31

EXPECTED ARCHAEOLOGICAL PATTERNS 31
PREHISTORIC SITES 31
SUGAR CANE CULTIVATION SITES 33
RANCHING AND MILITARY SITES 33
TRANSPORTATION ROUTES AND SITE LOCATION 33

RESULTS OF FIELDWORK 34

SITES LOCATED ALONG THE EAST EDGE OF THE PROJECT AREA 34
SITE 50-10-35-24233 34
Site 24233, Feature A 34
Site 24233, Feature B 34

SITES LOCATED IN THE SOUTHEAST CORNER OF THE PROJECT AREA 37
SITE 50-10-35-18918 37
Site 18918, Feature A 37
Site 18918, Feature B 39
Site 18918, Feature C 39
Site 18918, Feature D 39
SITE 50-10-35-18919 39
SITE 50-10-35-20681 40
SITE 50-10-35-24235 41
Site 24235, Feature A 41
Site 24235, Feature B 41
Site 24235, Feature C 44
Site 24235, Feature D 44
Site 24235, Feature E 44
Site 24235, Feature F 44
Site 24235, Feature G 44
Site 24235, Feature H 49
Site 24235, Feature I 49
Site 24235, Feature J 49
Site 24235, Feature K 49
SITE 50-10-35-24236 49
SITE 50-10-35-24237 53
Site 24237, Feature A 53
Site 24237, Feature B 56
Site 24237, Feature C 56
Site 24237, Feature D 56
Site 24237, Feature E 56
Site 24237, Feature F 57
Site 24237, Feature G 57
SITE 50-10-35-24238 57
Site 24238, Feature A 57

Site 24238, Feature B 60
Site 24238, Feature C 60
Site 24238, Feature D 60
Site 24238, Feature E 60
Site 24238, Feature F 64
Site 24238, Feature G 64
Site 24238, Feature H 64
Site 24238, Feature I 64
Site 24238, Feature J 64
Site 24238, Feature K 64
Site 24238, Feature L 71
Site 24238, Feature M 71
Site 24238, Feature N 71
Site 24238, Feature O 71
Site 24238, Feature P 71
Site 24238, Feature Q 71
Site 24238, Feature R 74
Site 24238, Feature S 74
Site 24238, Feature T 74
Site 24238, Feature U 74
Site 24238, Feature V 74
Site 24238, Feature W 74
Site 24238, Feature X 75
Site 24238, Feature Y 75
Site 24238, Feature Z 75
Site 24238, Feature AA 75
Site 24238, Feature BB 75
Site 24238, Feature CC 77
Site 24238, Feature DD 77
Site 24238, Feature EE 77
Site 24238, Feature FF 77
Site 24238, Feature GG 77
Site 24238, Feature HH 77
SITE 50-10-35-24239 78
SITE 50-10-35-24240 78
Site 24240, Feature A 78
Site 24240, Feature B 80
SITE 50-10-35-24241 80
Site 24241, Test-Unit 1 83
SITE 50-10-35-24242 83
Site 24242, Feature A 84
Site 24242, Feature B 84
Site 24242, Feature C 84
Site 24242, Feature D 84

SITES LOCATED ON THE NORTHWEST EDGE OF THE PROJECT AREA 86
SITE 50-10-35-24243 86

Site 24243, Feature A 86
Site 24243, Feature A, Test-Unit 1 92
Site 24243, Feature B 92
Site 24243, Feature C, Test-Unit 2 92
Site 24243, Feature D 92
Site 24243, Feature E 97
Site 24243, Feature F 97
Site 24243, Feature F, Test-Unit 3 97
Site 24243, Feature G 97
Site 24243, Feature H 97
Site 24243, Feature I 103
Site 24243, Feature I 103
Site 24243, Feature J 103
Site 24243, Feature K 103
Site 24243, Feature L 106
SITE 50-10-35-24244 106
Site 24244, Test-Unit 1 109
Site 24244, Test-Unit 2 109
SITE 50-10-35-24245 110
SITE 50-10-35-24246 110
SITE 50-10-35-24247 110
SITE 50-10-35-24248 110

SIGNIFICANCE ASSESSMENTS AND RECOMMENDED TREATMENTS 112

RECOMMENDED TREATMENTS 113
NO FURTHER WORK 113
DATA RECOVERY 114
Site 24244 114
Site 24243 114

REFERENCES CITED 115

APPENDIX A: MITIGATION OF CANE FIELD SITES ..... A

LIST OF FIGURES

Figure 1: Map of Hawai`i Island Showing Project Location. 2
Figure 2: Portion of USGS 1995 Hilo Quadrangle Topographical Map, Showing Project Location. 3
Figure 3: Project Area Map Showing Lava Flows, Soil Designations, and Natural Drainage. 5
Figure 4: *Ahupua`a* of Waiākea (Bush *et al.* 2000). 9
Figure 5: *`Ili Kūpono* Lands of Pi`opi`o (Kelly *et al.* 1981). 10
Figure 6: Map Showing Portion of Waiākea Homestead Lots and Plantation Fields South and East of the Project Area. 13
Figure 7: Map Showing Waiakea Pasture Land and Waiakea Mill Plantation Lot 20-A. 14
Figure 8: Portion of USGS Hilo Quadrangle Topographical Map, Showing Locations of Previous Archaeological Projects in the Vicinity of the UH Hilo Mauka Lands Project. 19
Figure 9: Map of Project Areas and Site Locations within the Pu`ainako Street Extension Corridors as Designated by Eble et al. 1997. 22
Figure 10: Map of Project Area and Excavation Locations within the Pu`ainako Street Extension Corridors as Designated by Eble *et al.* 1997. 25
Figure 11: Map of Reconnaissance Survey Project Area and Identified Sites within the Pu`ainako Street Extension Corridors. 27
Figure 12: Map of Inventory Survey Project Area and Identified Sites Within the Pu`ainako Street Extension Corridors as Designated by McGerty and Spear (1999). 28
Figure 13: Map of Inventory Survey Project Area and Identified Sites within the Pu`ainako Street Extension Corridors as Designated by Dega and Benson 1999. 30
Figure 14: Map of Inventory Survey Project Area and Identified Sites within the USDA Research Center Parcel as Designated by McDermott and Hammatt 2001. 32
Figure 15: Portion of USGS Hilo Quadrangle Topographical Map, Showing Sites Located on the UH Hilo *Mauka* Lands Project Area. 35
Figure 16: Map Showing Locations of Sites 24233 and 24234. 36
Figure 17: Map Showing Locations of Sites in Southeastern Corner of Project Area. 38
Figure 18: Planview Map of Site 24235 Showing Location of Features. 42
Figure 19: Planview of Site 24235, Feature B Rock Alignment. 43
Figure 20: Planview of Site 24235, Feature C Clearing Mound. 45
Figure 21: Planview of Site 24235, Feature D Clearing Mound. 46
Figure 22: Planview of Site 24235, Feature F Clearing Mound. 47
Figure 23: Planview of Site 24235, Feature G Clearing Mound. 48
Figure 24: Planview of Site 24235, Feature I Clearing Mound. 50
Figure 25: Planview of Site 24235, Feature J Clearing Mound. 51
Figure 26: Profile of Site 24236 Enclosed Lava Tube. 52
Figure 27: Planview of Site 24237 and Features. 54
Figure 28: Photographs of East and West sides of Site 24237, Feature 1 Causeway Looking North. 55
Figure 29: Planview of Site 24238. 58
Figure 30: Planview of Site 24238, Feature A Terrace. 59
Figure 31: Planview of Site 24238, Feature C Clearing Mound. 61
Figure 32: Photograph of Site 24238, Feature D Clearing Mound Looking East. 62

Figure 33: Planview of Site 24238, Feature D Clearing Mound. 62
Figure 34: **Planview of Site 24238, Feature E Clearing Mound.** 63
Figure 35: Planview of Site 24238, Feature F Clearing Mound. 65
Figure 36: Planview of Site 24238, Feature G Clearing Mound. 66
Figure 37: Planview of Site 24238, Feature H Clearing Mound. 67
Figure 38: Planview of Site 24238, Feature I Clearing Mound. 68
Figure 39: Planview of Site 24238, Feature J Clearing Mound. 69
Figure 40: Planview of Site 24238, Feature K Clearing Mound. 70
Figure 41: Planview of Site 24238, Feature L Clearing Mound. 72
Figure 42: Planview of Site 24238, Feature N Clearing Mound. 73
Figure 43: Planview of Clearing Mound Features AA, BB, and CC (Site 24238). 76
Figure 44: Planview of Site 24240. 79
Figure 45: Planview of Sites 24241 and 24242. 81
Figure 46: Planview of Site 24241 Enclosure Looking South. 82
Figure 47: Photograph of Enclosure (Site 24241) Looking South. 83
Figure 48: Planview of Site 50-10-30-18918 Feature C Clearing Mound. 85
Figure 49: Planview Map of Sites 24243, 24244, 24247, and 24248 Showing Feature Locations. 87
Figure 50: Photograph of Insignia Carved into *Hala* Tree North of Site 24243, Feature I. 88
Figure 51: Photographs of Site 24243, Feature A Looking West (Planview) and Northwest (Profile). 89
Figure 52: Planview of Site 24243, Feature A. 90
Figure 53: Profile of Site 24243, Feature A. 91
Figure 54: Planview of Site 24243, Feature B. 93
Figure 55: Planview of Site 24243, Feature C Platform. 94
Figure 56: Photograph of Site 24243, Feature D Looking West. 95
Figure 57: Planview of Site 24243, Feature D. 96
Figure 58: Planview of Site 24243, Feature E. 98
Figure 59: Planview of Site 24243, Feature F. 99
Figure 60: Planview of Site 24243, Feature G. 100
Figure 61: Profile of Site 24243, Feature G. 101
Figure 62: Planview of Site 24243, Feature H Building Foundation. 102
Figure 63: Planview of Site 24243, Feature J. 104
Figure 64: Planview of Exposed Portion of Site 24243, Feature K. 105
Figure 65: Planview of Site 24244 Enclosure. 107
Figure 66: Profile of Site 24244 Enclosure. 108
Figure 67: Planview of Site 24246 Stone Alignment. 111

LIST OF TABLES

Table 1: Land Commission Awards in Waiākea Ahupua`a. 11
Table 2: Previous Archaeological Research in Waiākea Ahupua`a and Project Vicinity. 15
Table 3: Initial Site Assessment of Sites on the UH Hilo Mauka Lands Project. 112

INTRODUCTION

PROJECT AREA DESCRIPTION

At the request of PBR Hawaii, Scientific Consultant Services (SCS), Inc. conducted an Archaeological Inventory Survey of a 258-acre parcel (TMK: 3-2-4-01:122) located in the *ahupua`a* of Waiākea, South Hilo District, Island of Hawai`i (Figures 1 and 2). The project area is situated approximately three kilometers southwest of Hilo Bay and is bounded by the Mohouli Street extension to the north, Komohana Street to the east, the Pū`āinakō Street extension to the south, and by the Sunrise Ridge subdivision to the west. The parcel is being considered for the University of Hawai`i (UH) Hilo Mauka Lands development, a proposed expansion of the Hawaii Community College and the University of Hawai`i Hilo campuses.

SCOPE OF WORK

The Archaeological Inventory Survey was undertaken in accordance with draft Hawai`i Administrative Rules 13§13-284 and was performed in compliance with the Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports contained in draft Hawai`i Administrative Rules 13§13-276. The investigation included the following procedures:

1.) A 100 percent pedestrian survey of the project area. All sites and features were located, mapped (GIS), described, drawn at appropriate scales, and photographed. Sites were assigned temporary numbers pending State Historic Preservation Division (SHPD) assignment of SIHP site numbers.

2.) Limited subsurface testing was conducted at sites, where warranted, to determine depth, quantity, and context of cultural materials and to obtain samples for radiocarbon dating.

3.) Extensive historical and archaeological archival research was conducted including a search of historic maps, aerial photos, written records, Land Commission Award documents, and State and County Planning Division documents.

4.) Interviews were conducted with community members regarding their recollections of land-use and activities known to have occurred within the study area.

METHODS

Prior to fieldwork, a search of geological maps, aerial photos, historical maps, historical documents, and archaeological reports was conducted. Extensive archival research and oral interviews were also carried out as part of the Inventory Survey work. The project area was found to exist entirely within known Waiākea Sugar Mill plantation fields and Waiākea Pastureland.

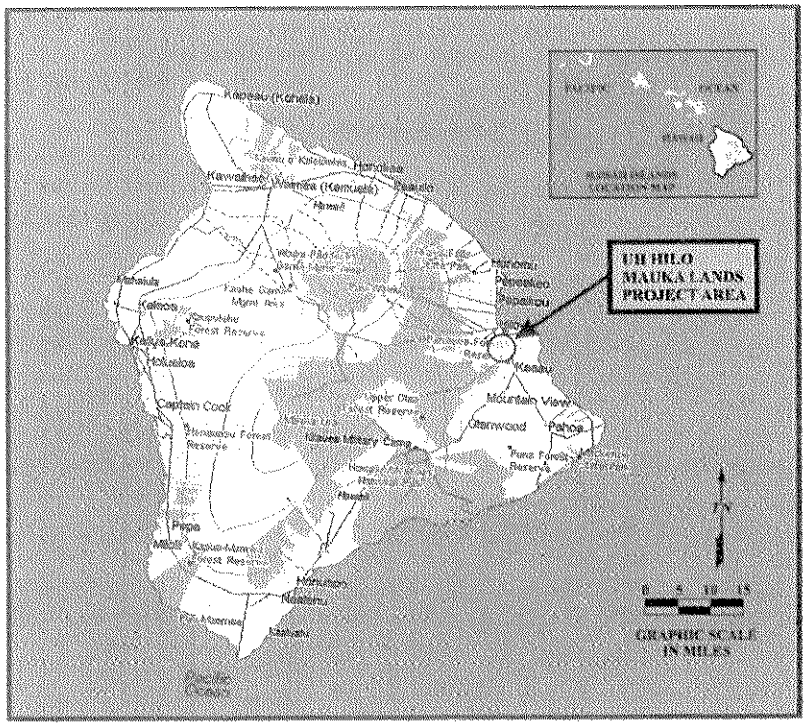


Figure 1: Map of Hawai`i Island Showing Project Location.

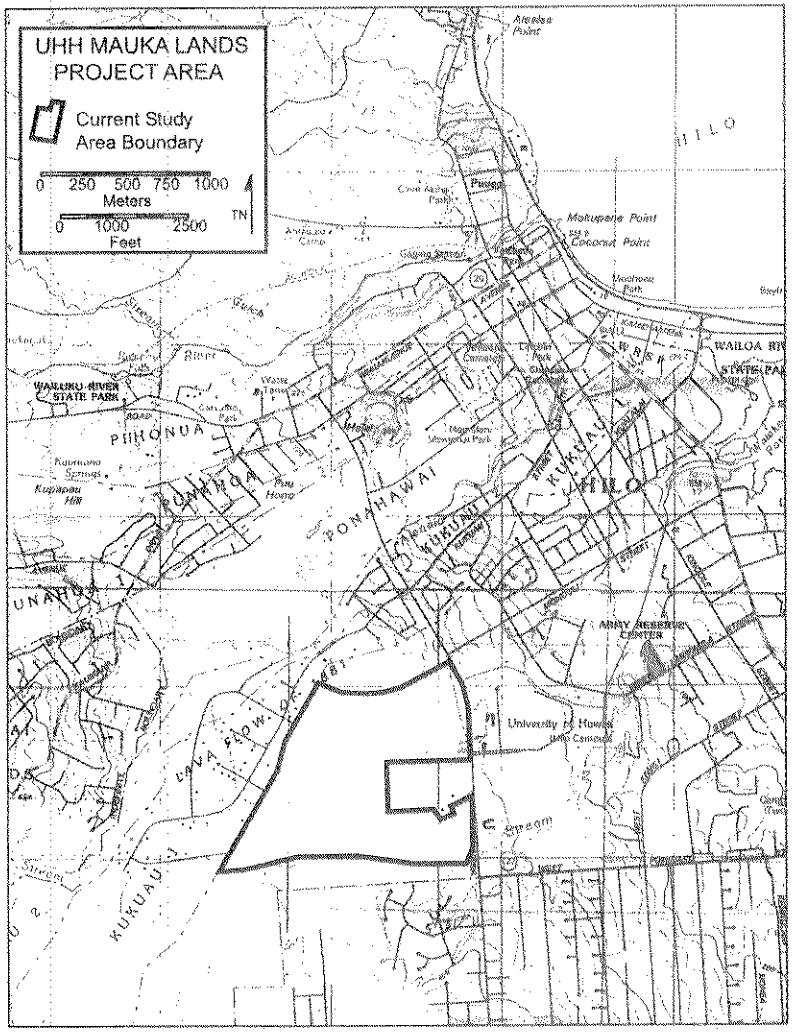


Figure 2: Portion of USGS 1995 Hilo Quadrangle Topographical Map, Showing Project Location.

Fieldwork was carried out in May and June 2003 under the direction of Glenn Escott, M.A. Fieldwork was completed in two steps; a preliminary reconnaissance was completed and was followed by an Inventory Survey. During the reconnaissance survey, SCS crewmembers were spaced 10 to 15-meters apart and traversed the project area in north-south intervals. Ground visibility was limited in many areas by dense mats of *uluhe* fern (*Dicranopteris linearis*). Interval spacing was reduced to as much as three meters in areas of thick ground cover. All features were surveyed and plotted on a GIS map by Control Point Surveyors of Honolulu. Fieldwork and the Inventory Survey report production were completed under the overall direction of Robert L. Spear, Ph.D. (Principal Investigator).

Sixteen new sites comprised 80 features and were recorded during this archaeological work. Site integrity of three previously-documented sites within the project area (State Inventory of Historic Places [SIHP] Sites 18918, 18919, and 20681) was reassessed during the present study. Inn total, there are 19 sites in the project area. The majority of all sites within the study area were interpreted to be related to historic sugar cane cultivation, ranching, or military activities; none of the sites were interpreted as pre-Contact in nature. Discussions between PBR Hawaii and community groups are presently underway regarding the preservation of cultural and environmental resources contained on the UH Hilo Mauka Lands parcel.

This report contains background information outlining the environmental and cultural contexts of the project area, a presentation of previous archaeological work within the study area and in the immediate vicinity, and current survey expectations based on that previous work. This report also includes an explanation of the archaeological methods used during the project; detailed descriptions of the archaeological resources encountered; interpretation and evaluation of those resources; and treatment recommendations for all of the documented sites along with a discussion of interim protection for those sites recommended for data recovery.

ENVIRONMENTAL SETTING

LAVA FLOWS

The UH Hilo Mauka Lands project area consists of a single undeveloped 258-acre parcel [TMK: 3-2-4-01:122] situated on gently sloping to level land at 80 m (300 feet) to 115 m (380 feet) above means sea level (amsl). Three Mauna Loa pāhoehoe flows within the project area dictate soil conditions, drainage, and vegetation (Wolfe and Morris 1996 [Figure 3]) in the area. The oldest flow, dating between 10,000 and 5,000 B.P., occurs along the southern boundary of the project area and is overlain by well-developed deep ash soils. A second flow dating to between 1,500 and 750 B.P. covers the majority of the project area and is overlain in places by

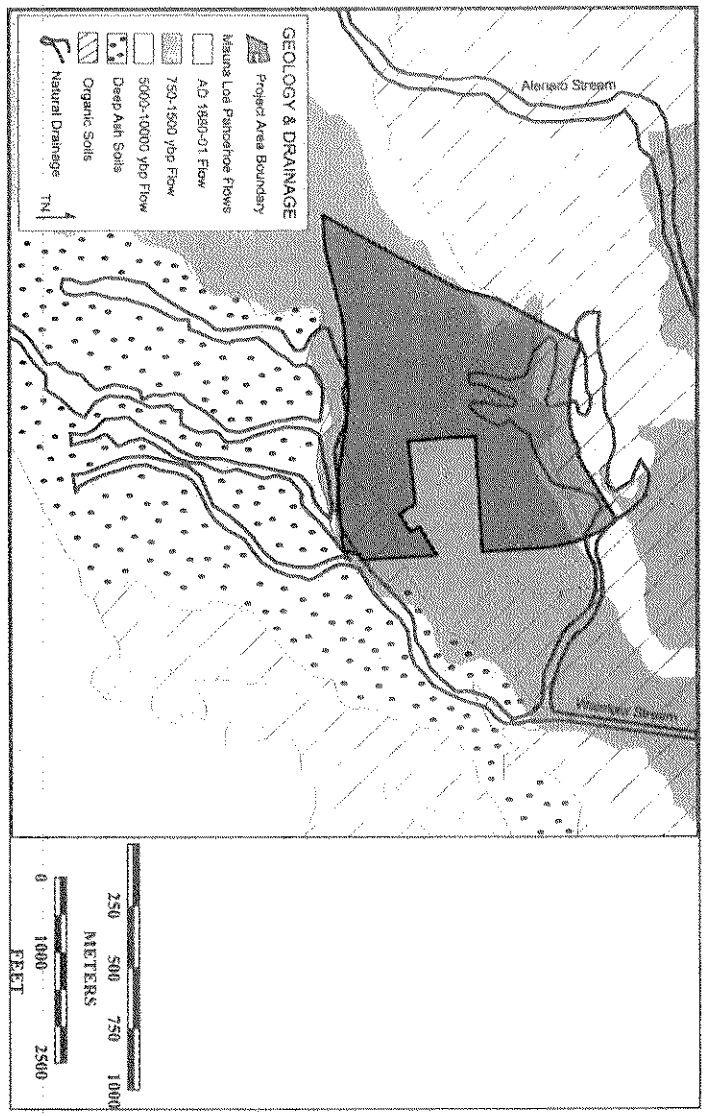


Figure 3: Project Area Map Showing Lava Flows, Soil Designations, and Natural Drainage.

thin organic soils. The third is the historic 1880–1881 flow present along the northern edge of the project area and consists of bare *pāhoehoe* overlain in places by a thin layer of organic soil. There are numerous shallow skylights, collapsed pressure blisters, and tree lava molds located on the surface of the 1,500 to 750 B.P. flow.

SOILS

Soils in the project area belong to the Pana`ewa very rocky silty clay loam (northern portion of project area) and Keaukaha extremely rocky muck series (along the southern boundary of the project area [Sato 1973]). Both soil types are characterized by poorly suited or unsuited to mechanized-farming (Soil Survey of the Territory of Hawaii 1955). Sugar cane was cultivated (Waiākea Mill Company Lot 20-A) along the southern edge of the project area where deeper pockets of well-developed organic soil exist despite the fact that Lot 20-A soil was classified as "poor" due to its shallow, very wet consistency (cited in Maly 1996:33).

RAINFALL AND DRAINAGE

Rainfall in the project area is high, ranging between 330 and 440 centimeters (150 and 200 inches) per year (Kelly *et al.* 1981). Natural drainage in the area runs from southwest to northeast and from west to east (see Figure 3). The majority of runoff affects the northern and southern edge of the project area where ground conditions are often swampy. A portion of the Waiākea Stream may have once flowed across the southeastern corner of the project area but has been diverted into a cement spillway. The central portion of the project area is fairly dry and is not affected by runoff from higher elevations to the west. Residents of Pu`ainako Street claimed that since the construction of neighborhoods (Sunrise Ridge) *mauka* (west) of their property, there has been a major reduction in runoff in their yards (Robert Chow interview).

VEGETATION

Plant communities in the wettest areas of the project—the southern, eastern, and northern portions—are dominated by *waivi* (*Psidium cattleianum*) and common guava (*Psidium guajava*). Economically useful plants and tree species, as well as ornamental palms, are often located on or near sites along the southern and eastern edges of the project area. They include red ginger (*Alpinia purpurata*), ti (*Cordyline fruticosa*), *liliko`i* (*Passiflora edulis*), avocado (*Persea americana*), royal palm, *hala* (*Pandanus odoratissimus*), and mango (*mangifera*). The western- and northern-central portions of the project area are dryer and are dominated by *ohi`a* (*Metrosideros polymorpha*), *uluhe* (*Dicranopteris linearis*), and grasses common to open savannas. Vegetation within the vast majority of the project is extremely dense.

Gerrish (2000) divides plant communities in the region of the UH Hilo Mauka Lands project into four groups:

I. The *Ohi`a* and *Uluhe* (*Metrosideros/Dicranopteris*) Fern Forest

The *ohi`a and uluhe* (*Metrosideros/Dicranopteris*) fern forest is the original natural vegetation and is an open forest of *ohi`a* (*Metrosideros polymorpha*) with thick, often impenetrable thickets of *uluhe* (*Dicranopteris linearis*). The fern forest is not a diverse plant community. Native plants such as *`ahaniu* (*Machaerina mariscoides*), *pukiawe* (*Styphelia tameiameiae*), *neneleau* (*Rhus sandwicensis*), *wawai-`iole* (*Lycopodium cernuum*), *hapu`u* (*Cibotium ssp.*), *papala-kepau* (*Pisonia umbellifera*), and *kawa`u* (*Ilex anomala*), and non-indigenous plants such as bamboo orchid (*Arundinia bambusifolia*), melastoma (*Melastoma candidum*), *waivi* (*Psidium cattleianum*), broomsedge (*Andropogon virginicus*), and swordfern ((*Nephrolepsis hirsutula*) are sometimes found dispersed throughout the fern forest.

II. The Closed *Ohi`a* Forest

The closed-canopy forest is dominated by three varieties of *ohi`a* (*Metrosideros polymorpha*): *icana, glaberrima*, and *macrophylla*. Native plant communities in the closed *ohi`a* forest are more diverse and include *kopiko* (*Pychotria hawaiiense*), *pilo* (*Coprosma sp.*), *hapu`u* (*Cibotium ssp.*), Kahili ginger (*Hedychium gardnerianum*), *ie`ie* (*Freycinetia arborea*), *`ekaha* (*Elaphoglossum lanceolatum*), *wawai-`iole* (*Lycopodium cernuum*), *palai-lau-li`i* (*Spaerocionium lanceolatum*). Introduced tree species include thickets of *waivi* (*Psidium cattleianum*) and common guava (*Psidium guajava*), and occasionally individual African tulip trees (*Spathodea campanulata*), albizia (*Paraserianthes falcataria*), and Alexandria palms (*Archontophoenix alexandrae*).

III. Savanna

Savannas of widely scattered trees and grasses are dominant in the central areas of the project that have been cleared for roads and possibly as a by-product of cattle grazing. The most common grasses within the savanna include Wainuku grass (*Panicum repens*), California grass (*Brachiaria mutica*), little bluestem (*Schizachyrium condensatum*), and broomsedge (*Andropogon virginicus*). Several tree species growing in savanna areas include albizia (*Paraserianthes falcataria*), *waivi* (Psidium cattleianum), common guava (*Psidium guajava*), melochia (*Melochia umbellata*), and gunpowder tree (*Trema orientalis*).

IV. The Mixed *Ohi`a* and *Waiwi* Shrubland

In many areas of the project with shallow soils, where the original growth has been disturbed or in areas between major plant communities a mixed *ohi`a* and *waiwi* shrubland has

developed. A large area of mixed *ohi`a* and *waiwi* shrubland has developed along the outside edges of the central portion of the project where it forms a boundary with the communities dominated by *waivi* thickets. Plant communities in the mixed *ohi`a* and *waiwi* shrubland often contain members from the other three major plant communities.

HISTORICAL AND CULTURAL CONTEXTS

Hilo was, by most estimates, one of the first settlements on the Island of Hawai`i and was settled between A.D. 300 and 600. The rich marine resources of Hilo Bay and the gently sloping forests of Mauna Loa and Mauna Kea provided abundant resources. Fresh water was available from the Wailoa and Wailuku rivers and smaller streams such as Waiākea, Waiolama, Pukihae, and `Alenaio.

The UH Hilo Mauka Lands Project is located on and near the former *`ili* (subdivision of an *ahupua`a*)lands of Pū`āinakō, Kāwili, and Mohouli, in the *ahupua`a* of Waiākea, Hilo Hanakāhi `Okana, in the *moku-o-loko* (district) of Hilo (Maly 1996:4–5) (Figure 4). Waiākea Stream flows along the southern edge of the present study area. The *ahupua`a* of Waiākea is large, consists of roughly 95,000 acres, and was regarded as a region of abundant natural resources and numerous fishponds. Waiākea was also an early important political center, notably under chief Kulukulu`a (Kelly *et al.* 1981:3). Kamehameha lived and often returned to his *`ili kūpono* (independent land division where all tributes were paid to the chief of the *`ili* and not the *ahupua`a*) lands of Pi`opi`o in the *ahupua`a* of Waiākea (Figure 5). The *`ili kūpono* lands and its royal fishpond were passed on to his son Liholiho after his death.

TRADITIONAL SETTLEMENT PATTERNS, SUBSISTENCE, AND LAND-USE

Historical accounts and archaeological/cultural studies pertaining to the *ahupua`a* of Waiākea (Ellis 1963; Bingham 1969; Handy and Handy 1972; Bird 1974; McEldowney 1979; Kelly *et al.* 1981; and Maly 1996) provide a wealth of information on traditional settlement patterns, land-use, and subsistence horticulture of the area. These are synthesized below as they allude to the types of sites that may be encountered in the project area.

Historical accounts of residence patterns, land-use, and subsistence horticulture are believed to be indicative of traditional practices developed long before contact with Europeans (McEldowney 1979). Early accounts describe several distinct environmental regions in Waiākea. From the coast inland five or six miles, scattered subsistence agriculture was evident, followed by a region of tall fern and bracken, flanked at higher elevations by a forest region

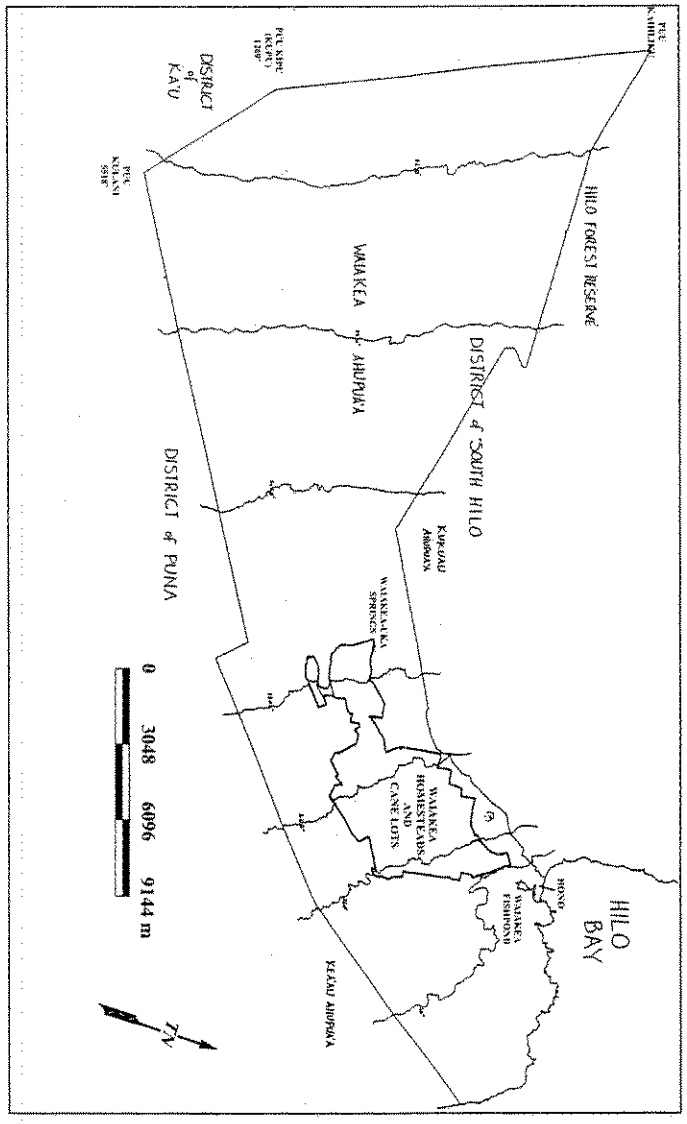


Figure 4: *Ahupua`a* of Waiākea (Bush *et al.* 2000).

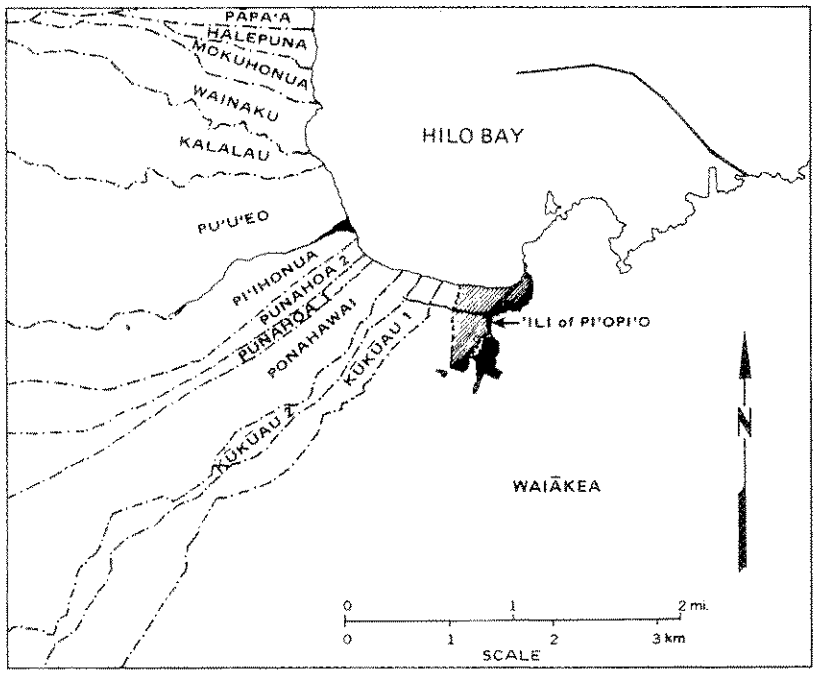


Figure 5: *'Ili Kūpono* Lands of Pi'opi'o (Kelly *et al.* 1981).

between 10 and 20 miles wide, beyond which was an expanse of grass and lava (Ellis 1969:403). The American Missionary C.S. Stewart wrote, "the first four miles of the country is open and uneven, and beautifully sprinkled with clumps, groves, and single trees of the bread-fruit, pandanus, and candle tree (Stewart 1970:361–363). The majority of Waiākea's estimated 2,000 inhabitants (in 1825) lived within this coastal region (Ellis1969:253). Taro, plantains, bananas, coconuts, sweet potatoes, and breadfruit were grown individually or in small garden plots. Fish, pig, dog, and birds were also raised and captured for consumption.

The present study area is located along the upper reaches of the open coastal region and the lower reaches of the tall fern and bracken zone. It is located in McEldowney's coined "upland agricultural zone" (see Previous Archaeology section) consisting of "scattered huts" amidst "garden "plots" created through "shifting agriculture" (McEldowney 1979:18–19).

Wood, such as *ohi'a* and *koa* for house construction, canoe building, and fires was obtained from this upland agricultural zone, and from the dense forests above (Ellis 1963:236). *Hala* for thatching was also known to be plentiful along the lava flows of eastern Waiākea (Ellis 1917, cited in Kelly *et al.* 1981:20). Of particular interest is a description of bird snaring and mention of banana growing in the area of the present study (Maly 1996:6–8).

THE *MĀHELE* OF 1848 AND LAND COMMISSION AWARDS

The *ahupua'a* of Waiākea became Crown Lands during the *Māhele* of 1848 and in the following years, twenty-five Land Claims were awarded within the *ahupua'a* of Waiākea (Table 1). The awards were small in area, 24 of which went to native claimants. No Land Commission awards were made within the project area, and all but two were located near the coast. A five-acre parcel was awarded to Keaniho (LCA 2402) approximately one kilometer east of the present study area. The parcel contained a house and three cultivation fields. Keaniho's parcel bordered *kalo* fields to the west according to testimony given in support of the claim (Maly 1996:22).

Table 1: Land Commission Awards in Waiākea Ahupua'a.

Grantee	LCA	Acreage
Barenaba	2327	12.25
Halai, L.K.	1279	0.60
Hale	40004	4.25
Kahue	2663	3.75
Kaiana, J.B.	2281	10.25
Kaihenui	11050-B	5.19
Kalolo	1333	2.25
Kalua	8854	3.40
Kaluhikaua	1738	2.98
Kamamalu, V.	7713	*'Ili 'aina*
Kamanuhaka	8803	1.02
Kapu	1-F	1.60
Kealiko	11174	1.00
Keaniho	2402	5.00
Keawe	5018	0.24
	10505	—
Kuaio	4344	1.22
Leoi	9982	0.80
Lolo	4738-B	1.27
Mahoe	1-E	4.46
Moealoha	4737	1.03
Nakai	4785	1.05
Napeahi	2603	1.30
Wahine	4737-B	1.01
Wahinealua	11173	2.50
Wahinenohoihilo	10004	1.69

CHANGING RESIDENTIAL AND LAND-USE PATTERNS (1845–1865)

Between 1845 and 1865, traditional land-use and residential patterns underwent a change. In particular, the regular use of Hilo Bay by foreign vessels, the whaling industry, the establishment of missions in the Hilo area, the introduction of the sandalwood trade, the legalization of private land ownership, the introduction of cattle ranching, and the introduction of sugar cane cultivation all brought about changes in settlement patterns and long-established land-use patterns (Kelly *et al.* 1981). Hilo became the center of population and settlements in outlying regions declined or disappeared. While food was still grown for consumption, greater areas of land were continually given over to the specialized cultivation and processing of commercial foodstuffs for export. Sugar cane plantations and industrial facilities were established in areas that were once upland agricultural areas and coastal settlements, respectively.

WAIĀKEA MILL COMPANY

On July 15, 1861, S. Kipi leased the Crown Land of Waiākea from Kamehameha IV to be used as pastureland for an annual amount of $600 (Kelly *et al.* 1981:89). In 1874, Rufus A. Lyman was granted a 25-year property lease (General Lease 124-A) within Waiākea, encompassing the government pastureland on which the present study area is located (Maly 1996:26). The lease granted him all privileges of land use including the cutting of firewood and the use of fishponds. The newly established Waiākea Mill Company, founded by Alexander Young and Theo H. Davies, acquired Rufus A. Lyman's General Lease 124-A in 1879 (with an extension of terms until June 1, 1918 [Maly 1996:27]). By the early 1900s, Waiākea plantation was cultivating sugar cane on over 6,000 acres of government land (Kelly *et al.* 1981:89,120).

In 1911, the Waiākea Mill Company applied for a title to several portions of its leased land, but was rejected by the Board of Public Lands. Rather than renew the lease with the Waiākea Mill Company, the government of Hawai'i implemented a plan to sell homestead lots and lease sugar cane lots to the public (Figure 6). By 1919, 2003 acres of land was returned for house lots and 5,300 acres was returned for cane field lease (Maly 1996:27–28). Sugar cane grown on these lots was, by terms of contract, to be processed by the Waiākea Mill Company for a share of the profits. None of the publicly leased government property is located within the present study area.

Waiākea Mill Company plantation Lot 20-A is the only sugar cane field within the current study area and is located along the project's southern border (Figure 7). Lot 20-A was retained by the Waiākea Mill Company and was classified as "poor" due to shallow, very wet

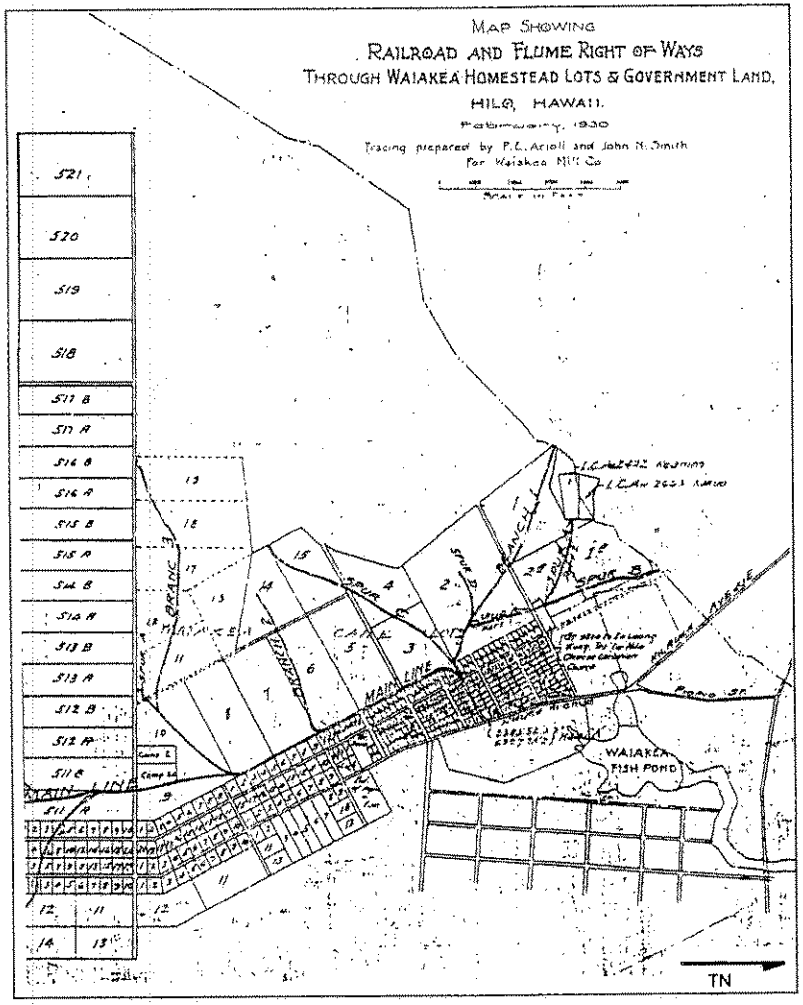


Figure 6: Map Showing Portion of Waiākea Homestead Lots and Plantation Fields South and East of the Project Area.

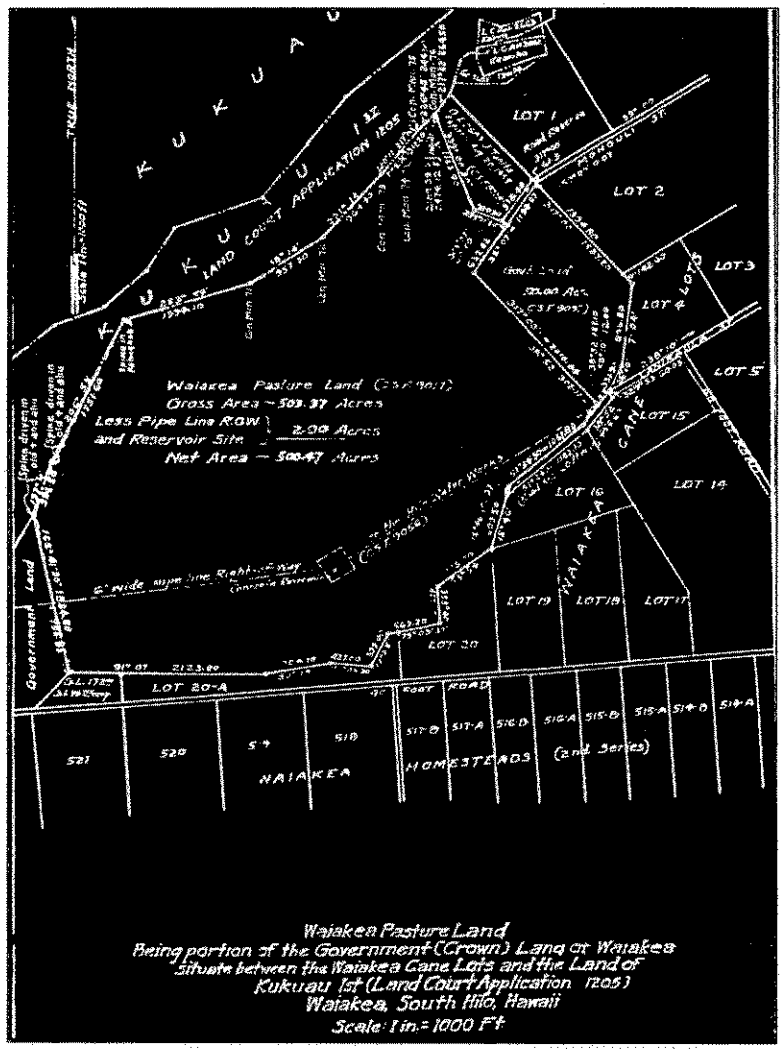


Figure 7: Map Showing Waiakea Pasture Land and Waiakea Mill Plantation Lot 20-A.

soils (cited in Maly 1996:33). The Waiākea Mill Company retained the property (General Lease 2741) and as late as 1947 was offering to lease it to private cultivators for the sole purpose of growing sugar cane (Maly 1996:34).

Fairview Dairy acquired a 21-year lease at public auction to Lots 11 through 20-A (General Lease 3333) to be used for pasturing cattle. Fairview Dairy transferred its lease to William Kama`u Sr. in 1959 for the purposes of pasturing cattle and horses. The majority of Lot 20-A is most recently located along the newly-constructed Pu`ainako Street extension.

The largest portion of the study area composed of a single government parcel known as "Waiākea Pasture Land" was leased (approximately 500 acres covered under General Lease 2751) to Kazuo Miyasaki in 1939 as pastureland for his dairy cattle (see Figure 7). The lease then passed to John Matson in 1942. During World War II, the parcel covered under General Lease 2751 and known as "Waiākea Pasture Land" was used for training by the U.S. Army Corps (Maly 1996:34). By 1946, the Army was clearing the property of barbed wire, unexploded ordinance, three Quonset buildings, and two latrines.

PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Numerous archaeological investigations have been carried out in the Hilo area and within the *ahupua`a* of Waiākea over the last 95 years. Many of the research projects are located adjacent to or in the immediate vicinity of the current study area. Table 2 summarizes major findings and Figure 8 shows the location of archaeological investigations adjoining the current project area.

Table 2: Previous Archaeological Research in Waiākea Ahupua`a and Project Vicinity.

Reference	Location	Description & Results
Thrum 1907	Waiākea Ahupua`a *heiau* sites	List of *heiau* in Waiākea—none located near present project area.
Thrum 1908	Waiākea Ahupua`a	List and description of *heiau* in Waiākea—none located near present project area.
Hudson 1932	East Hawai`i Island	Detailed description of various sites in the Hilo area.
McEldowney 1979	Hilo Bay area	Zonal characteristics—Land-use study.

Kelly, Nakamura, and Barrère 1981	Hilo Bay area	History of Hilo Bay.
Smith 1991	Waiākea Ahupua`a, South Hilo, Hawai`i Island [TMK: 3-2-4-01:7]	List and description of sites on the 4000+B.P. and 1500–750 B.P. lava flows. Inventory survey recommended.
Stokes and Dye 1991	Hawai`i Island	List and description of *heiau* of Hawai`i Island.
Smith 1992	Waiākea Cane Lots, Waiākea Ahupua`a, South Hilo, Hawaii Island [TMK: 3-2-4-56:1]	Numerous cane field features including walls, clearing mounds, a large rectangular enclosure, and c-shaped enclosures.
Moniz 1992	Waiākea Ahupua`a, Hilo Hawai`i	A listing of 1979-1992 Inventory Survey results within Waiākea Ahupua`a that document walls, mounds, platforms, and faced terraces.
Hunt 1992	Lands of Waiākea, Kukuau 1 and 2, and Ponahawai Ahupua`a, South Hilo District, Hawai`i (Puainako Street Extension Project)	Interim Inventory Survey report listing 31 cane field features including walls, clearing mounds, platforms, and faced terraces.
Spear 1993	Pi`ihonua Ahupua`a, South Hilo [TMK: 2-3-32:4]	Inventory Survey report of a 5-acre parcel that documents an historic oven and a trash dump. No further work recommended.
Borthwick, Collins, Folk, and Hammatt 1993	Waiākea Ahupua`a [TMK: 2-4-01:7 and 41]	Inventory Survey of 163 acres of UH property along and east of Komohana Street. Four historic sites associated with sugar cane agriculture documented. No further work recommended.
Hunt and McDermott 1994	Lands of Waiākea, Kukuau 1 and 2, and Ponahawai Ahupua`a, South Hilo District, Hawai`i (Puainako Street Extension Project)	Inventory Survey final report (completion of Hunt 1992) documenting 13 historical sites associated with sugar cane agriculture.
Maly, Walker, and Rosendahl 1994	Lands of Waiākea, South Hilo [TMK: 2-4-57:01]	Inventory Survey of 4.5 acres in the Waiākea Cane Lots documenting four sites associated with historical sugar cane agriculture. Forty-seven features were recorded including walls, clearing mounds, and terraces. One radiocarbon date and

		recovered artifacts suggest prehistoric land-use in the project area. Data recovery recommended.
Spear 1995	Lands of Waiākea, South Hilo [TMK: 2-4-57:01]	Data Recovery report of Maly *et al.* (1994) parcel documenting historic sugar cane agricultural features and a few temporary habitations. No further archaeological work recommended.
Maly 1996	Waiākea Cane Lots (12, 13, 17, 18, 19, 20 and 20-A, District of South Hilo, Island of Hawai`i	Oral interviews and archival research pertaining to Waiākea Cane Lots. Provides background of pre-Contact land-uses in the area and description of sugar cane agricultural features, their construction, and uses.
Robins and Spear 1996	Lands of Waiākea, Kukua 1 and 2, and Ponahawai, South Hilo District, Island of Hawai`i (Puainako Street Realignment/Extension Project)	Inventory Survey of proposed realignment of Puainako Street Extension Corridor documenting 30 new features at 3 sites (Hunt and McDermott 1994), and one new site containing 16 features. Sites and features are associated with historic sugar cane agriculture.
Eblé, Denham, and Pantaleo 1997	Lands of Waiākea, Kukuau 1 and 2, and Ponahawai Ahupua`a, South Hilo District, Hawaii (Puainako Street Extension Project)	Supplemental testing of features (six sites) documented in Hunt and McDermott (1994). Features were associated with historic sugar cane agriculture. Recommended preservation of several sites within the project area.
Spear 1998	Lands of Waiākea, Kukua 1 and 2, and Ponahawai, South Hilo District, Island of Hawai`i (Puainako Street Realignment/Extension Project)	Reconnaissance-level survey of proposed realignment of Puainako Street Extension Corridor documenting 27 new features associated with historical sugar cane agriculture. Inventory Survey recommended.
McGerty and Spear 1999	Lands of Waiākea, Kukua 1 and 2, and Ponahawai, South Hilo District, Island of Hawai`i (Puainako Street	Inventory Survey of Spear (1998) parcel documenting 17 features: 15 historic sugar cane agriculture features and

	Realignment/Extension Project)	two features associated with a modern pig farm. All features were added to site 18921. Data Recovery recommended.
Dega and Benson 1999	Lands of Waiākea, Kukua 1 and 2, and Ponahawai, South Hilo District, Island of Hawai`i (Puainako Street Realignment/Extension Project)	Reconnaissance-level survey of proposed realignment of Puainako Street Extension Corridor documenting eight sites containing 18 features including 12 clearing mounds, two platforms, two walls, a rock alignment, and an *`auwai* (drainage ditch). All but the *`auwai* were associated with historic sugar cane cultivation. The *`auwai* was described as a pre-Contact feature likely also utilized in historic cane field agriculture.
Dega 2000	Lands of Waiākea, Kukua 1 and 2, and Ponahawai, South Hilo District, Island of Hawai`i (Puainako Street Realignment/Extension Project)	Inventory Survey of Dega and Benson (1999) parcel documenting eight new features (at Site 18921) associated with sugar cane agriculture.
Dega and Spear 2000	Lands of Waiākea, Kukua 1 and 2, and Ponahawai, South Hilo District, Island of Hawai`i (Puainako Street Realignment/Extension Project)	Preservation Plan for sites 18914, 18915, 18917 and a boulder path/alignment recorded by Eblé *et al.* (1997).
Bush, McDermott, and Hammatt 2000	Lands of Waiākea, South Hilo [TMK: 2-4-01: 122], South Hilo, Hawai`i Island (USDA Pacific Basin Agricultural Center Project)	Inventory Survey of 20 acres along western edge of Komohana Street, and adjacent to east-central portion of current project area. One skylight (site 22080) containing a single human femur documented. Preservation recommended.
McDermott and Hammatt 2001	Lands of Waiākea, South Hilo [TMK: 2-4-01: 122], South Hilo, Hawai`i Island (USDA Pacific Basin Agricultural Center Project)	Inventory Survey of 10 acres adjacent (west) to Bush *et al.* (2000) documenting two historic sites (one feature each), including a modified outcrop and a stone causeway. No further work recommended.

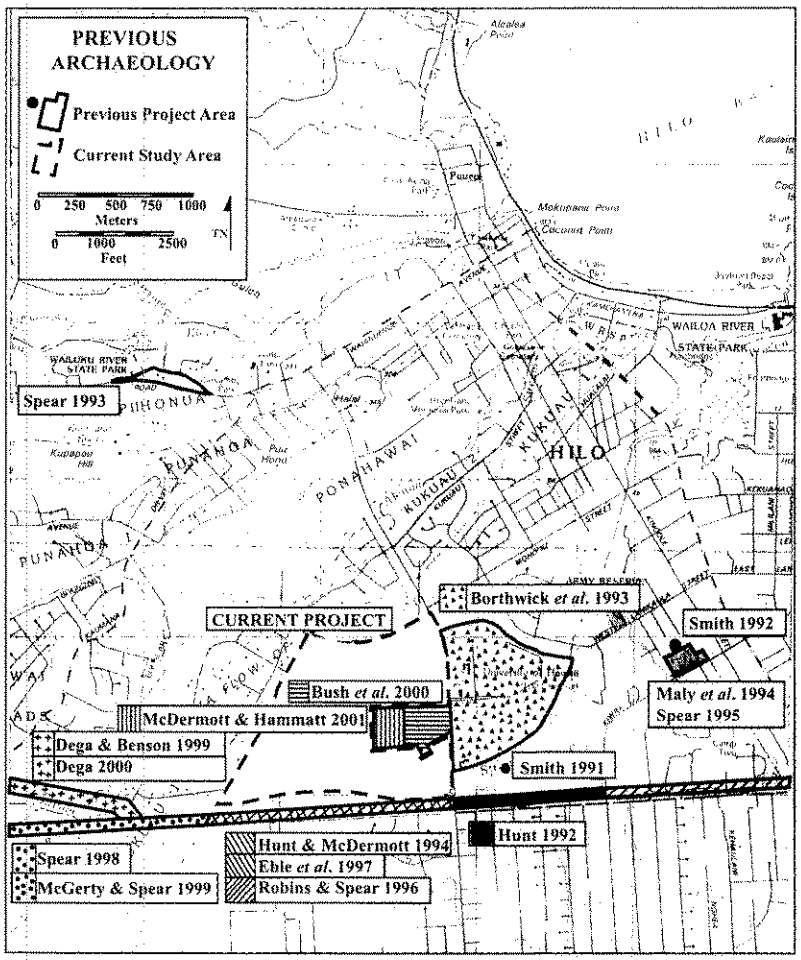


Figure 8: Portion of USGS Hilo Quadrangle Topographical Map, Showing Locations of Previous Archaeological Projects in the Vicinity of the UH Hilo Mauka Lands Project.

The archaeological and historical investigations listed are instrumental to understanding broad patterns of land-use in the Hilo area (see McEldowney 1977; Kelly *et al.* 1981; Maly 1996), general trends in the distribution of formal archaeological features in the Hilo area (see Thrum 1907 and 1908; Hudson 1930; Smith 1991; Moniz 1992; Spear 1993), and to formulating archaeological expectations at the UH Hilo Mauka Lands project (see Borthwick *et al.* 1993; Hunt and McDermott 1994; Spear 1995; Robins and Spear 1996; McGerty and Spear 1999; Bush *et al.* 2000; Dega 2000; and McDermott and Hammatt 2001).

REGIONAL ARCHAEOLOGICAL STUDIES

MCELDOWNEY (1979)

McEldowney (1979) provides an overview of changing land-use patterns in the Hilo area based on early historic accounts. She proposes that Hawaiians utilized land in accordance with five elevation zones (1979:14). Land-use zones are classified as (I) coastal, (II) upland agricultural, (III) lower forest, (IV) rainforest, and (V) sub alpine, or montane. The inhabitants of Waiākea Ahupua`a had access to resources in all five of McEldowney`s zones.

The present project is situated in the upland agricultural zone (50 to 1,500 feet) described as unwooded grasslands and extensive dryland cultivation plots. McEldowney suggests this region was likely deforested prior to European contact through shifting agricultural practices such as swidden farming. Site types consist of scattered houses adjacent to garden and arboreal plots on older *pāhoehoe* and *`a`ā* flows with well-developed soils. Modified lava tubes and tubes were used for cultural practices were also common in the upland agricultural zone.

SMITH (1991)

Smith (1991) also comments on site distribution in the *ahupua`a* of Waiākea based on Mauna Loa lava flows, including a portion of the 1880–1881 A.D. *pāhoehoe* flow, a *pāhoehoe* flow dating to 750–1,500 B.P., and a *pāhoehoe* flow dating to 5,000–10,000 B.P. He notes that the majority of sites are located on the older lava flow, which has deeper, more developed soils.

KELLY *ETAL.* (1991)

Kelly *et al.* (1991) also contributes to a historical understanding of changing land-use patterns following European involvement in the economy of Hawai`i. In particular, they site how the regular use of Hilo Bay by foreign vessels, the whaling industry, the establishment of missions in the Hilo area, the introduction of the sandalwood trade, the legalization of private land ownership, the introduction of cattle ranching, and the introduction of sugar cane cultivation all brought about changes in settlement patterns and long-established land-use patterns. Kelly *et al.* (1991) suggest that Hilo became a population center and settlements in outlying regions declined. While food was still grown for consumption, greater areas of land were continually given over to the specialized cultivation and processing of commercial foodstuffs for export. Eventually, sugar cane plantations and industrial facilities were established in areas that were once upland agricultural areas and coastal settlements.

THRUM (1907 AND 1908), HUDSON (1932), AND STOKES AND DYE (1991)

Thrum (1907 and 1908), Hudson (1932), and Stokes and Dye (1991) represent early archaeological efforts to document site distribution pertinent to the greater Hilo area. Hudson notes there were already no archaeological sites remaining in the city of Hilo by the early 1930s (Hudson 1932:236). All three authors note the dismantling of well-known *heiau* in the Hilo area (Thrum 1908:240; Hudson 1932:236; Stokes and Dye 1991:152).

INVESTIGATIONS SPECIFIC TO STUDY AREA

Several recent archaeological and historical investigations completed in the immediate vicinity of the present UH Hilo Mauka Lands project have direct bearing on what types and distribution of sites and features were expected. The majority of these reports (associated with the Pu`ainako Street Extension project) document sites on well-developed ash and organic soils overlaying a Mauna Loa *pāhoehoe* flow dating to 5,000–10,000 B.P. that is also present in the southeast corner of the present study area (see Figure 3). The sites were primarily the remains of sugar cane field clearing and in-field collection and processing architecture. The two most recent reports (Bush *et al.* 2000, McDermott and Hammatt 2001) provide insight into predicting the types of sites located on a *pāhoehoe* flow dating to 750–1,500 B.P. that covers the majority of the UH Hilo Mauka Lands project area.

HUNT AND MCDERMOTT (1994)

The initial archaeological investigation in the immediate vicinity of the present study area was an Inventory Survey of the Pu`ainako Street Extension within Waiākea, Kūkūau 1 and 2, and Ponahawai Ahupua`a conducted by Hunt and McDermott (1994) in 1992 and 1993. The project area was adjacent to and southeast (*makai*) of the UH Hilo Mauka Lands project. The study entailed historical background research, pedestrian survey, and limited subsurface testing.

The Inventory Survey report documented 13 sites (SIHP Sites 50-10-35-18911 to -18923) comprising 88 individual features (Figure 9). All features were interpreted to date from A.D. 1880 to 1950, and were assumed to be features associated with the cultivation and processing of sugar cane. Five test units were excavated within several features and it was concluded that the

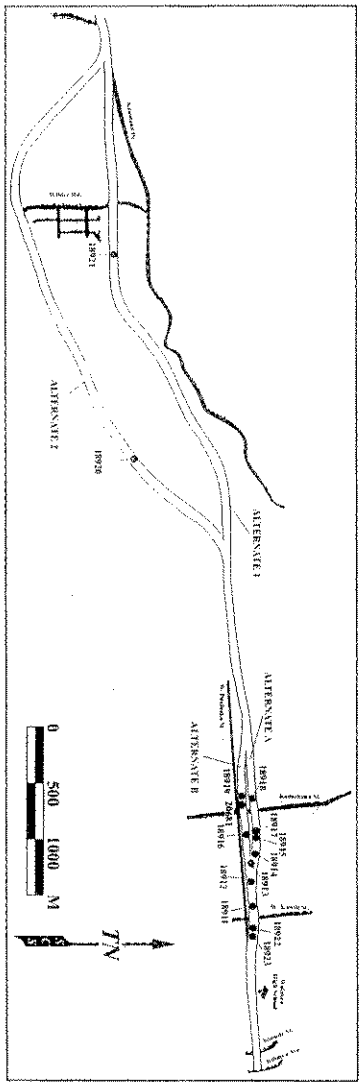


Figure 9: Map of Project Areas and Site Locations within the Pu`ainako Street Extension Corridors as Designated by Eble et al. 1997.

lack of prehistoric artifacts and traditional subsurface features within them supported the interpretation that the features were historic in origin (Hunt and McDermott 1994:104). The Inventory Survey report recommended that Data Recovery be implemented at site complexes as additional excavation work "could potentially yield isolated traces of prehistoric use of the area, presumably for dryland agriculture" (Hunt and McDermott 1994:109–113). The report also recommended extensive archival research, a task later undertaken by Maly (1996).

BORTHWICK, COLLINS, FOLK, AND HAMMATT (1993)

Cultural Surveys Hawaii conducted an Archaeological Inventory Survey and limited testing on a 163-acre UH Hilo parcel adjacent to and east *makai* of the present study area. The report documents four historic sugar cane cultivation sites (SIHP Sites 18667 through 18670) composed of seven features (one feature contains 25 clearing mounds), including walls, clearing mounds, enclosures, and a remnant sugar cane field. Test units contained no cultural material or traditional Hawaiian feature components confirming their association with more recent sugar cane cultivation. Sites were situated on older *pāhoehoe* flows with well-developed soils. No further work was recommended.

MALY (1996)

Kepa Maly's report combines the results of McEldowney's report (1979) with traditional Hawaiian history, early European accounts, previous archaeological work, and oral histories to document cultural and agricultural practices in Hilo and the *ahupua`a* of Waiākea. The report focuses on Hawaiian settlement and population expansion in the region of the present study area. Of particular interest is the description of bird snaring and mention of banana growing in the area of the present study (Maly 1996:6–8). Maly also documents the effect of sugar cane cultivation (Waiākea Mill Company operations from the 1870s to 1940s) on pre-Contact archaeological remains within the present project area. While some components of early Hawaiian sites might be incorporated in more modern archaeological features, the clearing of fields and the construction of crop collection and processing facilities have dismantled or obscured older archaeological sites (Kenneth Bell in Maly 1996:57). Informants who remembered the Waiākea sugar cane plantation fields stated that features such as stone mounds, ramped platforms, terraces, walls, enclosures, and berms (railway berms) were built in order to facilitate sugar cane cultivation and ranching.

ROBINS AND SPEAR (1996)

Following Maly's (1996) work, SCS (Robins and Spear 1996) conducted an Inventory Survey on a narrow parcel of land adjacent to and south of the present study area (see Figure 9). The project area covered four proposed road alignments for the Pu`ainako Street Extension

project and reflected both an elongation and a lateral expansion of the original road alignment study (Hunt and McDermott 1994) from a 120 foot corridor to 300-foot wide corridor.

The Robins and Spear survey documented the 30 architectural features associated with sites previously reported by Hunt and McDermott (SIHP Sites 18912, 18914, and 18919) as well as 16 additional features that were combined, with features taken by SHPD from SIHP Site 18919 to form a new site (SIHP Site 20681). Robins and Spear (1996:49–52) concluded that all 46 features—representing four sites—were associated with historic sugar cane activities based on the following facts: 1.) all of the sites were located within or adjacent to known sugar cane fields; 2.) all features were representative of formal sugar cane field features; 3.) site structure were comparable to other known plantation sites and is atypical of traditional Hawaiian structures; and 4.) the documented sites contain historic-era artifacts that are specific to sugar plantation or ranching activities. No traditional Hawaiian components of modern features or pre-Contact artifacts were discovered during the Inventory Survey work. Robins and Spear (1996:53–56) recommended Data Recovery for eight sites within the corridor and concurred with SHPD in the preservation of several other sites.

EBLÉ, DENHAM, AND PANTALEO (1997)

At the request of the Ho`oikaika Hawaiian Club (HHC), Garcia and Associates (Ganda) conducted supplemental archaeological excavations (reported in Eblé *et al.* 1997) at sites previously identified by Hunt and McDermott (1994 [Figure 10]). The purpose of the additional work was "to aid in the interpretation of site function and chronology, and to ensure that all cultural remains in the area have been sufficiently identified" (Eblé *et al.* 1997:1). The Hunt and McDermott survey had excavated only five units within 88 features and the sponsoring Ho`oikaika group deemed additional excavations necessary to support or refute the report`s site age and function determinations. The supplemental archaeological work performed by Ganda was not considered an official stage in the State of Hawaii historic preservation process but was deemed a supplemental aid to the previous study.

Seven test-units (typically 1.0 m by 1.0 m) were excavated within six sites previously mapped and recorded by Hunt and McDermott (1994). The sites included SIHP Site 18916, 18911, 18912, 18914, 18915, and 18917. The excavation units yielded historic artifacts such as metal and midden. Three samples of wood charcoal were submitted for radiocarbon testing and were dated to pre-Contact (traditional) and early-historic times. The samples were considered problematic since they did not precisely date the architectural structures themselves but were taken from the soil matrix below features and were not associated with any subsurface features such as *`imu* or discrete hearths, for example. The report further concluded that all "intact

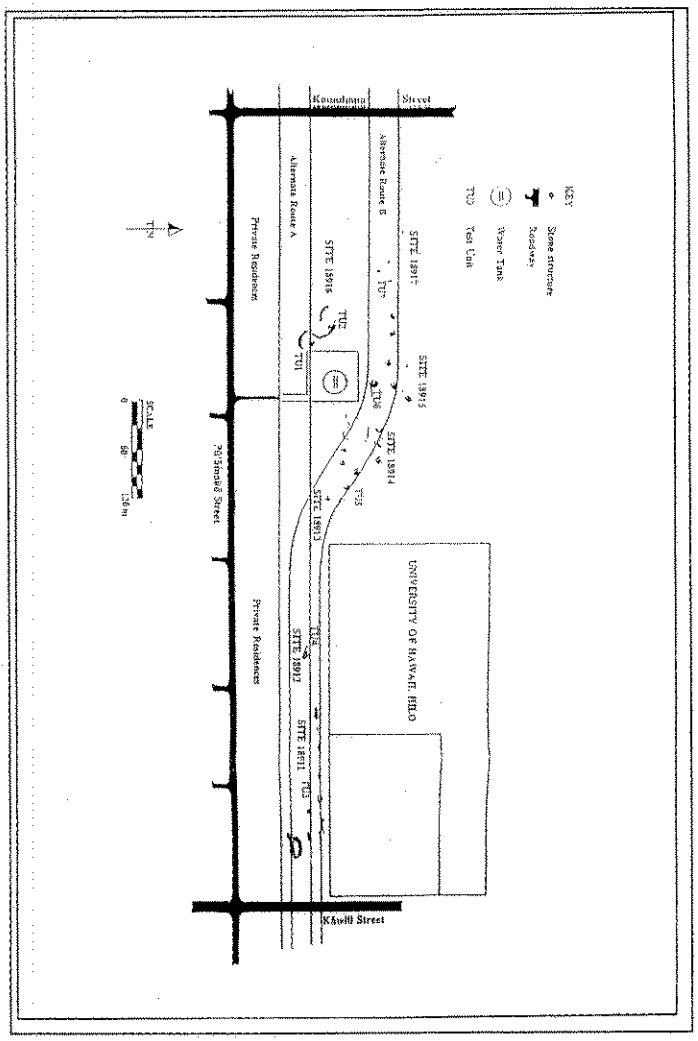


Figure 10: Map of Project Area and Excavation Locations within the Pu`ainako Street Extension Corridors as Designated by Eblé *et al.* 1997.

evidence of pre-Contact occupation and/or activity in the project area has been disturbed or destroyed as a result of post-Contact period activity" (Eblé *et al.* 1997:53). The archaeological features examined as part of this supplemental project were interpreted to be associated with sugar cane cultivation and processing and reinforced the interpretations offered by Hunt and McDermott (1994), Maly (1996), and Robins and Spear (1996). The supplemental testing report recommended preservation for several sites (Eblé *et al.* 1997:56).

SPEAR (1998)

The following year, an archaeological reconnaissance-level investigation was carried out by SCS along the *mauka* portion of the Pu'ainako Street Extension, located to the south of the present study area (Figure 11). While reconnaissance surveys are not recognized by the SHPD as a stage in the historic preservation process, reconnaissance surveys provide a rapid means of assessing the cultural resources within a given project area. A formal report of a reconnaissance survey is not generally submitted to SHPD because the results are usually incorporated into Inventory Survey reports. Twenty-seven features were recorded during the reconnaissance survey and were associated with SIHP Site 18921, previously recorded by Hunt and McDermott (1994). Spear (1998) recommended that an Inventory Survey be conducted.

MCGERTY AND SPEAR (1999)

The Inventory Survey work (McGerty and Spear 1999) generated as a result of the previous reconnaissance survey (Spear 1998) was listed as an addendum to the Inventory Survey report completed by Robins and Spear (1996). McGerty and Spear (1999) reidentified the features documented by Spear (1998) and recorded a total of 17 features (Figure 12). The number of features was reduced from 27 to 17 because several of the features documented during the reconnaissance survey were combined into more discrete feature designations or were assessed as not being archaeological features. All 17 features were assigned to SIHP Site 18921. Fifteen of the features were interpreted to be associated with historic sugar cane activities cultivation and processing. The Inventory Survey report notes that SIHP Site 18921 is located on former Waiākea Sugar Company cane fields (Conde and Best 1973:120, cited in McGerty and Spear 1999:23).

Based on information provided in an interview, two features (see Features 1 and 11) were likely remnants of a modern pasture or a pig farm. The Inventory Survey report (McGerty and Spear 1999:25) concurred with Hunt and McDermott (1994:112) that the site was significant under Criterion D and they consequentially recommended a Data Recovery investigation.

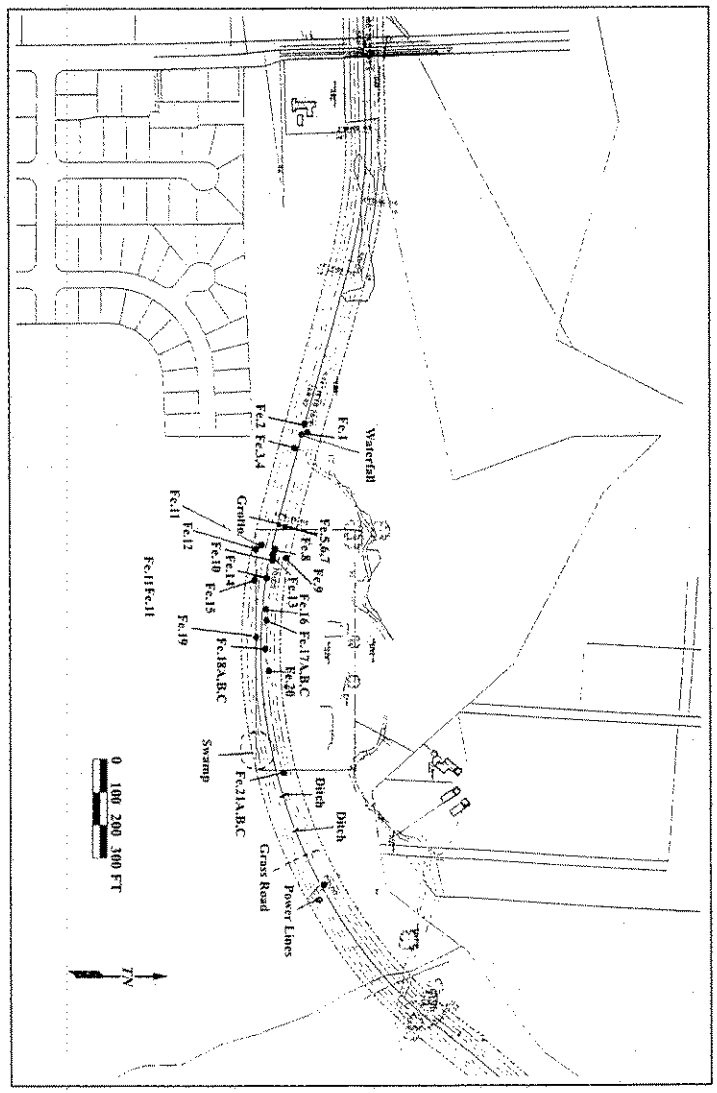


Figure 11: Map of Reconnaissance Survey Project Area and Identified Sites within the Pu'ainako Street Extension Corridors.

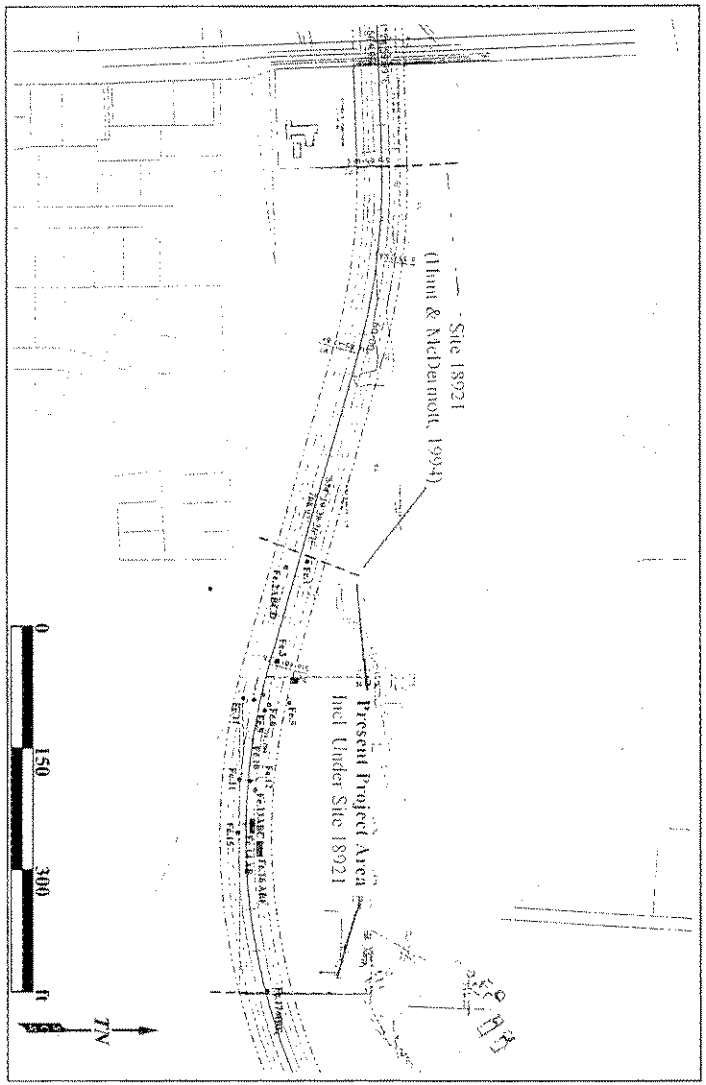


Figure 12: Map of Inventory Survey Project Area and Identified Sites Within the Pu`ainako Street Extension Corridors as Designated by McGerty and Spear (1999).

DEGA AND BENSON (1999)

In August 1999, SCS conducted a reconnaissance-level survey (Dega and Benson 1999) adjacent to and southwest of the UH Hilo Mauka lands project (Figure 13). The survey was performed within a short, expanded section of the highway (western end) occurring just to the south and partially overlapping the reconnaissance survey area documented in Spear (1998), and the Inventory Survey work reported in McGerty and Spear (1999). The project area was approximately 1.6 kilometers long (east-west) and 100 meters wide (north-south) and was situated from 0.40 km to 2.50 km south of Kaumana Drive at the study corridor`s western and eastern termini.

Eight archaeological sites were identified within the western border of the project area. Eighteen features were documented including 12 rock mounds, two platforms, two walls, one alignment, and one stone-lined *`auwai,* or water channel. Seventeen features were interpreted to be related to historic sugar cane cultivation and processing, a similar interpretation to that presented previously (Hunt and McDermott 1994, Robins and Spear 1996, McGerty and Spear 1999).

One feature, a rock-lined *`auwai*, was thought to be traditional (pre-Contact). The *`auwai* was situated parallel to and between several rock mounds associated with sugar cane cultivation but is suggestive of a traditional water channel because its width (0.80 m) is much smaller than channels typically used for sugar cane field irrigation. Secondly, the gravity-fed system was lined with small cobbles and not metal, as is commonly used in the construction of sugar cane water channels. Thirdly, the channel itself was not deep (average 0.10 m below rock surface) and had not been maintained for some time. Finally, the channel emptied onto a small alluvial plain that would have been well suited to small-scale irrigated taro cultivation. The Dega and Benson (1999) reconnaissance survey report recommended Inventory Survey work be carried out, including test-excavations within and near the *`auwai* feature.

DEGA (2000)

SCS conducted an Inventory Survey to complete the reconnaissance-level survey reported by Dega and Benson (1999) at SIHP Site 18921 (see Figure 13). Eight features were documented, two previously recorded by Spear (1998) and Dega and Benson (1999) during the reconnaissance surveys. Features included walls, clearing mounds, rock alignments, a platform, and a stone-lined *`auwai*. Four stratigraphic trenches were mechanically excavated in and around the *`auwai* feature. Trenches were typically 1.80 meters wide and totaled 17 meters in length. The *`auwai* was reinterpreted as an historical sugar cane field irrigation ditch due to a

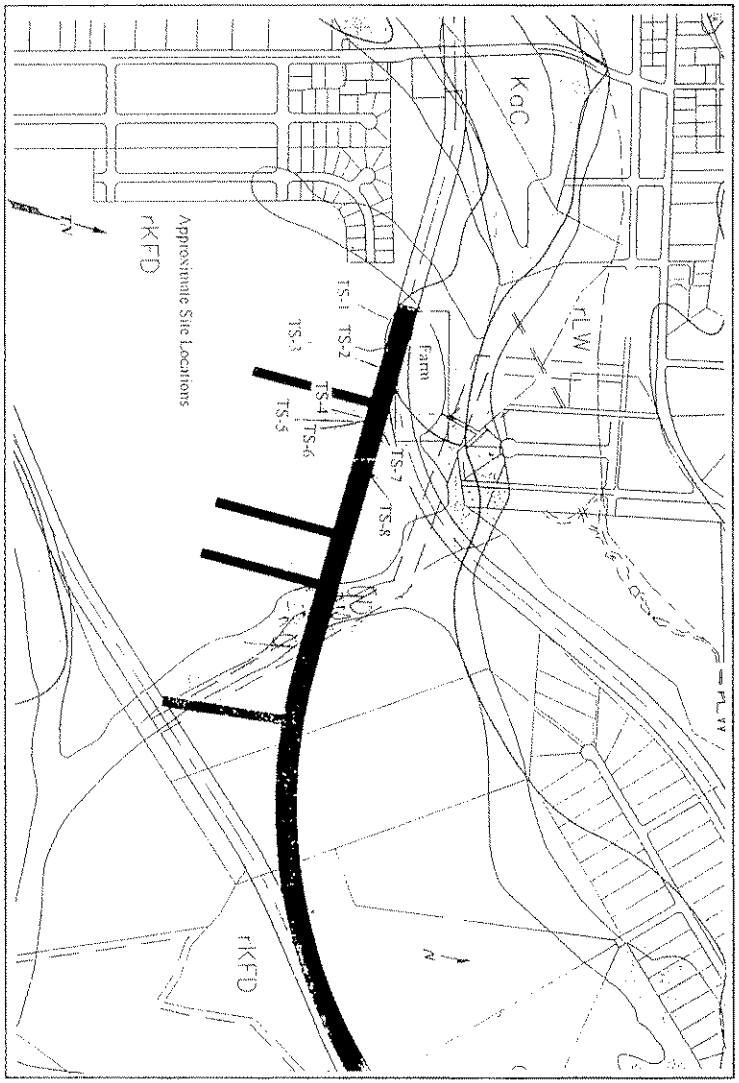


Figure 13: Map of Inventory Survey Project Area and Identified Sites within the Pu`ainako Street Extension Corridors as Designated by Dega and Benson 1999.

lack of stones lining its bottom as is common in traditional Hawaiian *`auwai*. No evidence was found to substantiate the presence of *lo`i* (wetland agricultural terraces) associated with the irrigation ditch.

BUSH, MCDERMOTT, AND HAMMATT (2000)

Cultural Surveys Hawaii carried out an Inventory Survey of a 20-acre parcel for the proposed USDA Pacific Basin Research Center (Figure 14). The project was located on a parcel along the western-central edge of the UH Hilo Mauka Lands project area on a Mauna Loa *pāhoehoe* lava flow dating between 750 and 1,500 B.P.. A single human femur was located in an overhang of a lava tube within a shallow skylight. The site (SIHP Site 22080) was designated a burial and recommended for preservation.

MCDERMOTT AND HAMMATT (2001)

Cultural Surveys Hawaii carried out an additional Inventory Survey of a 10-acre parcel (adjacent to and west of the 2000 study area) for the proposed USDA Pacific Basin Research Center (see Figure 14). The project was also located along the western-central edge of the UH Hilo Mauka Lands project area on a Mauna Loa *pāhoehoe* lava flow dated between 750 and 1,500 B.P. Two post-Contact sites composed of two features were documented. SIHP Site 22734 consisted of a modified outcrop and SIHP Site 22735 consisted of a stacked stone causeway. No further work was recommended at either site.

EXPECTED ARCHAEOLOGICAL PATTERNS

Based on previous archaeological studies, geological studies, historical research, interviews, and County Planning Department records, site distribution and type can be predicted to fall into two major zonal types: sugar cane cultivation and processing sites (along the southern boundary of the project area) and historic period ranching activities (within the remaining portion of the project area).

PREHISTORIC SITES

Historical accounts of Waiākea Ahupua`a describe the region surrounding the present project as unwooded grasslands consisting of extensive dryland cultivation plots. McEldowney suggested this region was likely deforested prior to European contact through shifting agricultural practices such as swidden farming. Site types would consist of scattered houses sites adjacent to garden and arboreal plots on older *pāhoehoe* and *`a`ā* flows with well-developed soils. Modified lava tubes and tubes used for cultural practices were also expected to be found in

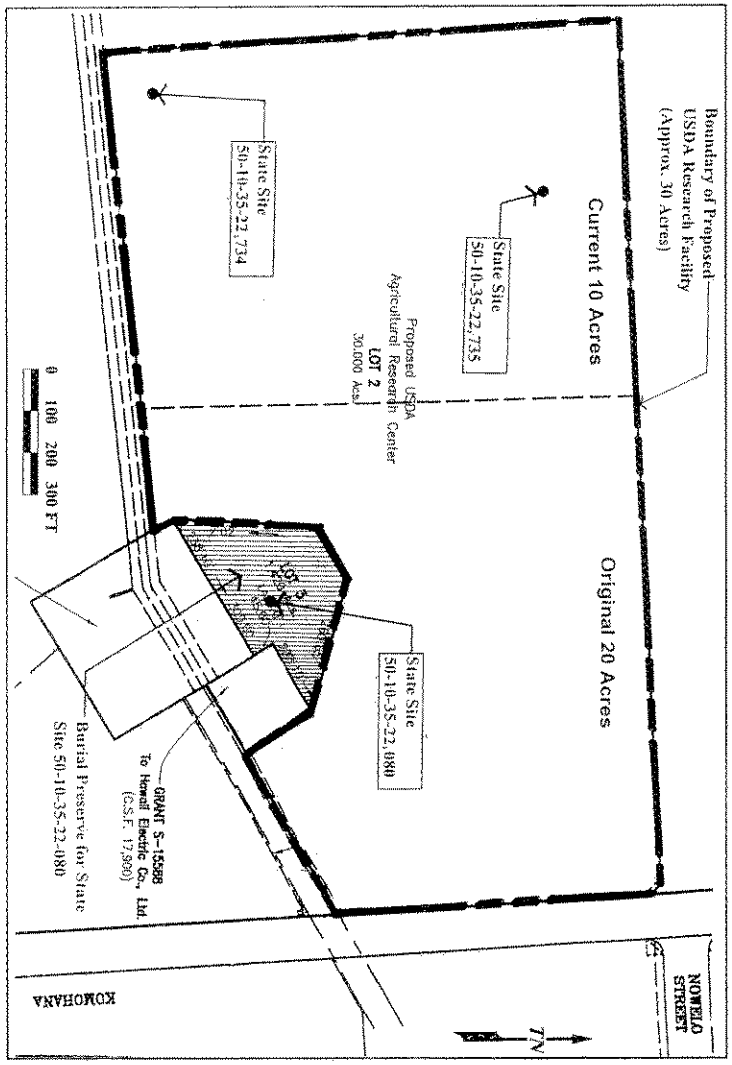


Figure 14: Map of Inventory Survey Project Area and Identified Sites within the USDA Research Center Parcel as Designated by McDermott and Hammatt 2001.

this upland agricultural zone. A single human femur located in an overhang within a shallow skylight (SIHP Site 22080) was discovered adjacent to the current study area (Bush *et al.* 2000).

SUGAR CANE CULTIVATION SITES

According to Smith (1991), the majority of sites in the region are located on the older lava flow, along the southern boundary of the project area. Archaeological investigations and historical documentation have shown that the predominant site type in this area is associated with Waiākea Mill Company plantation fields. Pre-Contact sites are infrequently documented and were likely dismantled or obscured by cane field clearing (Maly 1996). It is expected that sugar cane field features will be encountered along the southern and southeastern boundary of the project area in an area formerly designated as Waiākea Mill plantation Lot 20-A (see Figure 7). The southeast corner of the project area likely contains water diversion and catchment features because it is situated in a low basin near a primary runoff that once flowed into the Waiākea Stream, and because water was necessary for irrigating sugar cane and for preparing field pesticides and herbicides.

RANCHING AND MILITARY SITES

The majority of the project area is situated on a more recent lava flows (1,500 to 750 B.P. and the historic 1880–1881 flow) along the northern edge of the project area. Soils on these two flows are thin and scattered and are poorly suited for traditional or modern agriculture. While traditional pre-Contact horticultural practices (*i.e.*, planting in pockets of soil in bedrock depressions and mulching with rocks) may have been practiced in the area, it is expected that they will be infrequently encountered. Arboreal agriculture is not expected in the thin soils. If traditional agriculture was not practiced in the area, it is unlikely that temporary habitation and associated features will be located in the central and northern portions of the project area. It is primarily expected that sites related to historic-period ranching and military training (pertaining to General Lease 2741) will be encountered (see Figure 7).

TRANSPORTATION ROUTES AND SITE LOCATION

It is also expected that the majority of historic-period sites will be located along the eastern and southern edges of the project area because of transportation routes. Historic maps of the area show Mohouli Street and Pu`ainako Street as the only two points of access to this undeveloped area. It is known that a trail (Maly 1996) and several dirt roads (Robert Steamy Chow interview) ran between these two streets, under and *mauka* Komohana Street. Two separate dirt roads are evident in aerial photos of the project area (taken in the years 1950, 1952, and 1964), both along the southern edge of the study area. Portions of the trail and dirt roads may be encountered within the study area parcel.

RESULTS OF FIELDWORK

Sixteen new sites comprising 80 features were recorded in the course of this archaeological work. Site integrity of three previously documented sites within the project area (SIHP Sites 18918, 18919, and 20681) was reassessed during the present study (Figure 15). In total, there are 19 sites in the project area. The majority of all sites within the study area were interpreted to be related to historic sugar cane cultivation, ranching, or military activities. None of the sites were interpreted as pre-Contact.

SITES LOCATED ALONG THE EAST EDGE OF THE PROJECT AREA

SITE 50-10-35-24233

Site 24233 is a rock alignment located three to five meters *mauka* of Komohana Street and 10 meters south of a Helco power line road, at an elevation of 98 meters (320 feet) amsl (Figure 16). The site is situated in a dense *waivi* thicket growing on a thin mantle of soil in an uneven and sloping area with numerous bedrock outcrops. Site 24233 consists of two features (Features A and B).

Site 24233, Feature A

Feature A is a rock alignment measuring 30 meters long (173°/253°), 1 to 2 meters wide, and averages 0.40 meters in height. It is constructed of piled angular and subangular *pāhoehoe* cobbles and boulders, with no evidence of stacking or facing. There are four large albezia trees along the *makai* edge of the feature at intervals of approximately 4 meters. The alignment likely delineates a remnant portion of trail, the continuance of which has been removed by the construction of Komohana Street and the Helco power line road. The trail surface is now overgrown and it is not certain if the trail was located *mauka* or *makai* of the alignment. The feature has been altered by a recent flood event and is in fair condition.

Site 24233, Feature B

Feature B is a *pāhoehoe* cobble and boulder concentration situated in a shallow basin adjacent to a modern drainage tunnel under Komohana Street, and is two meters south of Site 24233 (see Figure 16). The cobble and boulder concentration measures 8 meters long (179°/359°), 6.7 meters wide, is even with the ground surface, and is not well sorted or level. Feature B is likely associated with trail Site 24233 and allowed passage over the low swampy terrain in this area. An albezia and two small mango trees are located adjacent to and *makai* the site. The site has been altered by the construction of Komohana Street and appears to be in fair condition

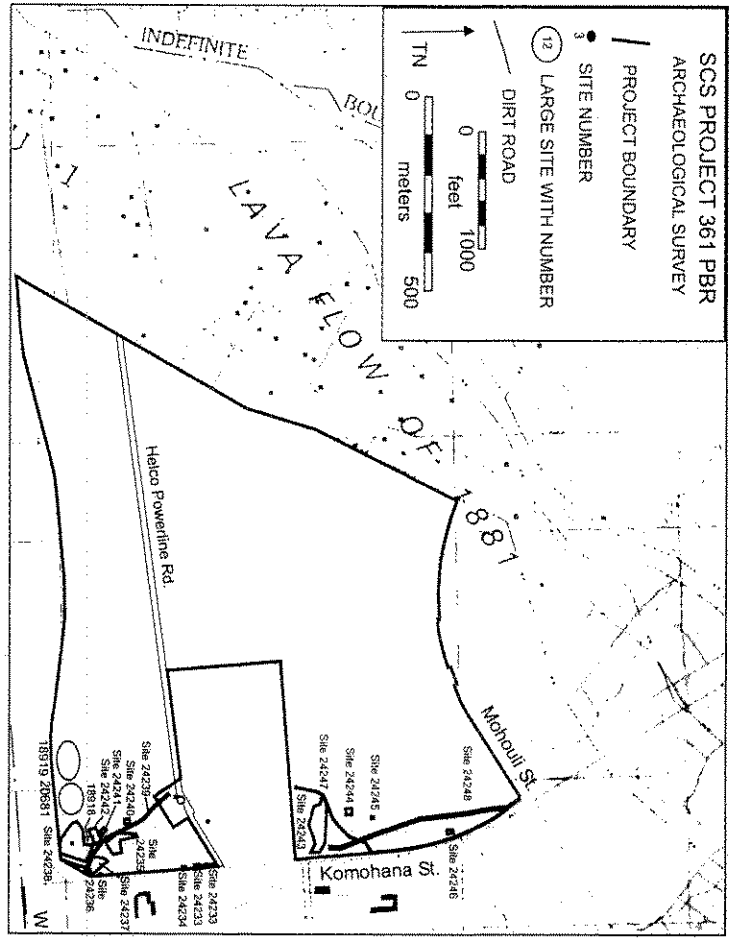


Figure 15: Portion of USGS Hilo Quadrangle Topographical Map, Showing Sites Located on the UH Hilo *Mauka* Lands Project Area.

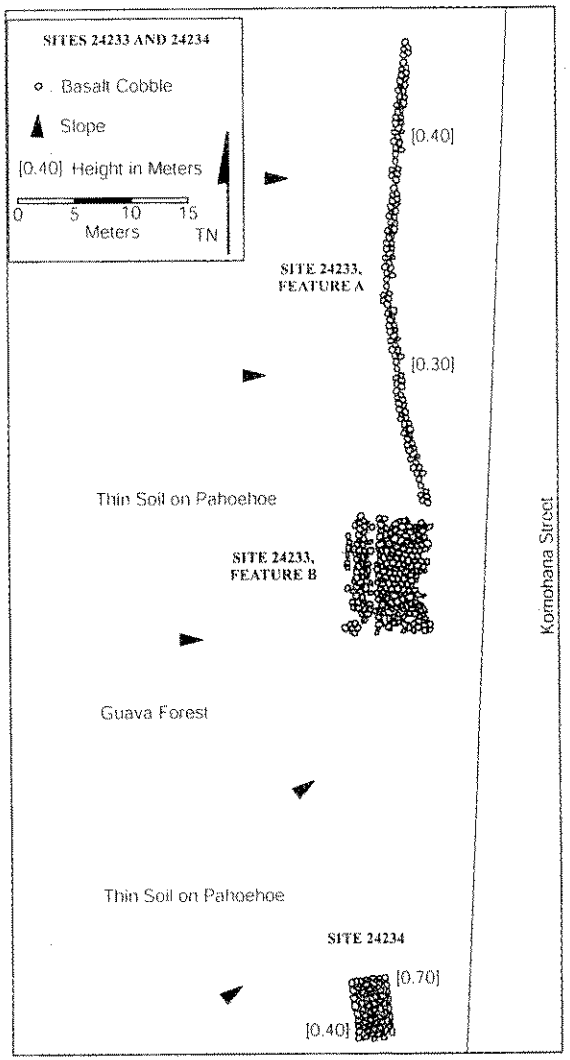


Figure 16: Map Showing Locations of Sites 24233 and 24234.

is located on a bedrock outcrop in an area of eastern sloping *waivi* forest and *uluhe* fern. The rock mound is constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders, and measures 4 meters long (170°/350°), 3 meters wide, and from 0.40 to 0.70 meters in height. The rock mound is faced on its west, north, and east sides and was stacked three to four courses high. The south side of the mound appears to be disturbed. The feature is likely a clearing mound associated with historic sugar cane fields documented adjacent to and east of Site 24234 in Borthwick *et al.* (1993). The feature is slightly altered, is in fair condition, and is similar in form to numerous clearing mounds documented in several reports completed in the immediate vicinity.

SITES LOCATED IN THE SOUTHEAST CORNER OF THE PROJECT AREA

Sites located in the southeastern corner of the project area (Figure 17) are associated with sugar cane agriculture and are likely remnant portions of Waiākea Mill plantation Lot 20-A (see Figure 7). They consist of numerous field-clearing mounds, all of which are constructed on or up against the sides of bedrock outcrops.

SITE 50-10-35-18918

State Site 50-10-35-18918 is located approximately 75 meters northwest of the southeast corner of the project area, between Site 24238 and 11, and west of dirt road Site 24239, at an elevation of 340 feet (105 m) amsl, and occupies an area of steeply sloping *waiwi* forest growing in pockets of Keaukaha extremely rocky muck series soil dispersed between bare *pāhoehoe* and bedrock outcrops (see Figure 17). Several royal palms are located on the site. The site was originally recorded by Hunt and McDermott (1994) and was later reassessed in Robins and Spear (1996). Hunt and McDermott interpreted the site's four features (Feature A through D) as clearing mounds and an enclosure associated with pastureland. It is evident from a reevaluation during the present study that SIHP Site 50-10-35-18918 is associated with Sites 4, 7, and 11 and are part of the northwestern corner of historic sugar cane fields, likely Waiākea Mill Company plantation Lot 20-A.

Site 18918, Feature A

Feature A is a clearing mound constructed of basalt cobbles and boulders stacked on a *pāhoehoe* outcrop. The feature measures 3.2 m long (north/south), 1.0 m wide, and is from 0.6 to 1.0 m in height. The feature is slightly collapsed and is in fair condition.

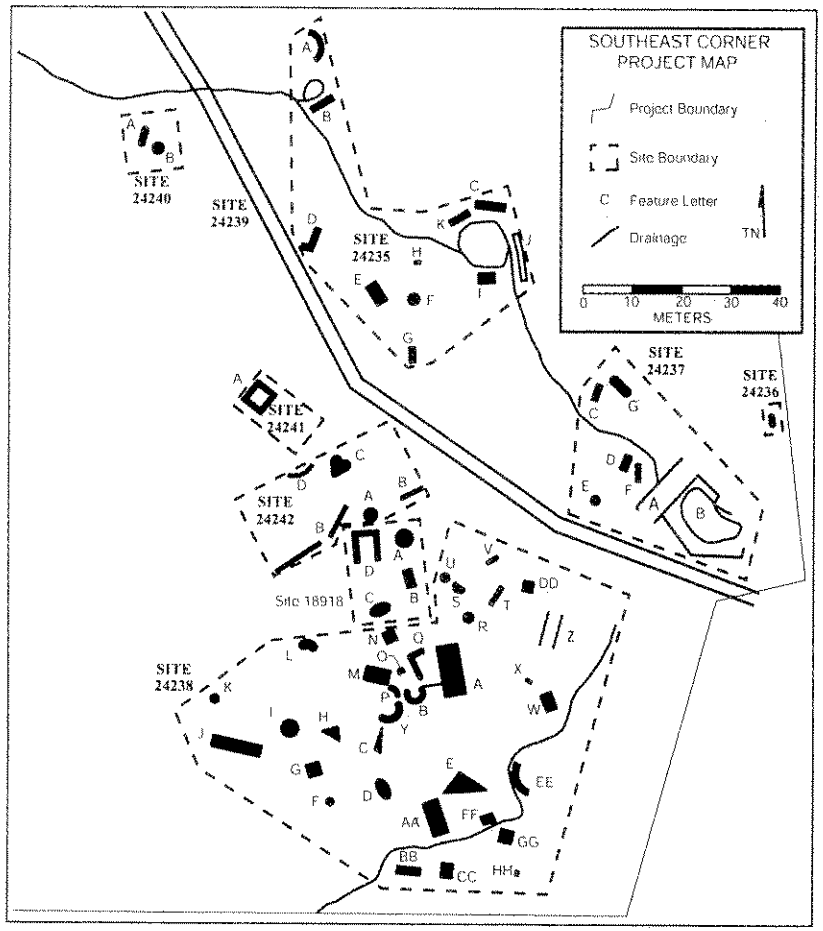


Figure 17: Map Showing Locations of Sites in Southeastern Corner of Project Area.

Site 18918, Feature B

Feature B is a clearing mound constructed of basalt cobbles and boulders stacked on a *pāhoehoe* outcrop. The feature measures 3.2 m long (north/south), 1.0 m wide, and is from 0.6 to 1.0 m in height. The feature is slightly collapsed and is in fair condition.

Site 18918, Feature C

Feature C is an oval clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located in the southwest corner of the site, measures 4.0 meters long (70°/250°), 2.70 meters wide across center, and ranges from 0.80 to 1.60 meters in height (. The sides are very well faced and the top surface is level. It is apparent in the construction that an outer ring was first built and then center filled with piled *pāhoehoe* cobbles and boulders. The feature appears unaltered and is in good condition.

Site 18918, Feature D

Feature D is an L-shaped modified outcrop constructed of basalt boulders stacked on a *pāhoehoe* outcrop to form a U-shaped enclosure. The interior of the feature measures 2.0 m long (north/south), 1.5 m wide, and is a maximum of 1.1 m in height. The walls average 0.8 m in thickness and are well faced on the interior. Feature D likely functioned as a clearing mound and perhaps storage of some kind. The feature is slightly collapsed and is in fair condition.

SITE 50-10-35-18919

The following site description follows Robbins and Spear (1996). Site 18919 is located in the southeast corner of the project area at approximately 340 ft amsl. The site consists of 58 component features, including 36 features (Feature A through "JJ") previously recorded during the Hunt and McDermott 1992 survey and 22 features (Feature 11 through 32) recorded during the Robbins and Spear (1996) survey. There is a gap in the numbering sequence of the newly identified feature designations, because 16 features (Feature 1-10 and 33-38) were originally considered to be associated with Site 18919. In accordance with the SHPD's request, these 16 features (Feature 1-10 and 33-38) are now regarded as a separate site (Site 20681). The feature number designations were retained to facilitate the relocation of these sites' features since each structure was labeled as such in the field. The site area is characterized by an undulating *pāhoehoe* lava surface with intermittent soil-filled depressions. Vegetation is generally dense with some forested areas providing more open canopies.

In total, the features of Site 18919 consist of 29 modified outcrops, 18 mounds, seven retaining walls, two terraces, and two platforms. The majority of these features are built on or

against outcrop exposures and the differing architectural types range in shapes, from linear to circular and all variations in between, including rectangular platforms.

The site features vary in shape and size and they commonly modify exposed outcrop. A common architectural feature type of the site consisted of modifications that appeared to block openings to lava tubes, blisters or potential overhang shelters. Several of these feature types were carefully dismantled during both the 1992 and present project surveys, but none of these explorations identified any sizable openings that would have been appropriate for human use (e.g. shelters).

Several features were also tested during the Hunt and McDermott survey primarily to determine the age and function of the site and to examine cultural deposits if present. The testing included nine individual feature excavations. The testing indicated that the stone structures were loosely constructed (lacking "internal structure" - meaning stacking or substantiality) and lacked any associated prehistoric cultural deposits. A wire observed in the wall construction of Feature E suggests that it was constructed during the historic period. Site 189191 is interpreted as being associated with historic cane agriculture. The site structures were likely the resulting waste piles from clearing sugar cane fields close by.

SITE 50-10-35-20681

The following site description follows Robbins and Spear (1996). Site 20681is located in the southeast corner of the project area at approximately 340 ft amsl, and includes 16 features (Feature 1-10 and 33-38). There is a gap in the numbering sequence of the feature designations of Site 20681 because the site was originally recorded" as being part of Site 18919 (see Site 18919 description).

The site area is characterized by an undulating *pāhoehoe* lava and soil surface that slopes downward moderately to the southeast. The site is bounded by a ridge ascending to the west and by a seasonally dry runoff gulch to the southeast. Site 18919 is located to the west of the site on top of the ridge. Vegetation is generally dense with some forested areas providing more open canopies.

Of the 16 features recorded at Site 20681, twelve are rock, clearing mounds, two are modified outcrops, and two are retaining walls. Site 20681 is interpreted as being associated with historic cane agriculture. The site structures were likely the resulting waste piles from clearing sugar cane fields close by.

SITE 50-10-35-24235

Site 24235 is located in the southeastern corner of the study area, at an elevation of 105 m (340 feet) amsl, and occupies an area of steeply sloping *waiwi* forest growing in pockets of Keaukaha extremely rocky muck series soil dispersed between bare *pāhoehoe* and bedrock outcrops (Figure 18). The site measures approximately 70 meters long, (132°/312°) by 10 to 40 meters wide (42°/222°), and consists of 11 historic sugar cane field features (Features A-J), likely part of Waiākea Mill Company plantation field Lot 20-A. A natural drainage channel crosses the site from a more recent dirt road (Site 24239) located along the northwest edge to the *makai* portion of the site. The channel is modified in two locations (See Features B and J below) to pond water. Water no longer flows through this channel as a result of the construction of the dirt road (Site 24239) and the construction of the Waiākea Stream cement spillway further uphill. Four large, pruned mango trees, several small *hala* trees, and several *ti* plants are located along the channel at the northern edge of the site. A concentration of older *hala* trees is located in a basin at the southeastern corner of the site. Numerous modern beer liquor bottles, beer bottles, and a teacup are located across the site.

Site 24235, Feature A

Feature A is located at the northern edge of the site and is a crescent-shaped pile of *pāhoehoe* cobbles and boulders associated with a modern trash pile located along its *makai* (east) edge. The rock pile measures 7.60 meters long (north/south), 1.4 meters wide, and ranges from 0.40 to 0.67 meters in height. No facing or formal stacking is evident in the feature. Refuse at the dump consists of *circa* 1950s liquor, beer, soda, medicine, Purex, Clorox, and food bottles; scrap metal; and an old washing machine. A 1952 license plate was also located within the refuse.

Site 24235, Feature B

Feature B is an alignment of *pāhoehoe* cobbles piled in a low spot on a bedrock ridge located roughly 6.00 meters south of Feature A, and measures 3.20 meters long (60°/240°), 1.00 meter wide, and from 0.10 to 0.45 meters in height (Figure 19). The bedrock ridge on which the feature is piled forms a natural basin along the northern edge of the natural drainage channel that crosses the site. Soil within the basin was wet when inspected. The alignment serves to dam a low spot on the bedrock outcrop. The feature appears to be unaltered and is in fair condition.

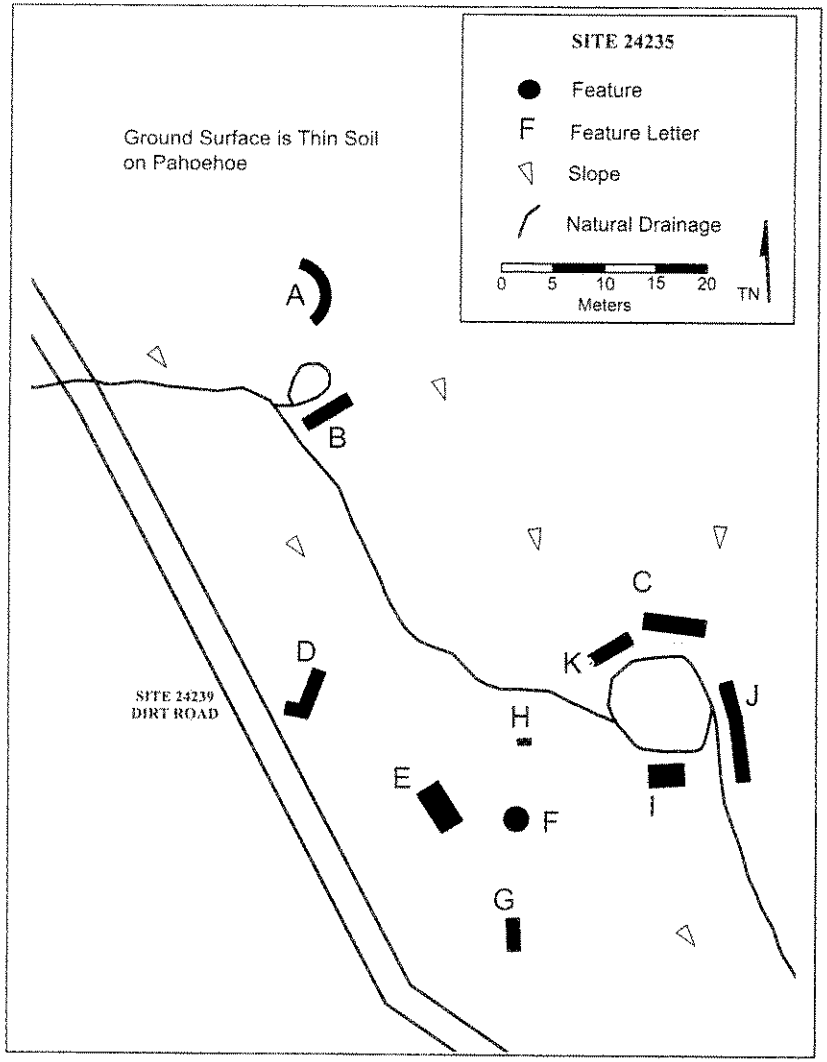


Figure 18: Planview Map of Site 24235 Showing Location of Features.

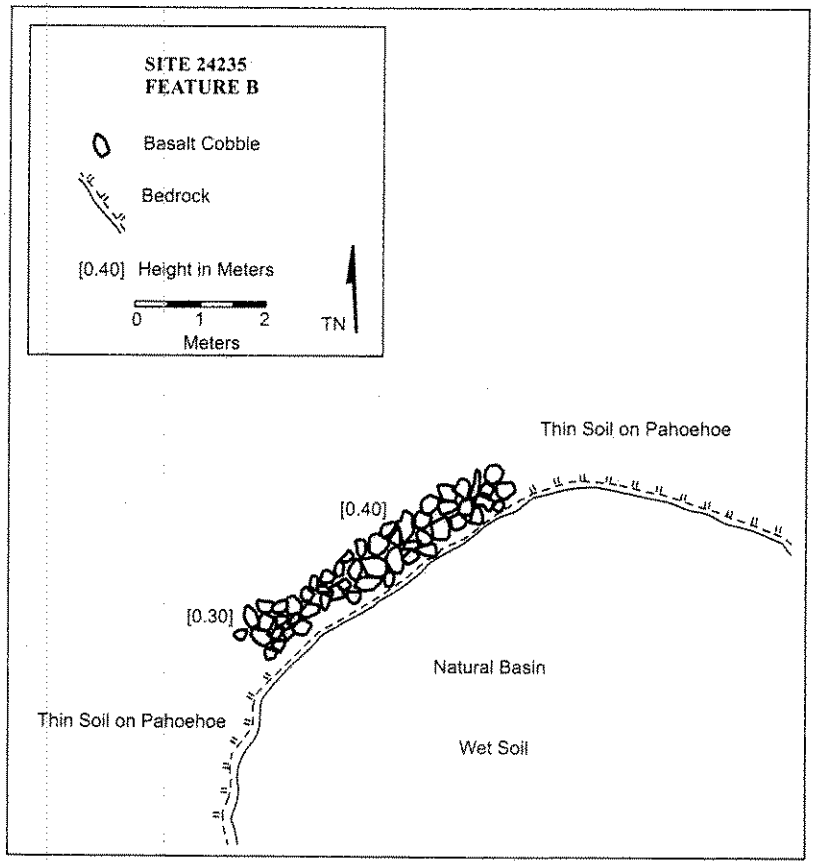


Figure 19: Planview of Site 24235, Feature B Rock Alignment.

Site 24235, Feature C

Feature C is a level, rectangular clearing mound/terrace located roughly 35.00 meters southeast of Feature A, and measures 6.80 meters long (99°/279°), 1.40 meters wide, and is 1.30 meters in height along its southern face (Figure 20). The feature is constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders, is well-faced along its south side, and is level with the ground surface on the three other sides. The feature is built onto the southern edge of a bedrock cliff situated above a natural basin to the south. The basin has been modified (see Feature J) to collect water. Feature C is likely a clearing mound and work area associated with sugar cane agriculture in the area. The feature appears unaltered and is in good condition.

Site 24235, Feature D

Feature D is a rectangular clearing mound constructed of *pāhoehoe* cobbles and boulders located roughly 22 meters south of Feature B, and measures 4.6 meters long (20°/200°), 1.5 meters wide, and averages 0.60 meters along its southeast side (Figure 21). The feature is built onto the southeastern face of a bedrock ledge, is level with the ground surface to the northwest, and is faced on its southeast side. The feature is the result of field clearing, appears unaltered, and is in fair condition.

Site 24235, Feature E

Feature E is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 12 meters southeast of Feature D, measures 5.2 meters long (160°/340°), 2.0 meters wide, and averages 0.60 meters in height. The feature is faced, appears unaltered, and is in good condition.

Site 24235, Feature F

Feature F is a square clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 3.00 meters east of Feature E, measures 2.30 meters per edge, is 0.37 to 0.67 meters in height, and is well-faced on all sides (Figure 22). The southeast corner of the feature has collapsed, but over all integrity appears to be fair.

Site 24235, Feature G

Feature G is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 10.00 meters southeast of Feature E, measures 3.00 meters long (179°/369°), 1.00 meter wide, is 0.37 to 0.67 meters in height, and is well-faced along its western side (Figure 23). The feature is built onto the eastern face of a bedrock ledge and is level with the ground surface to the east. The feature appears unaltered and is in good condition.

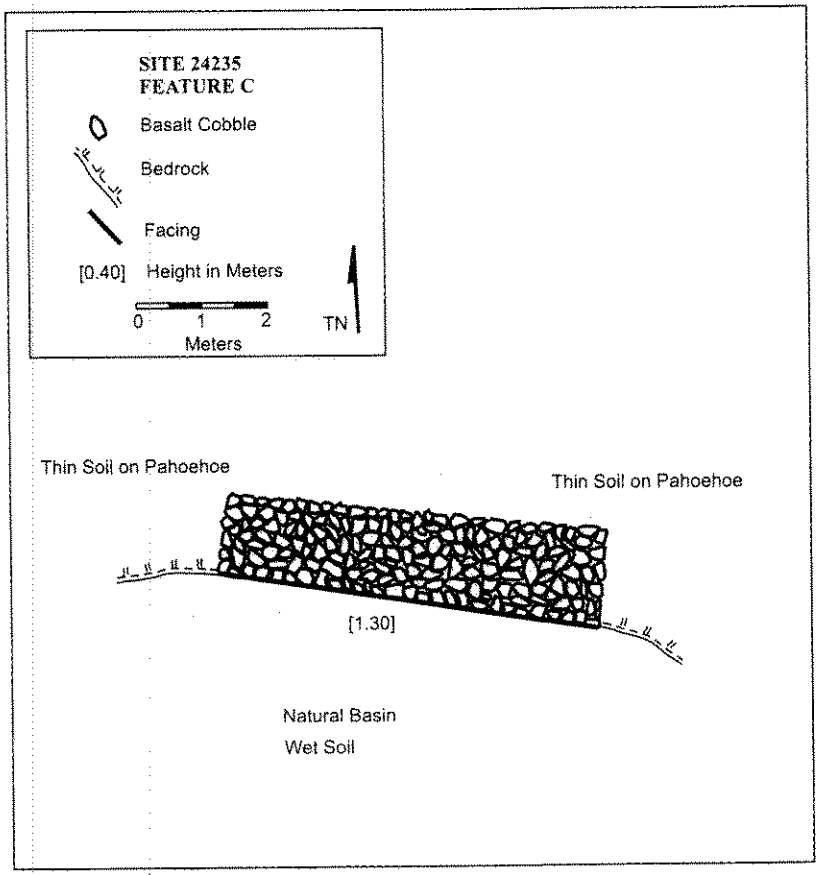


Figure 20: Planview of Site 24235, Feature C Clearing Mound.

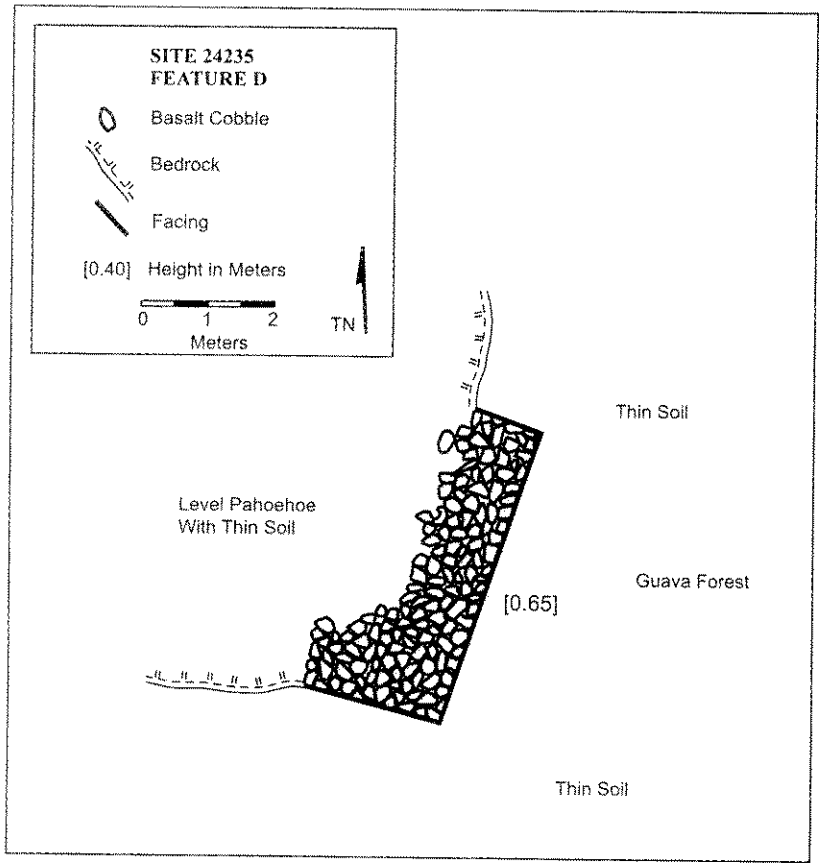


Figure 21: Planview of Site 24235, Feature D Clearing Mound.

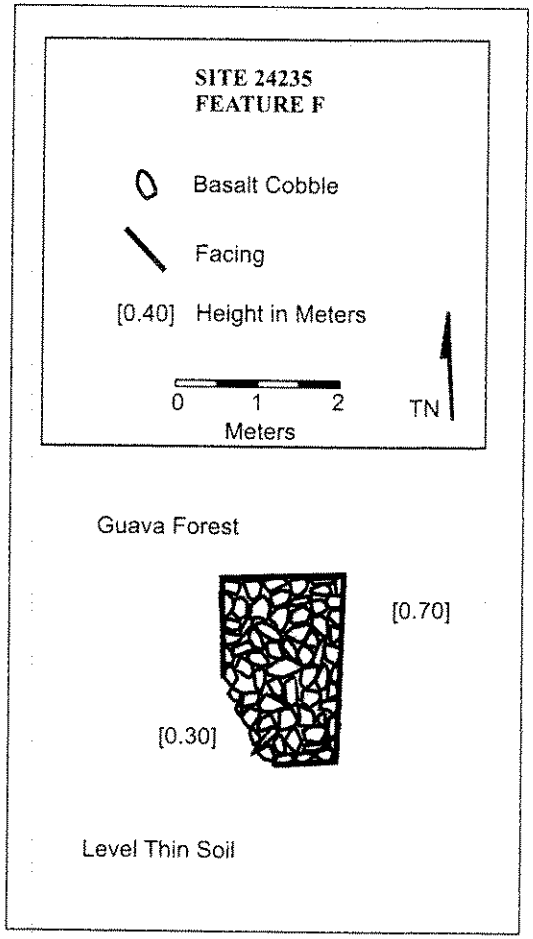


Figure 22: Planview of Site 24235, Feature F Clearing Mound.

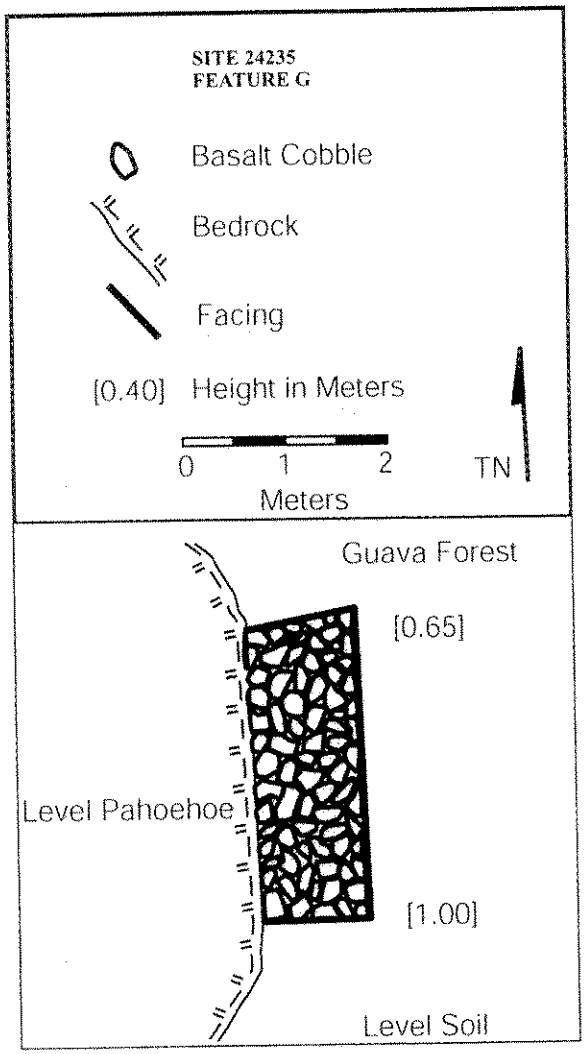


Figure 23: Planview of Site 24235, Feature G Clearing Mound.

Site 24235, Feature H

Feature H is a rectangular clearing mound constructed of angular and subangular *pāhoehoe* cobbles and boulders stacked on a bedrock outcrop located 5 meters north of Feature F. The feature measures 1.6 meters long (east/west), 0.8 meters wide, is 0.6 to 1.0 meter in height, and is faced on its east side. The feature appears to be unaltered and is in fair condition.

Site 24235, Feature I

Feature I is a triangular clearing mound constructed of angular and subangular *pāhoehoe* cobbles and boulders stacked on a bedrock outcrop located 11.00 meters east of Feature H. It measures 2.80 meters long (east/west), 0.97 meters wide, is 0.66 to 1.00 meter in height, and is faced on all side (Figure 24). The feature appears unaltered and is in fair condition.

Site 24235, Feature J

Feature J is a rock alignment constructed of angular and subangular *pāhoehoe* cobbles and boulders piled on a bedrock outcrop located 4 meters east of Feature I and measures 9.3 meters long (north/south), 1.0 meter wide, and is from 0.30 to 0.55 meters in height (Figure 25). The bedrock ridge on which the feature is piled forms a natural basin along the eastern edge of the natural water channel that crosses the site. Soil within the basin was wet when inspected. The alignment serves to dam a low spot on the bedrock outcrop. The feature appears to be unaltered and is in fair condition.

Site 24235, Feature K

Feature K is a field clearing alignment constructed of angular and subangular *pāhoehoe* cobbles and boulders piled on a bedrock outcrop located 1 meter west of Feature C. It measures 3.9 meters long (59°/239°), 0.78 meters wide, and is from 0.30 to 0.43 meters in height. No facing is evident in the feature. The feature is a result of clearing associated with historic sugar cane agriculture. The feature appears to be unaltered and is in fair condition.

SITE 50-10-35-24236

Site 24236 is a single, semicircular rock alignment enclosing a lava tube located in the southeastern corner of the project area and 3.0 meters west of Komohana Street at an elevation of 98.00 meters (320 feet) amsl, and occupies an area of level to gently sloping *waiwi* forest growing on a thin to moderately deep mantle of Keaukaha extremely rocky muck series soil (see Figure 17). The rock alignment is semicircular, measures 2.30 meters long (174°/354°), 0.28 meters wide and is from 0.32 to 0.55 meters in height (Figure 26). The lava tube enclosure measures 2.3 meters in diameter, is 1.3 meters long, pinches off at its interior end, and is devoid of sediment and cultural material (bare lava interior). The feature is associated with a historic

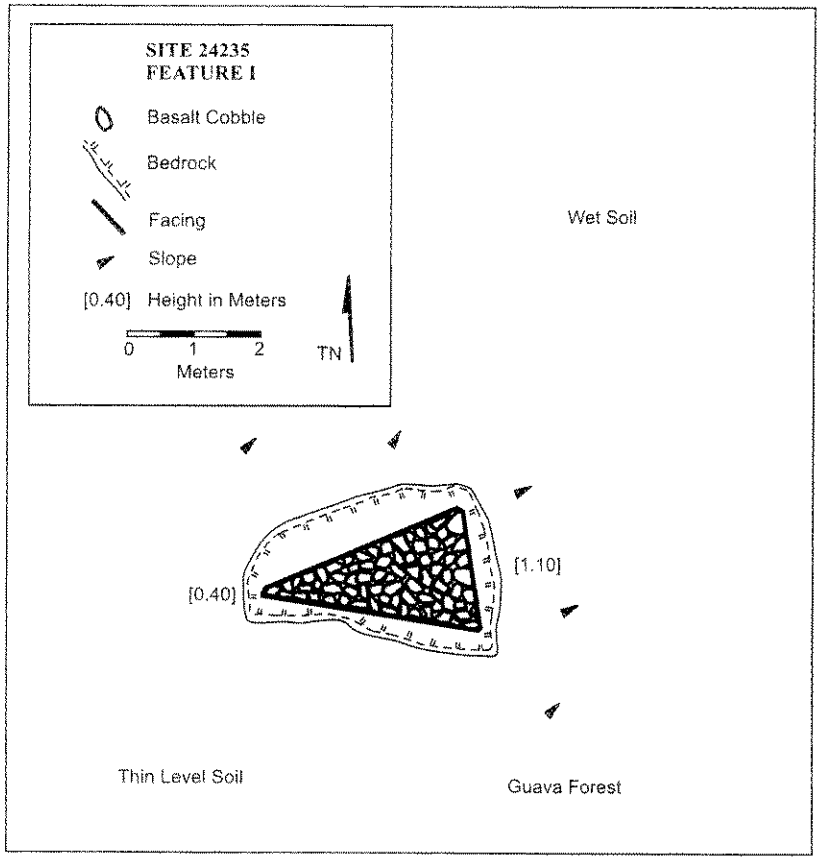


Figure 24: Planview of Site 24235, Feature I Clearing Mound.

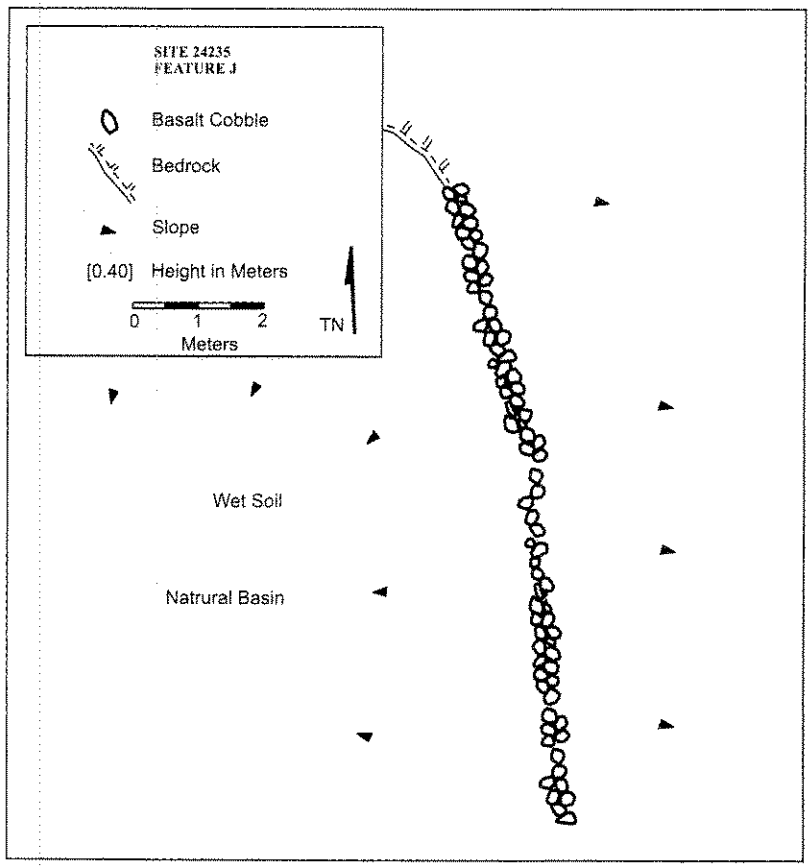


Figure 25: Planview of Site 24235, Feature J Clearing Mound.

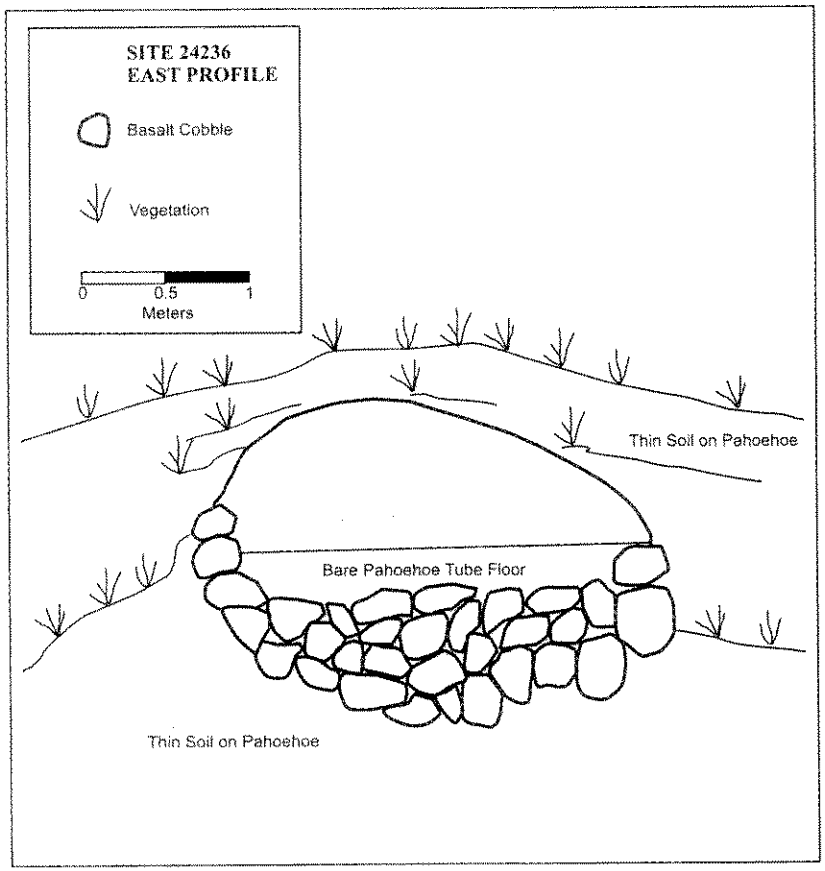


Figure 26: Profile of Site 24236 Enclosed Lava Tube.

water catchment complex (Site 24241) located approximately 15 meters to the west. Site 24241 appears unaltered and in good condition.

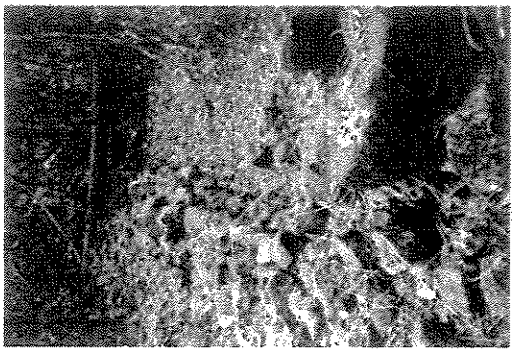
SITE 50-10-35-24237

Site 24237 is located in the southeastern corner of the study area, at an elevation of 320 feet (98 m) amsl, and occupies an area of level to gently sloping *waiwi* forest growing on a thin to moderately deep mantle of Keaukaha extremely rocky muck series soil (Figure 27). The site measures approximately 55 meters long (northwest/southeast), by 18 to 30 meters wide (northeast/southwest) and consists of 7 features (Features A–J), likely part of nearby Waiākea Mill Company plantation field Lot 20-A and Fairview Dairy pasture land. A natural drainage channel enters the site from Site 24235 to the west, and Site 24237 Features A and G (see below) catch the water entering from that channel. Water no longer flows through this channel as a result of the construction of a dirt road (Site 24239) and the construction of the Waiākea Stream cement spillway further uphill. Numerous modern beer bottles, cans, and chunks of cement are located across the site.

Site 24237, Feature A

Feature A is a road causeway (Figure 28) constructed of angular and subangular *pāhoehoe* cobbles, boulders, and boulder-sized chunks of flat cement stacked across a low spot in the surrounding ground surface located 20.0 meters west of Komohana Street and 3 meters north of a dirt road (Site 24239). The causeway measures 20.0 meters long (45°/225°), is 4.5 to 5.5 meters wide and is level across the top of its cobble paved surface. The surface is level at both ends of the causeway and is from 0.3 to 1.1 meters above ground surface along its sides. In contrast to the cobble surface, the well-faced sides of the feature are constructed of stacked large angular and subangular *pāhoehoe* boulders. They are stacked from two to four courses high. Water flowing down the natural channel to the northwest likely pooled along the causeway's northwest side and slowly seeped into a catchment (Feature G) constructed on the causeway's southeast face.

The causeway was constructed to allow vehicle traffic over this area and is blocked by the more recently constructed dirt road (Site 24239) to its southwest. A small section of the causeway road is located on Site 24238 (Feature CC). No road or trails are evident along the causeway's northeast terminus; any preexisting road surface is now overgrown. A section of dirt road is visible on an aerial photo taken in 1964 and crosses from Feature A to Komohana Street heading in a northerly direction. The center of the causeway has been altered by the placement



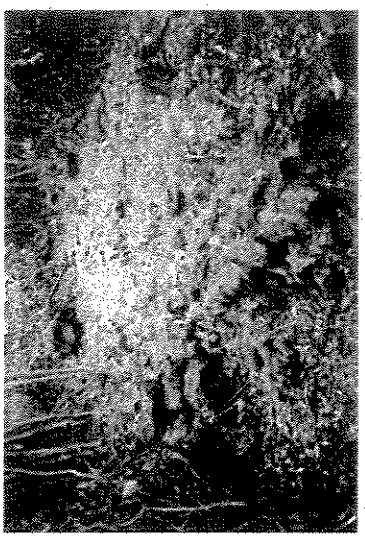


Figure 28: Photographs of East and West sides of Site 24237, Feature 1 Causeway Looking North.

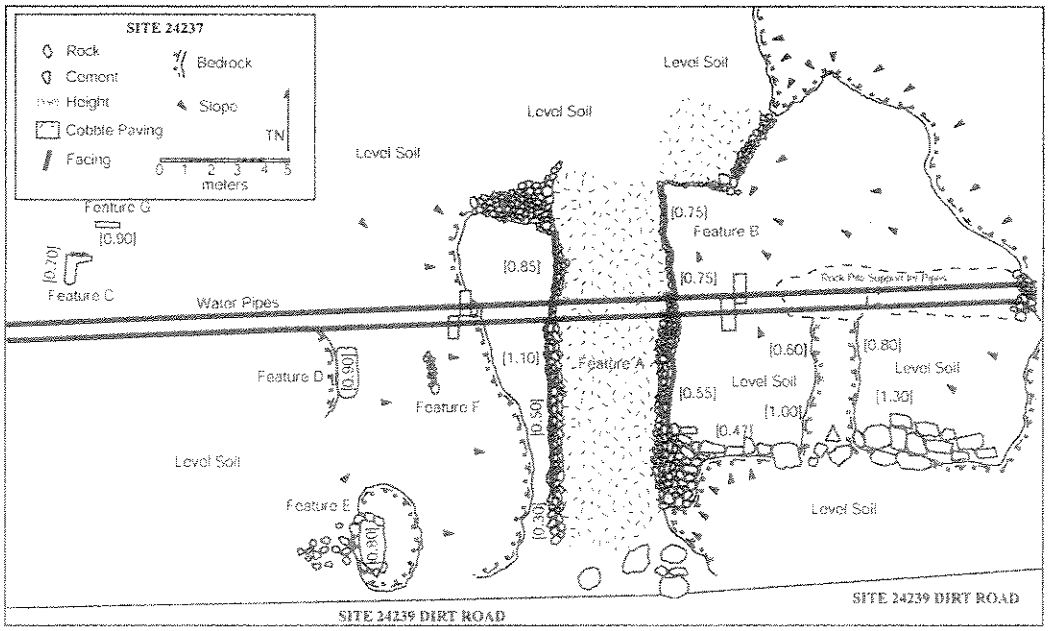


Figure 27: Planview of Site 24237 and Features.

of two 10-inch water pipes that carry water from a reservoir tank uphill into Hilo. The feature appears otherwise unaltered and is in good condition.

Site 24237, Feature B

Feature B is a catchment located on the southeast side of Feature A in a basin measuring approximately 10.00 meters in diameter. The basin is soil filled and formed by Feature A, a crescent shaped raised bedrock outcrop along its south and east edges and, a rock alignment of subangular *pāhoehoe* cobbles and boulders piled along the northern edge. Large Boulder-sized chunks have been discarded over the southern edge of the bedrock outcrop. The rock alignment measures 5.00 meters (east/west), averages 0.50 meters in width (1 to 3 courses), and is 0.25 to 0.40 meters in height (2 to 3 courses). The alignment is cobble paved along its northern edge and forms a low 3.5 meter square two-sided terrace. Feature B is the catchment pool and terrace likely constructed for obtaining water for nearby sugar cane fields and later used to water dairy cattle. The feature appears unaltered and is in fair condition.

Site 24237, Feature C

Feature C is an L-shaped trench located 20.00 meters northwest of Feature A, measures 1 meter in length (per segment), is 0.40 to 0.50 meters wide, and is from 0.40 to 0.76 meters deep. The trench appears to be mechanically excavated into the bedrock and is lined with *pāhoehoe* cobbles around its top edge. The bottom of the feature contains a thin layer of sediment on bedrock. The feature likely functioned as a water catchment. The feature appears unaltered and is in fair condition.

Site 24237, Feature D

Feature C is a rectangular trench located 6 meters northwest of Feature A, measures 2.0 meters in length (20°/200°), is 0.4 to 0.5 meters wide, and is 0.9 meters deep. The trench appears to be mechanically excavated into the bedrock and likely functioned as a water catchment. The bottom of the feature contains a thin layer of sediment on bedrock. The feature appears unaltered and is in fair condition.

Site 24237, Feature E

Feature E is an excavated crack in a *pāhoehoe* outcrop and measures 2.30 meters in length (20°/200°), is 0.82 to 0.95 meters wide, and is 0.80 meters deep. *Pāhoehoe* cobbles removed from the crack are randomly located around the perimeter of the pit. The bottom of the feature contains a thin layer of sediment on bedrock. The feature may be a prehistoric basalt extraction pit, or a catchment feature similar to Features C, D, and G in the immediate vicinity. The feature appears unaltered and is in fair condition.

Site 24237, Feature F

Feature F is rock alignment constructed of one to two courses of angular and subangular *pāhoehoe* cobbles piled on the steeply sloping terrain 3 meters west of Feature A. The alignment measures 1.4 meters long (north/south), is 0.50 meters wide, and measures from 0.20 to 0.42 meters in height. The feature appears to divert water to a catchment in a space between it Feature A. The feature appears unaltered and is in fair condition.

Site 24237, Feature G

Feature G is a rectangular trench located 15.0 meters northwest of Feature A, measures 1 meter in length (130°/310°), is 0.4 to 0.5 meters wide, and is 0.9 meters deep. The trench appears to be mechanically excavated into the bedrock, is lined with *pāhoehoe* cobbles around its top edge, and likely functioned as a water catchment. The bottom of the feature contains a thin layer of sediment on bedrock. The feature appears unaltered and is in fair condition.

SITE 50-10-35-24238

Site 24243 is located in the southeast corner of the study area, at an elevation of 98 meters (320 feet) amsl, and occupies an area of steeply sloping *waiwi* forest growing in pockets of Keaukaha extremely rocky muck series soil dispersed between bare *pāhoehoe* and bedrock outcrops (Figure 29). The west side of the site is a level basin containing an old stream channel, once part of the Waiākea Stream. Water no longer flows through this channel as a result of the construction of the Waiākea Stream cement spillway to the south of the study area. The site measures approximately 88 meters long (east/west), by 20 to 75 meters wide (north/south), and consists of 32 historic sugar cane field features (Features A–HH), likely part of Waiākea Mill Company plantation field Lot 20-A. Several large albezia trees, royal palms, *lilliko'i* vines, and *ti* plants are located along the lower side of the site surrounding Feature A. Numerous modern liquor, beer, milk, medicine, Purex, Clorox, and food bottles; metal fence posts; and chunks of cement are located across the site.

Site 24238, Feature A

Feature A is a three-sided rectangular terrace located 45.00 meters southwest of Site 24237, Feature A. The terrace is constructed of stacked angular and subangular *pāhoehoe* cobbles, boulders, and boulder-sized chunks of flat cement. It measures 13.30 meters in length (3°/183°), is 2.25 to 6.00 meters wide, and is 0.13 to 0.98 meters in height along its western, northern, and southern sides (Figure 30). The terrace surface consists of a level *pāhoehoe* cobble/ boulder/ cement chunk paving that is level with the surrounding ground surface on its east side. There is a relatively open level ground surface on the feature's west side and a

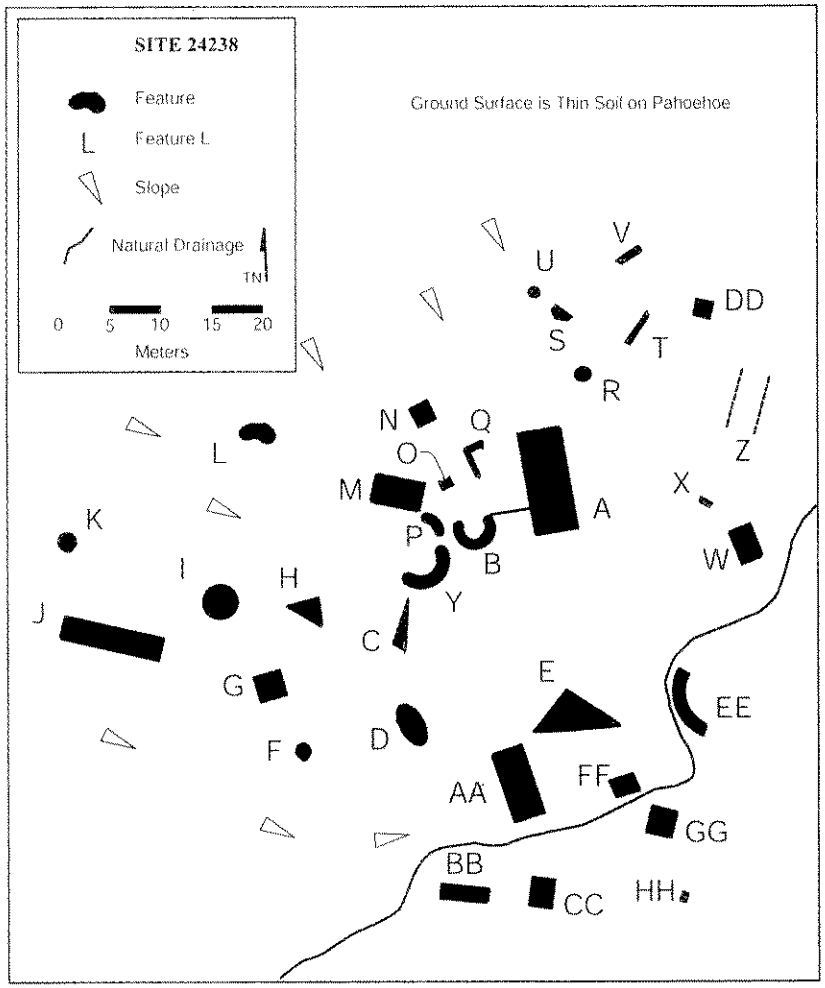


Figure 29: Planview of Site 24238.

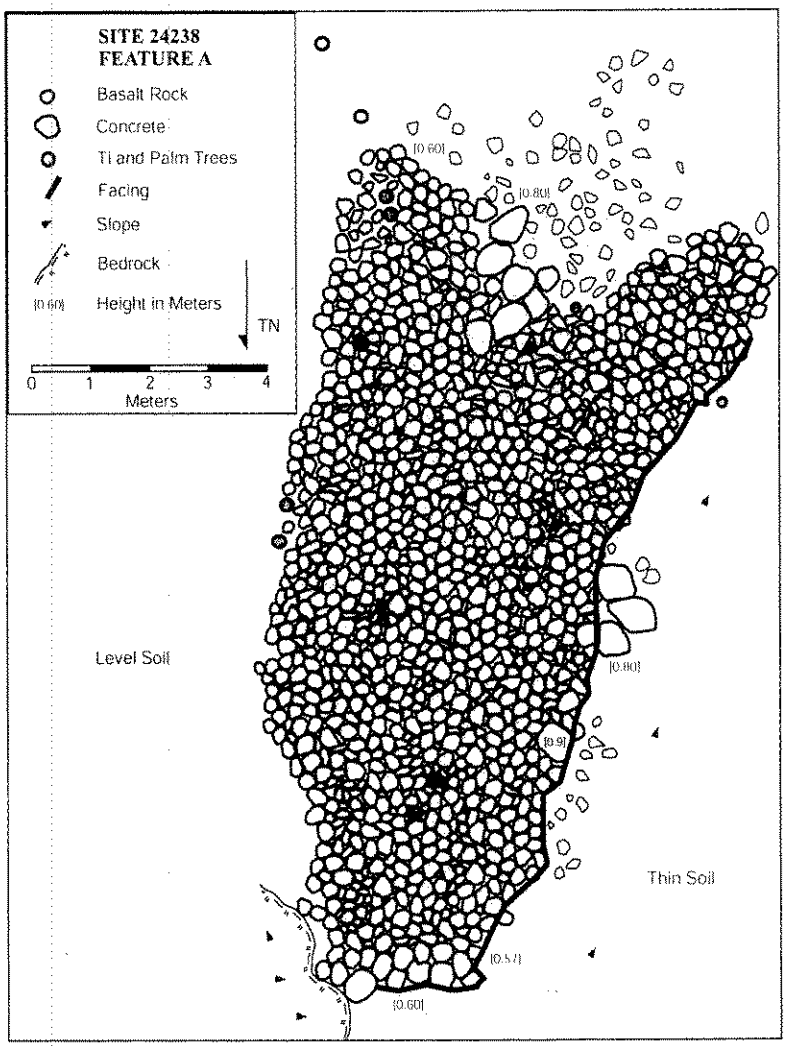


Figure 30: Planview of Site 24238, Feature A Terrace.

possible road surface leading north from the northern edge of the terrace. Another bulldozer-leveled road segment (Feature Z) likely leads to the clearing on the east side of the terrace. There are several royal palm trees and *ti* plants growing on and around the feature, as well as many historic bottles below the west side of the terrace. The terrace likely functioned as a collection and initial processing point for freshly cut sugar cane. Collected cane would have been loaded onto trucks and brought to the Waiākea Mill via nearby Puainako Street. The feature appears unaltered and is in good condition.

Site 24238, Feature B

Feature B is a crescent-shaped clearing mound constructed of angular and subangular *pāhoehoe* cobbles stacked against a bedrock outcrop to its south. It is located 2.50 meters southwest of Feature A, measures 2.60 meters long (76°/256°), 0.75 meters wide, is 0.30 to 0.40 meters in height, and is roughly faced on its north side. The feature appears unaltered and is in fair condition.

Site 24238, Feature C

Feature C is a triangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 7.00 meters southeast of Feature B. The feature measures 4.00 meters long (10°/190°), 3.45 meters wide, and is from 0.80 to 1.20 meters in height (Figure 31). The feature is well-faced on two sides, slightly collapsed along its east side, and is in good condition.

Site 24238, Feature D

Feature D is an octagonal clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 5.00 meters south of Feature C. It measures 4.00 meters long (150°/330°), 3.20 meters wide, and averages 0.74 meters in height (Figures 32 and 33). The feature is well-faced on all sides, is level on its top surface, appears unaltered, and is in good condition.

Site 24238, Feature E

Feature E is a triangular clearing mound constructed of angular and subangular *pāhoehoe* cobbles and boulders stacked against the west edge of a linear bedrock outcrop, located 10 .00meters east of Feature D. This feature measures 2.00 meters long (east/west), 2.50 meters wide, and is from 0.20 to 0.45 meters in height (Figure 34). The feature is faced on its north side, appears unaltered, and is in fair condition.

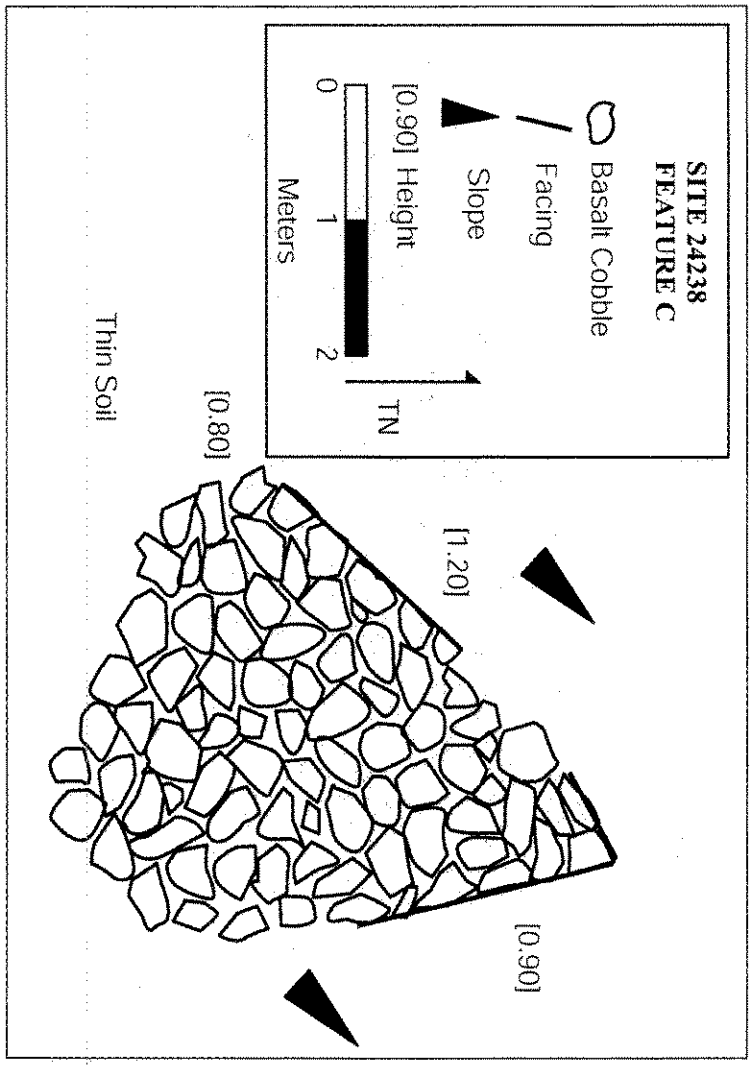


Figure 31: Planview of Site 24238, Feature C Clearing Mound.

Figure 32: Photograph of Site 24238, Feature D Clearing Mound Looking East.

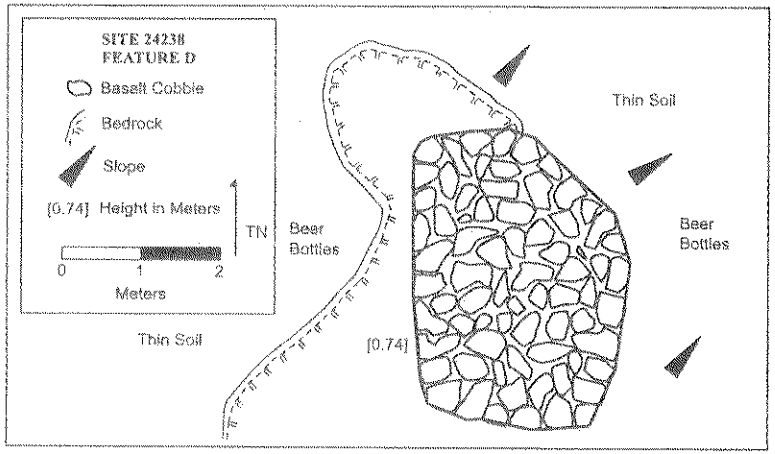


Figure 33: Planview of Site 24238, Feature D Clearing Mound.

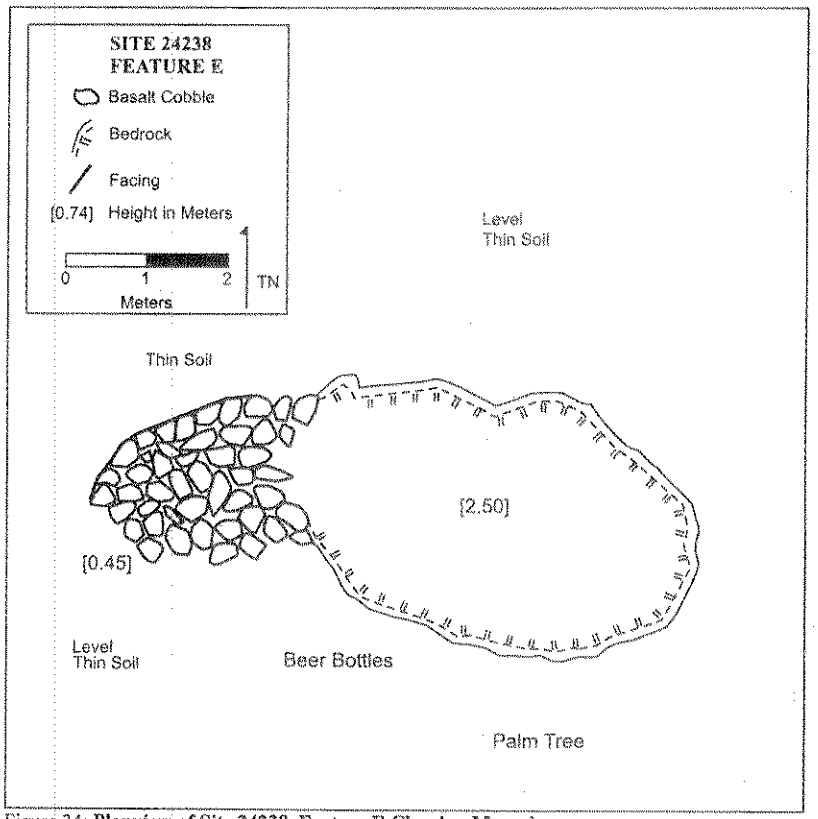


Figure 34: **Planview of Site 24238, Feature E Clearing Mound.**

Site 24238, Feature F

Feature F is a triangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 7.5 meters west of Feature D, measures 1.60 meters per side, and averages 0.55 meters in height (Figure 35). The feature is well-faced on all sides, appears unaltered, and is in good condition.

Site 24238, Feature G

Feature G is a trapezoidal clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 4.00 meters northwest of Feature F. It measures 2.50 meters along each side and averages 0.90 meters in height (Figure 36). The feature is faced on two sides, is collapsed along its southwest side, and is in good condition.

Site 24238, Feature H

Feature H is a diamond-shaped clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 4.00 meters north of Feature G, measures 4.00 meters along each side, and is from 0.55 to 1.25 meters in height (Figure 37). The feature is faced on all sides, is slightly collapsed along its south and southeast sides, and is in fair condition.

Site 24238, Feature I

Feature I is a dome-shaped clearing mound constructed of piled angular and subangular *pāhoehoe* cobbles and boulders located 3.50 meters west of Feature H. The feature measures 3.00 meters in diameter, and is 0.15 to 0.80 meters in height (Figure 38). The feature is not faced, is collapsed, and is in poor condition.

Site 24238, Feature J

Feature J is a rectangular clearing mound constructed of angular and subangular *pāhoehoe* cobbles and boulders stacked along the north face of a bedrock outcrop located 4 meters west of Feature I. This feature measures 8.5 meters long (102°/282°), is 1.0 to 2.0 meters wide and averages 0.80 meters in height (Figure 39). The feature is not faced, appears unaltered, and is in fair condition.

Site 24238, Feature K

Feature K is a square clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 8.5 meters northwest of Feature J. It measures 2.2 meters along each side and averages 0.9 meters in height (Figure 40). The feature is faced on its southeast side, appears unaltered, and is in good condition.

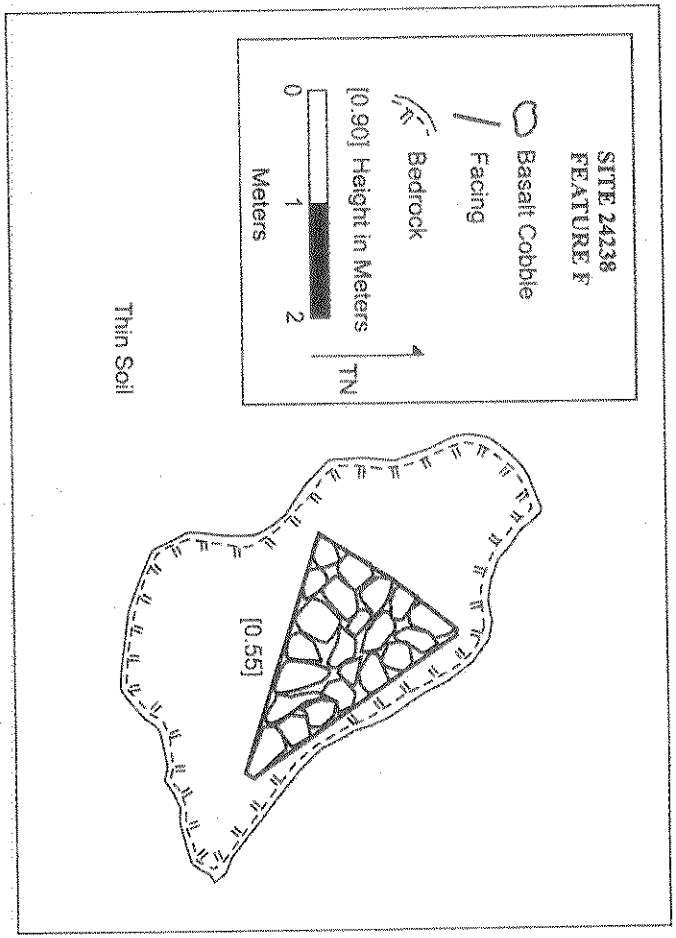


Figure 35: Planview of Site 24238, Feature F Clearing Mound.

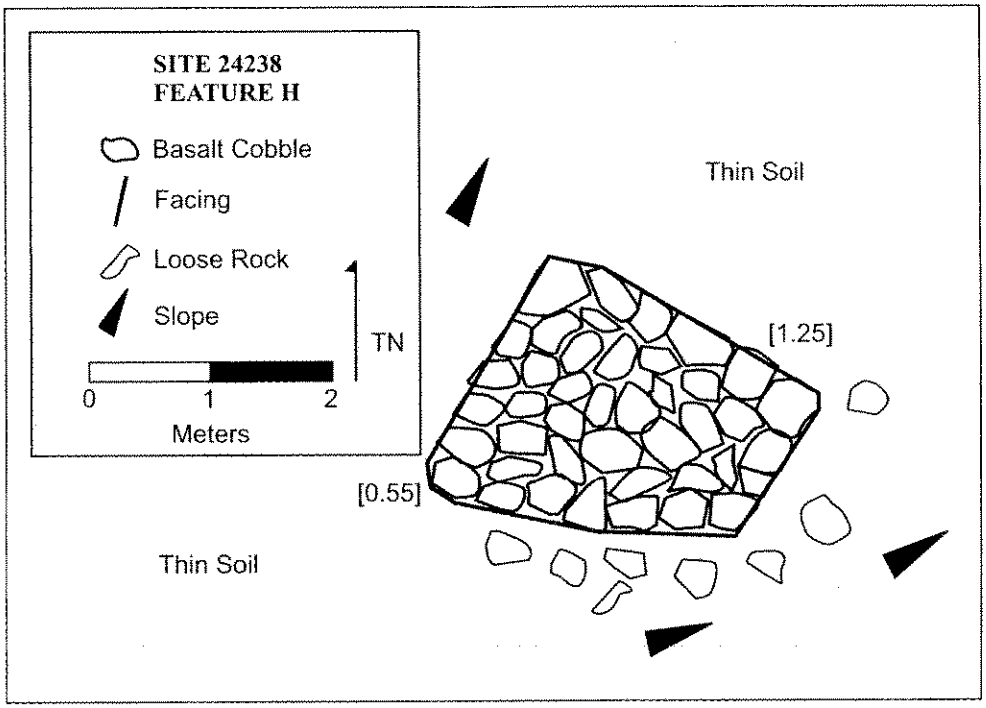


Figure 37: Planview of Site 24238, Feature H Clearing Mound.

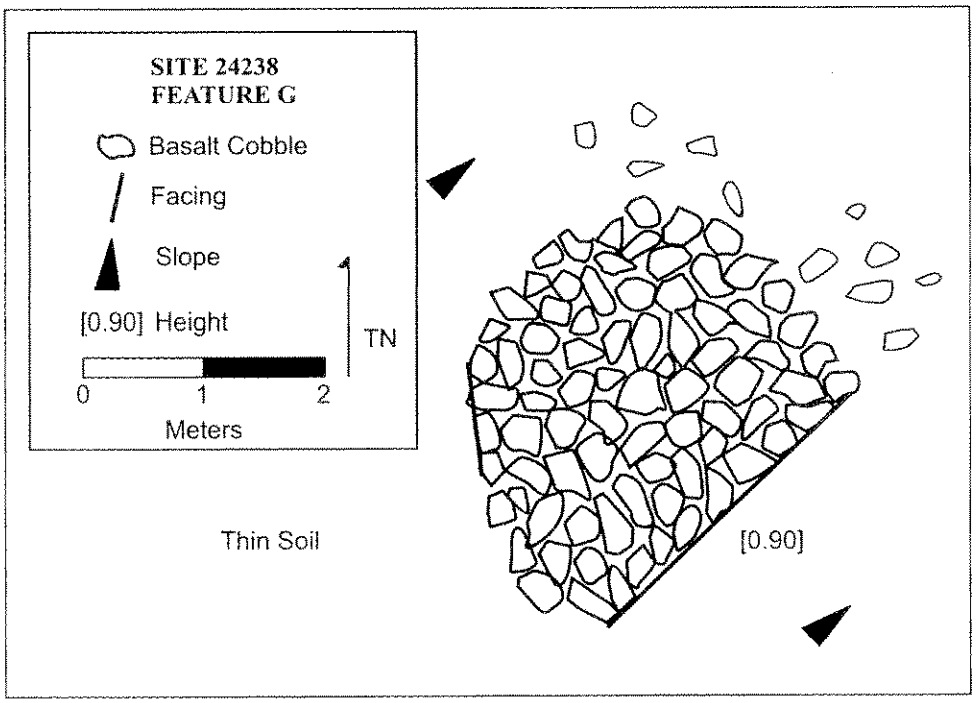


Figure 36: Planview of Site 24238, Feature G Clearing Mound.

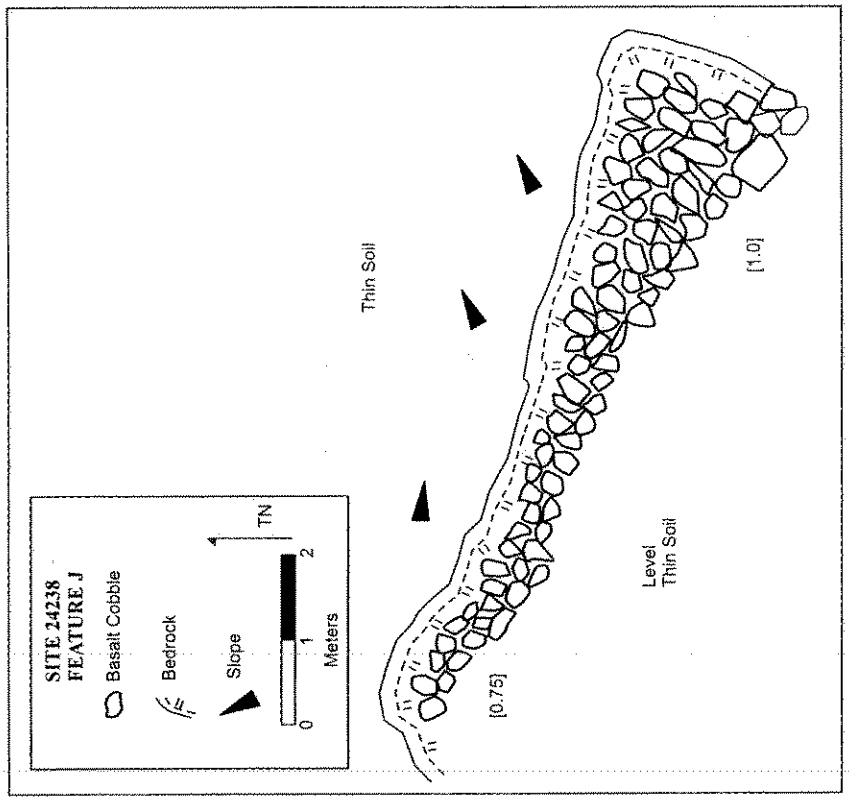


Figure 39: Planview of Site 24238, Feature J Clearing Mound.

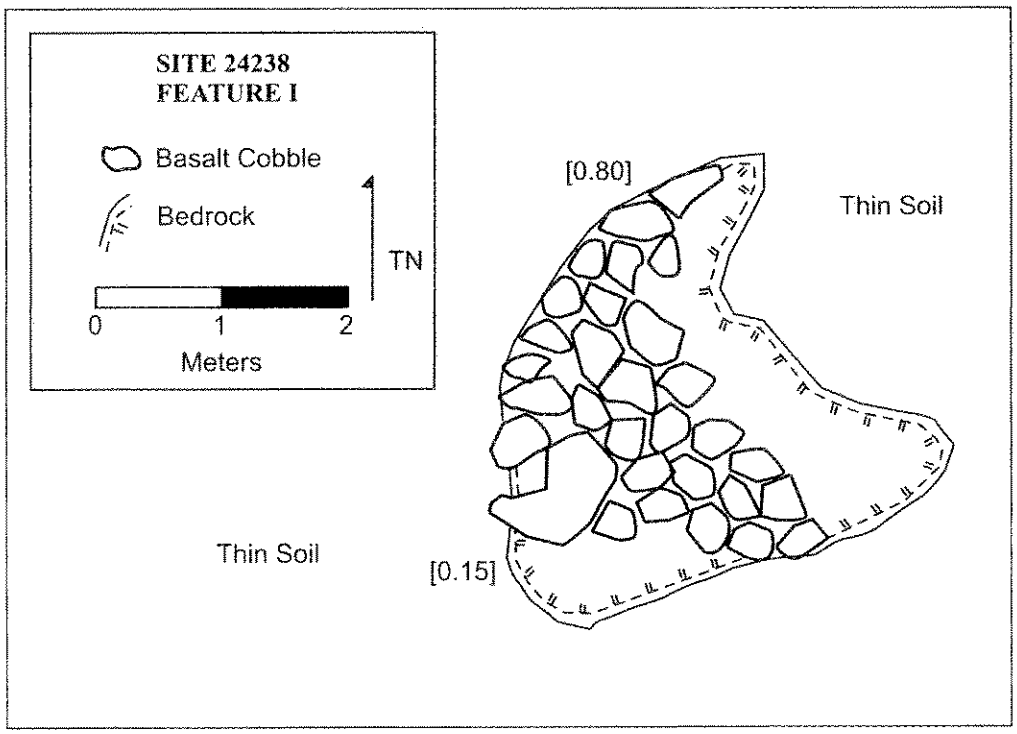


Figure 38: Planview of Site 24238, Feature I Clearing Mound.

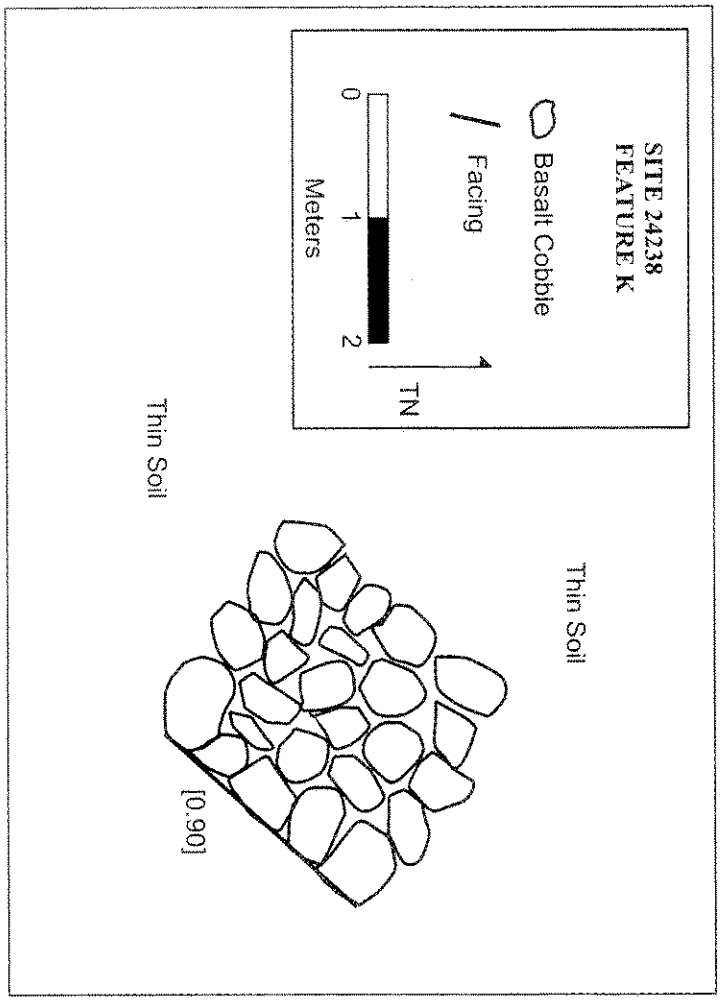


Figure 40: Planview of Site 24238, Feature K Clearing Mound.

Site 24238, Feature L

Feature L is a kidney-shaped clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 19.0meters northeast of Feature K. The feature measures 4.0 meters long (102°/221°), is 2.0 meters wide, and averages 0.8 meters in height (Figure 41). The feature is not faced, is unaltered, and is in good condition.

Site 24238, Feature M

Feature M is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 11.0 meters east of Feature L It measures 7.1 meters long (100°/280°) at base and averages 1.4 meters in height. The top surface is level and measures 5.2 meters by 3.0 meters. The feature is well-faced, appears unaltered, and is in excellent condition.

Site 24238, Feature N

Feature N is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 12.0 meters southeast of Feature D. The feature measures 5.2 meters long (160°/330°), 2.0 meters wide, and averages 0.6 meters in height in height (Figure 42). The feature is faced, appears unaltered, and is in good condition.

Site 24238, Feature O

Feature O is a rectangular trench located 6 meters west of Feature A. The feature measures 1.7 meters long (2°/182°), 1.0 meter wide, and averages 0.7 meters in depth. The trench appears to be mechanically excavated into the bedrock and likely functioned as a water catchment. The bottom of the feature contains a thin layer of sediment on bedrock. The feature appears unaltered and is in fair condition.

Site 24238, Feature P

Feature P is a rectangular trench located 7.50 meters west of Feature A. It measures 3.00 meters long (142°/322°), 0.65 meters wide, and averages 0.45 meters in depth. The trench appears to be mechanically excavated into the bedrock and likely functioned as a water catchment. The bottom of the feature contains a thin layer of sediment on bedrock. Rocks removed from the trench are located along the eastern edge of the trench. The feature appears unaltered and is in fair condition.

Site 24238, Feature Q

Feature Q is an L-shaped trench located 3 meters west of Feature A. It measures 2.0 meters in length (per segment), is 0.80 to 0.90 meters wide, and averages 0.55 meters deep. The trench appears to be mechanically excavated into the bedrock and is lined with *pāhoehoe* cobbles

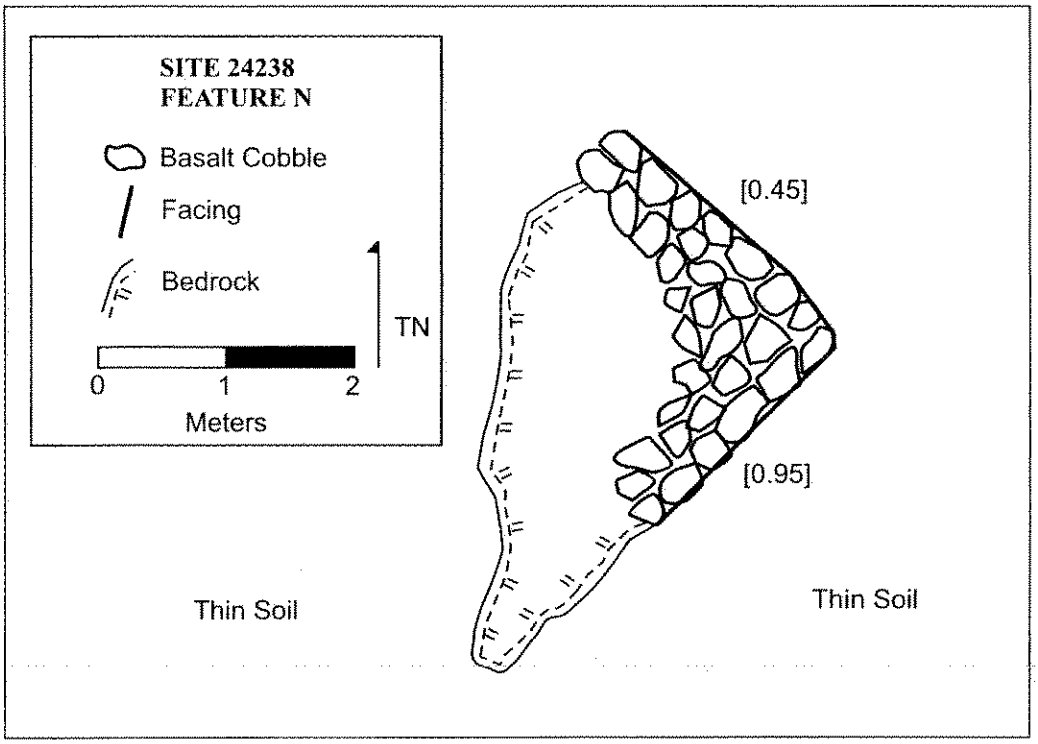


Figure 42: Planview of Site 24238, Feature N Clearing Mound.

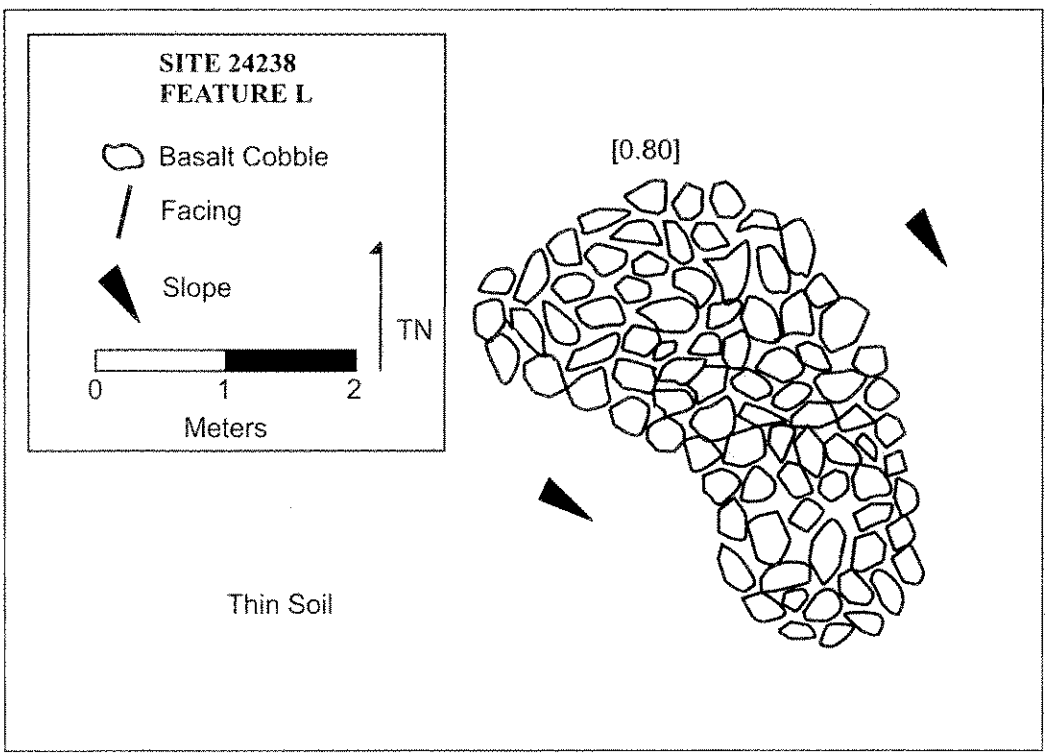


Figure 41: Planview of Site 24238, Feature L Clearing Mound.

around its top edge. The bottom of the feature contains a thin layer of sediment on bedrock. The feature likely functioned as a water catchment. The feature appears unaltered and is in fair condition.

Site 24238, Feature R

Feature R is a square clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 4.00 meters northeast of Feature A. It measures 1.80 meters along each side, and averages 0.45 meters in height. The feature is poorly faced, appears unaltered, and is in fair condition.

Site 24238, Feature S

Feature S is a semicircular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 3.50 meters north of Feature R. The feature measures 2.80 meters long (124°/304°), 2.00 meters wide, and averages 0.55 meters in height. The feature is built onto the northeast face of a bedrock outcrop, is faced, unaltered, and is in good condition.

Site 24238, Feature T

Feature T is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 10.00 meters northeast of Feature A, measures 4.20 meters long (29°/209°), is 1.75 meters wide, and averages 0.35 meters in height in height. The feature is built onto the side of a bedrock outcrop, is faced, appears unaltered, and is in fair condition.

Site 24238, Feature U

Feature U is a circular clearing mound constructed of piled angular and subangular *pāhoehoe* cobbles and boulders located 1.00 meter northwest of Feature S. It measures 1.30 meters in diameter, and averages 0.45 meters in height. The feature is not faced, is slightly collapsed, and is in fair condition.

Site 24238, Feature V

Feature V is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 7.50 meters northeast of Feature U. The feature measures 2.70 meters long (60°/240°), averages 0.95 meters wide, and averages 0.55 meters in height. The feature is faced, appears unaltered, and is in good condition.

Site 24238, Feature W

Feature W is a pentagonal clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 10.00 meters east of Feature A, measures 5.30 meters

long (8°/188°), 3.45 meters wide, and ranges from 0.40 to 1.84 meters in height. The feature is faced on all sides, is collapsed along its southern corner, and is in good condition. Several large chunks of flat cement are located in this low spot in the vicinity of Feature W.

Site 24238, Feature X

Feature X is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 2.50 meters northwest of Feature W. It measures 1.85 meters long (122°/302°), 1.00 meter wide, and averages 1.00 meter in height. The feature is built onto the northwest face of a bedrock ledge, is well-faced, appears unaltered, and is in good condition. A tin can was observed within the interstices of the feature.

Site 24238, Feature Y

Feature Y is a V-shaped rectangular trench located 8.75 meters west of Feature A. It measures 2.00 to 2.75 meters in length (per segment), is 0.80 to 0.90 meters wide, and ranges from 0.55 to 0.80 meters in depth. The trench appears to be mechanically excavated into the bedrock and is lined with *pāhoehoe* cobbles around its top edge. The bottom of the feature contains a thin layer of sediment on bedrock. The feature likely functioned as a water catchment. The feature appears unaltered and is in fair condition.

Site 24238, Feature Z

Feature Z is a 7.0-meter long segment of bulldozed road located 7.5 meters northeast of Feature X. The road surface is 2.5 to 3.0 meters wide and consists of bare *pāhoehoe*. The road segment appears to be a portion of Site 24241 Feature A. There are numerous modern beer bottles in the area around the feature. The road surface is overgrown, is not evident beyond the short segment documented, and is in poor condition.

Site 24238, Feature AA

Feature AA is a triangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 5.80 meters southeast of Feature D. The feature measures 5.10 meters long (160°/340°), 2.00 meters wide, and is from 0.66 to 0.90 meters in height (Figure 43). The feature is faced, appears unaltered, and is in good condition.

Site 24238, Feature BB

Feature BB is a kidney-shaped clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 13.00 meters south of Feature D. It measures 3.20 meters long (96°/266°), 1.15 meters wide, and averages 0.90 meters in height (see Figure 43). The feature is well-faced on all sides, appears unaltered, and is in good condition.

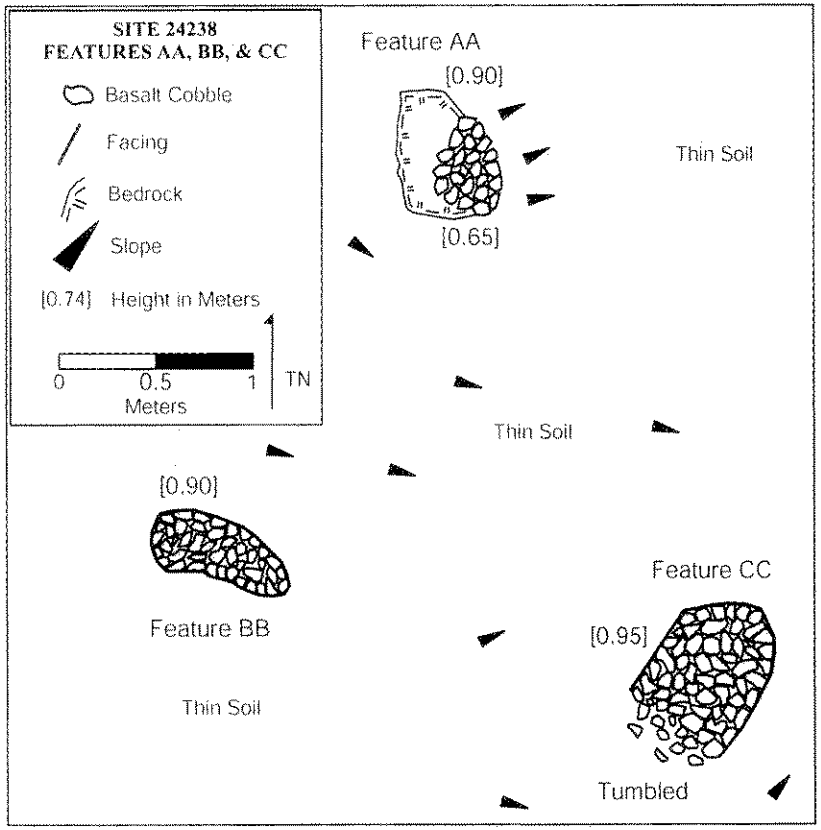


Figure 43: Planview of Clearing Mound Features AA, BB, and CC (Site 24238).

Site 24238, Feature CC

Feature CC is a bullet-shaped clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 3.00 meters east of Feature BB. It measures 3.30 meters long (north/south), 2.40 meters wide, and averages 0.65 meters in height (see Figure 43). The feature is faced on its east, north, and west sides, is collapsed along its south side, and is in fair condition.

Site 24238, Feature DD

Feature DD is a square clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 5.0 meters northwest of Feature Z. The feature measures 2.0 meters along each side and averages 0.70 meters in height. The feature is faced, appears unaltered, and is in good condition.

Site 24238, Feature EE

Feature EE is a rectangular clearing mound constructed of piled angular and subangular *pāhoehoe* cobbles and boulders located 17.0 meters southeast of Feature A. It measures 6.2 meters long (160°/340°), averages 1.4 meters wide, and is from 0.1 to 0.4 meters in height. The feature built onto the west side of a low bedrock outcrop, is not faced, appears unaltered, and is in fair condition.

Site 24238, Feature FF

Feature FF is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 7.00 meters southwest of Feature EE, measures 2.90 meters long (75°/255°), 1.84 meters wide, and ranges from 0.40 to 1.10 meters in height. The feature is well-faced, slightly collapsed along its southwest corner, appears unaltered, and is in good condition.

Site 24238, Feature GG

Feature GG is a pentagonal clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 1.20 meters southeast of Feature FF. The feature measures 1.34 meters long (160°/330°), 1.20 meters wide, and ranges from 0.70 to 1.10 meters in height. The feature is well-faced, appears unaltered, and is in good condition.

Site 24238, Feature HH

Feature HH is a kidney-shaped clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 3.8 meters south of Feature GG. It measures 1.2 meters long (east/west), 0.8 meters wide, and averages 0.6 meters in height. The feature is

built onto the north face of a low bedrock outcrop, is faced, appears unaltered, and is in good condition.

SITE 50-10-35-24239

Site 24239 is a dirt road situated from the southeastern corner of the project area to a modern water tank located approximately 500 meters to the northwest (see Figure 17). The winding road is visible on a 1964 aerial photomap and connects Puainako Street with the water tank. The road appears on an aerial photograph taken in 1950. The road surface is roughly 2.5 to 3.0 meters wide and consists of bulldozed *pāhoehoe* covered with sand and mechanically crushed *pāhoehoe* pebbles used as fill to bridge depressions in the bedrock surface. The road was constructed by the Water Department and was used to lay two 10.0-inch pipes bringing water from the tank into Hilo. The road is partially overgrown and there are numerous trash piles located along the side of the road consisting of various modern bottles, cans, a toilet, and swim fins.

SITE 50-10-35-24240

Site 24240 is located approximately 185 meters northwest of the southeast corner of the project area, 11 meters west of a dirt road (Site 24239) at an elevation of 105 meters (340 feet) amsl, and occupies an area of uneven and gently sloping *waiwi* forest growing in pockets of Keaukaha extremely rocky muck series soil dispersed between bare *pāhoehoe* and bedrock outcrops (Figure 44; see also Figure 17). The site consists of two features (Feature A and B). The features are located on a 2.0-meter high bedrock ridge overlooking the dirt road, and appear to be defensive positions constructed by the U.S. Army while training in the area during World War II (Maly 1996:32). An old water channel is located 4 meters to the northwest of the site; it is the same channel that bisects Sites 4 and 6, and has been blocked by the dirt road between Site 24240 and Site 24235. Water no longer flows through this channel as a result of the construction of the Waiākea Stream cement spillway to the south of the study area.

Site 24240, Feature A

Feature A is an oval enclosure encircling a crack in a bedrock outcrop and measures 2.40 meters long (75°/255°), 1.50 meters wide across center, ranges from 0.65 to 0.85 meters in depth below ground surface, and is located 32.00 meters west of Site 24235 Feature B. The interior of the enclosure measures 2.40 meters by 0.50 meters. The enclosure walls consist of a single course of *pāhoehoe* cobbles and boulders (0.30 meters wide) stacked two courses high (0.30 to 0.60 meters above ground surface). No cultural material was located in or around the feature.

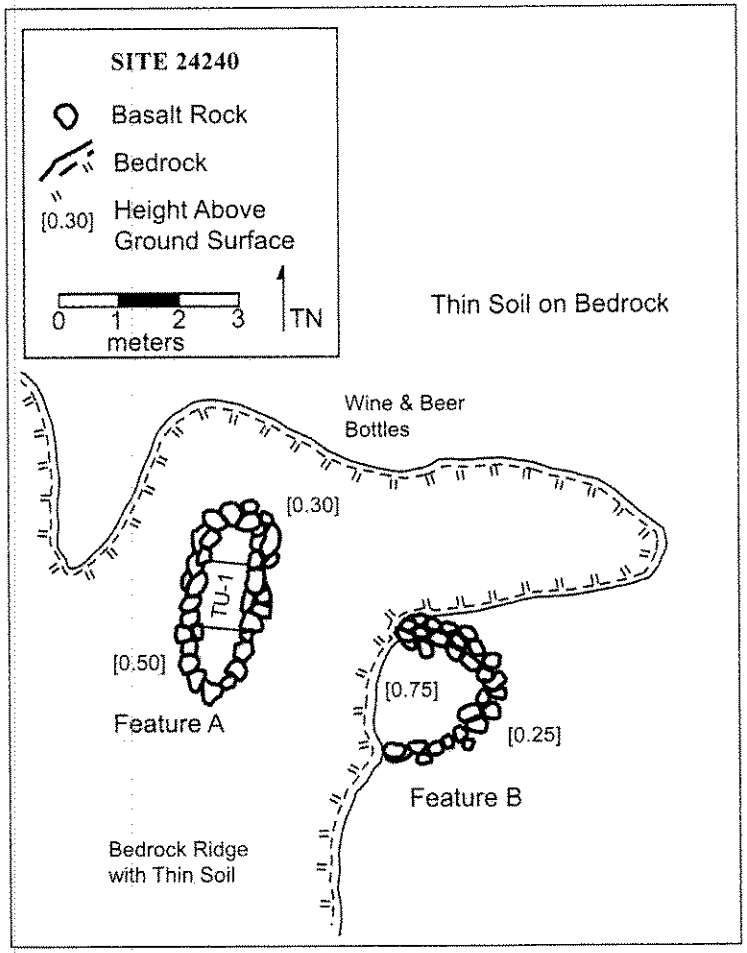


Figure 44: Planview of Site 24240.

Site 24240, Feature A, Test-Unit 1

A 0.50 by 1.0 meter test-unit was excavated in the center of the enclosure. All matrix was screened through 1/8-inch wire mesh. Layer I consisted of a variable 0.07 to 0.18 meters of a reddish brown (5YR 5/4) soft mulch with 80 percent root inclusions. Layer II consisted of a variable 0.17 to 0.37 meters of dark grayish red (5YR 4/2) sandy silt with strong peds and 10 percent exfoliated cobbles. TU-1 was excavated to bedrock and contained no cultural material.

Site 24240, Feature B

Feature B is a semicircular enclosure located 2.65 meters east of Feature A. It is constructed of piled angular and subangular *pāhoehoe* cobbles and boulders, measures 2.10 meters in diameter, and ranges from 0.25 to 0.34 meters in height. The enclosure walls are piled one to three courses wide and one to two courses high. The west side of the enclosure is a 0.75 meter high bedrock outcrop ledge. The interior of the enclosure is bedrock with a very thin layer of scattered sediment. No cultural material was located in or around the feature.

SITE 50-10-35-24241

Site 24241 is a square enclosure located approximately 128 meters northwest of the southeast corner of the project area, 10 meters west of a dirt road (Site 24239) at an elevation of 105 meters (340 feet) amsl, and occupies an area of level *waiwi* forest growing in pockets of Keaukaha extremely rocky muck series soil dispersed between bare *pāhoehoe* and bedrock outcrops (Figure 45; see also Figure 17). The site consists of a single square enclosure constructed of subangular *pāhoehoe* cobbles and boulders stacked along the perimeter of a wide crack in a bedrock outcrop (Figures 46 and 47). The enclosure measures 4.75 meters along each side and ranges from 0.30 to 0.40 meters above the outside ground surface. The interior measures 3.00 to 3.25 meters across and is from 0.60 to 1.60 meters deep. There are two level depressions in the northeast (0.40 meters wide) and southeast (1.00 meter wide) sides of the enclosure that appear to be access points into the enclosure. The northwest side of the enclosure slopes to ground surface and does not appear to be collapsed. The overall elevation of the top of the enclosure is level and may have supported a cover; however, no post-holes are evident in the enclosures surface. The feature is partially collapsed along the south corner and is in good condition.

The ground surface surrounding the enclosure is level *pāhoehoe*. Two large water-filled shallow skylights are located roughly 2 and 10 meters east and northwest of the enclosure. The lava tube skylight to the northeast is filled with modern trash consisting of liquor, beer, Clorox, medicine, and food bottles; several 12 volt and D cell batteries; and an oil filter.

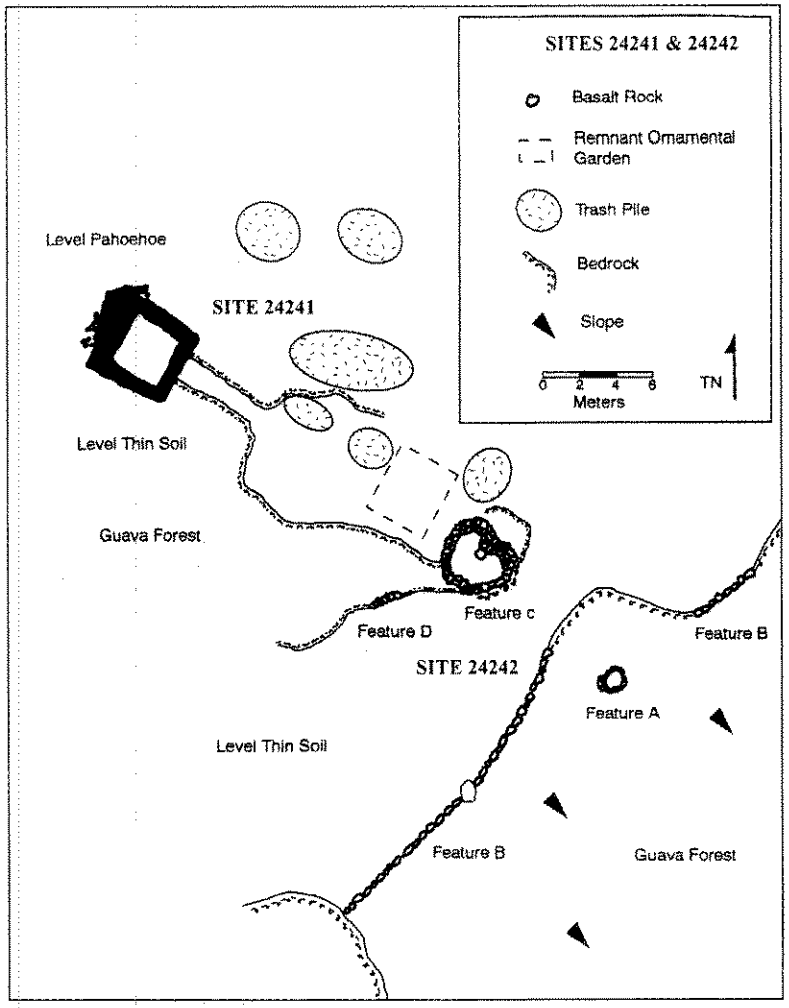


Figure 45: Planview of Sites 24241 and 24242.

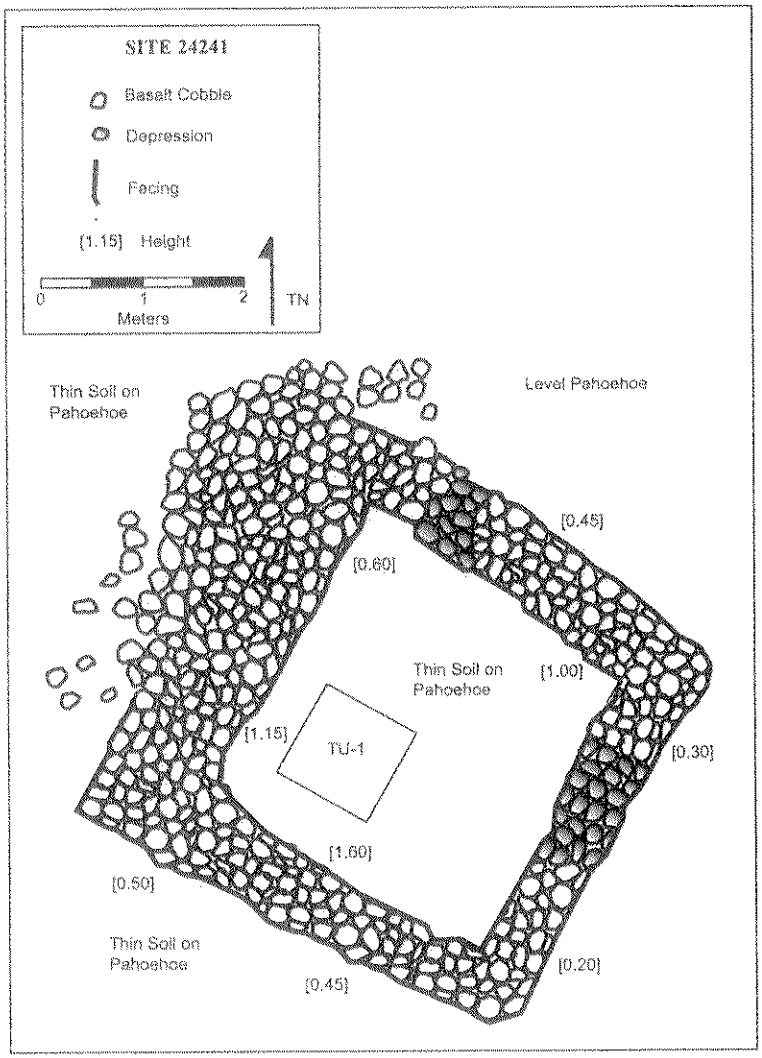


Figure 46: Planview of Site 24241 Enclosure Looking South.

Figure 47: Photograph of Enclosure (Site 24241) Looking South.

There is a second large modern trash pile located from 6.0 to 12.0 meters southeast of the enclosure. The refuse consists of bits of sheet plastic; mason jars; Noxema cold cream jars; dry cell batteries; scraps of sheet metal; light bulbs; a lamp; a drinking glass; boot soles; a tire; a galvanized bucket; a washing machine; a vacuum tube; an ash tray; a vase; Olympia beer cans; and whiskey, sake, beer, medicine, soda, Clorox, Purex, and food bottles. Just southeast of the trash pile is an overgrown remnant garden with a small avocado tree, ginger, and ornamental plants.

Site 24241, Test-Unit 1

A one by one meter test unit was excavated in the northwest corner of the enclosure. All matrix was screened through 1/8-inch wire mesh. A single layer consisting of a variable 0.10 to 0.20 meters of dark brown (7.5YR3/2) sandy loam with 80 percent root mat was excavated from the unit. TU-1 was excavated to bedrock and contained several pieces of insulted electrical wire and sherds of glass on the surface of Layer I. No other cultural remains were present in the test unit. Site 24241 is likely a rest and workstation associated with sugar cane agriculture in the immediate vicinity.

SITE 50-10-35-24242

Site 24242 is located approximately 100 meters northwest of the southeast corner of the project area between SIHP Site 50-10-35-18918 and Site 24241, and west of dirt road Site 24239, at an elevation of 340 feet (105 m) amsl, and occupies an area of level *waiwi* forest growing in pockets of Keaukaha extremely rocky muck series soil dispersed between bare

pāhoehoe and bedrock outcrops (Figures 17 and 46). The site measures 35 meters long (60°/240°), 15 meters wide, and consists of 5 features (Features A through D). Site 26 is associated with SIHP Site 50-10-35-18918, Sites 4, 7, and 10 and is part of the northwestern corner of historic sugar cane fields, likely Waiākea Mill Company plantation Lot 20-A.

Site 24242, Feature A

Feature A is an oval enclosure constructed of angular and subangular *pāhoehoe* cobbles and boulders piled on a bedrock outcrop located 1.80 meters north of SIHP Site 50-10-35-18918 Feature D, measures 3.00 meters long (east/west), 2.00 meters wide across center, and ranges from 0.20 to 0.80 meters in height. The *pāhoehoe* cobbles and boulders are piled one course wide and one to two courses high. The interior of the feature contains a thin deposit of soil. The feature appears to be the start of a clearing mound; it is not faced, it has been altered but is in fair condition.

Site 24242, Feature B

Feature B is a one-course wide rock alignment along a low bedrock ridge located 2.90 meters north of Feature A. The alignment consists of three segments totaling 35.00 meters long (60°/240°), is from 0.20 to 0.75 meters wide, and is from 0.15 to 0.45 meters high. The feature appears to mark an overgrown trail segment and may have served as a boundary marker. Several modern beer bottles are located across the site.

Site 24242, Feature C

Feature C is a heart-shaped enclosure (Figure 48) constructed of angular and subangular *pāhoehoe* cobbles and boulders piled on a bedrock outcrop located 8.00 meters north of Feature A. It measures 3.75 to 4.10 meters in diameter and ranges from 0.45 to 0.95 meters above the exterior ground surface. The *pāhoehoe* cobbles and boulders are piled two to three courses wide (from 0.50 to 090 meters wide) and three to four courses high. The interior is 3.00 meters in diameter, from 0.85 to 1.10 meters deep, and contains a thin layer of sediment scattered on exposed bedrock. The feature appears to be the start of a clearing mound, is faced, is unaltered, and is in good condition.

Site 24242, Feature D

Feature D is a rectangular clearing mound constructed of stacked angular and subangular *pāhoehoe* cobbles and boulders located 2.70 meters southwest of Feature C, measures 2.00 meters long (60°/240°), 0.50 meters wide, and averages 0.96 meters in height. The feature is built onto the southeast face of a bedrock ledge, is faced, appears unaltered, and is in good condition.

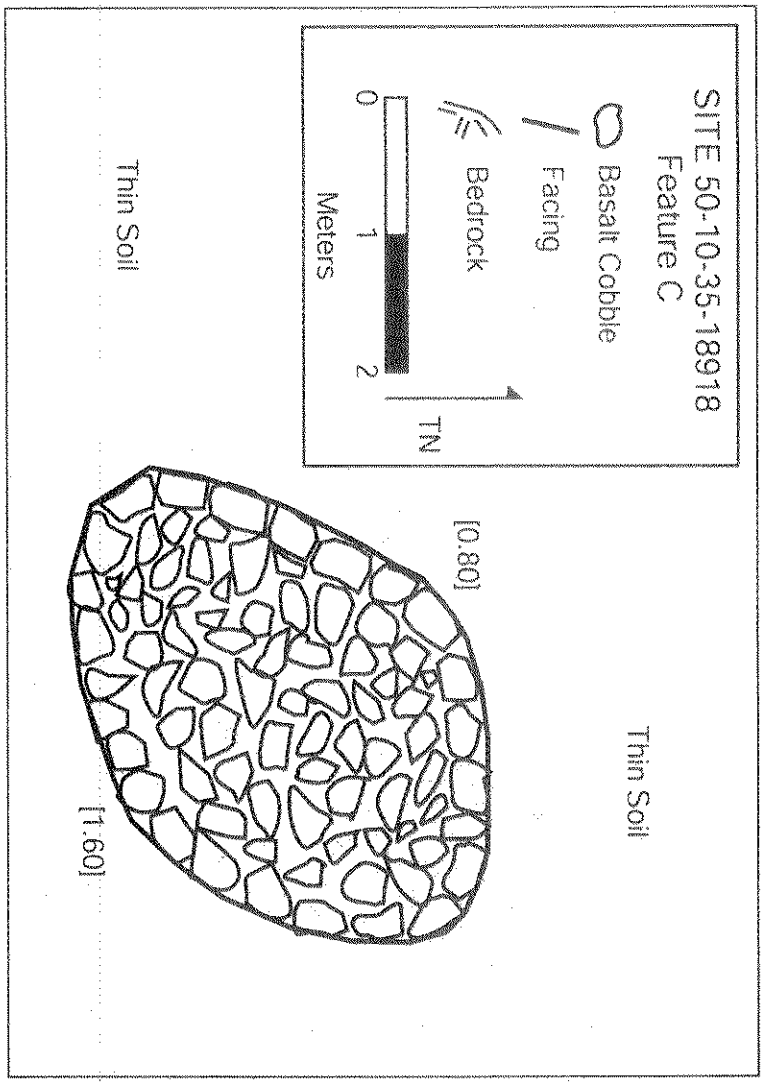


Figure 48: Planview of Site 50-10-30-18918 Feature C Clearing Mound.

SITES LOCATED ON THE NORTHWEST EDGE OF THE PROJECT AREA

Sites located on the northwest edge of the project area (see Figure 15) are on property covered under General Lease 2751 and known as Waiākea Pasture Land. The 500-acre parcel was used as a dairy pasture and, during World War II, as a military training area by the U.S. Army (Maly 1996:36). A dirt road leading to a water tank in the center of the study area and connecting to both Puainako and Mohouli Streets is visible in an aerial photo taken in 1964. All sites documented in this portion of the project are located along the dirt road.

SITE 50-10-35-24243

Site 24243 is located immediately *mauka* of Komohana Street at a distance of roughly 25 meters north of Nowelo Street, at an elevation of 100 meters (330 feet) amsl, and occupies an area of level *waiwi* forest (see Figure 15). The site is situated on an uneven and hummocky Mauna Loa *pāhoehoe* lava flow dated to between 750 and 1,500 B.P. A shallow layer of dark brown (7.5 YR 3/2) Pana'ewa very rocky, silty clay loam (Sato *et al.* 1973) covers roughly 60 percent of the *pāhoehoe* at the site. Site 24243 consists of eleven features (Features A through L) connected by a system of kerbstone-lined trails (Figure 49).

The site is most likely associated with military activities and may have been used earlier by Fair View Dairy. The parcel on which Site 24243 is located is designated on historic maps as Government Pastureland and Waikea Pastureland. Insignia have been branded, or carved onto several large *hala* trees located on the site (Figure 50). The insignia consists of the capital letter *A*, above the capitol letter *B*, above the letters *USA*, above a symbol that resembles the outline of a snow angel. Artifacts scattered across the ground surface at the site include beer bottles, liquor bottles, medicine bottles, metal brackets and bolts, and pieces of broken concrete.

Site 24243, Feature A

Feature A is located 15 meters west of Komohana Street at a distance of roughly 25 meters north of Nowelo Street. The feature is an oval trough (Figure 51) measuring 3.4 meters long (45°/225°), 1.60 meters wide, and 0.77 to 1.00 meter in depth (Figures 52 and 53). The trough is from 0.36 meters above to level with the surrounding ground surface. It is constructed of crudely mortared sub-angular *pāhoehoe* cobbles lining a pit excavated into a bedrock outcrop. The feature has an organic shape that follows the bedrock pit into which it was built. The feature is likely a military foxhole, appears unaltered, and is in good condition.

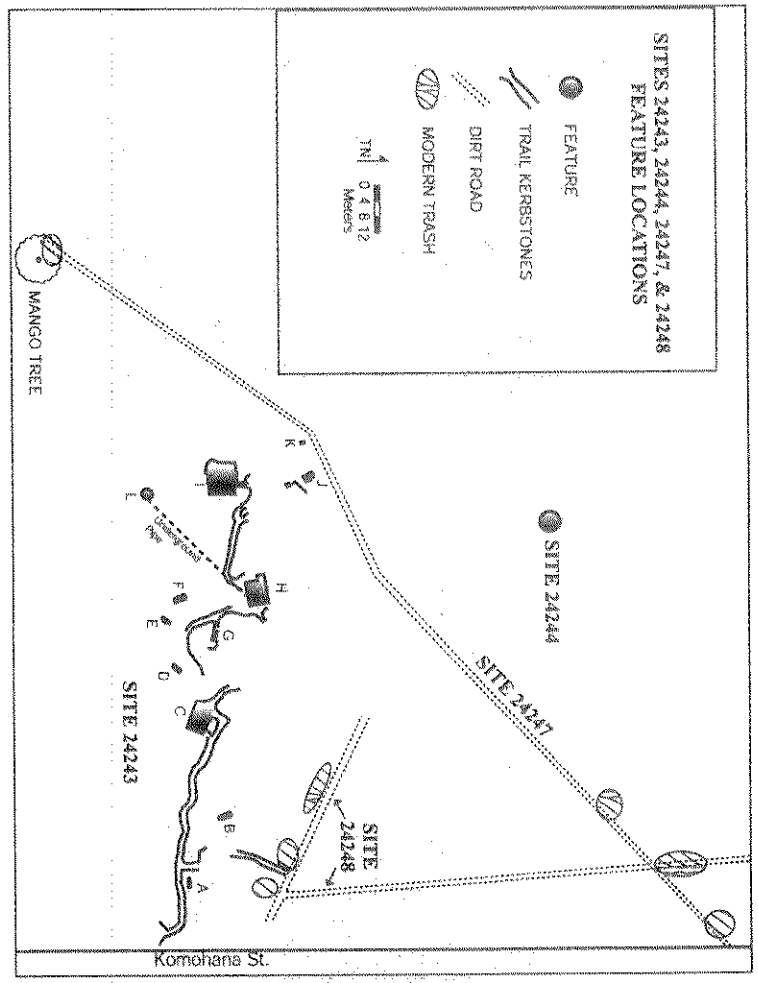


Figure 49: Planview Map of Sites 24243, 24244, 24247, and 24248 Showing Feature Locations.

Figure 50: Photograph of Insignia Carved into *Hala* Tree North of Site 24243, Feature I.

Figure 51: Photographs of Site 24243, Feature A Looking West (Planview) and Northwest (Profile).

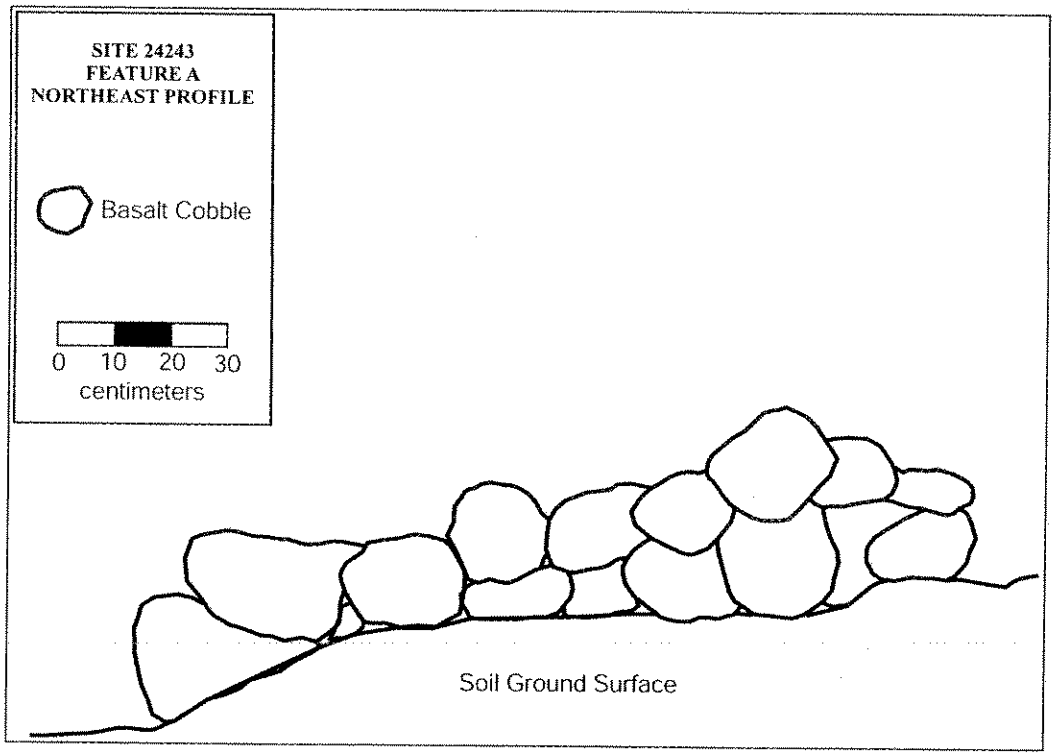


Figure 53: Profile of Site 24243, Feature A.

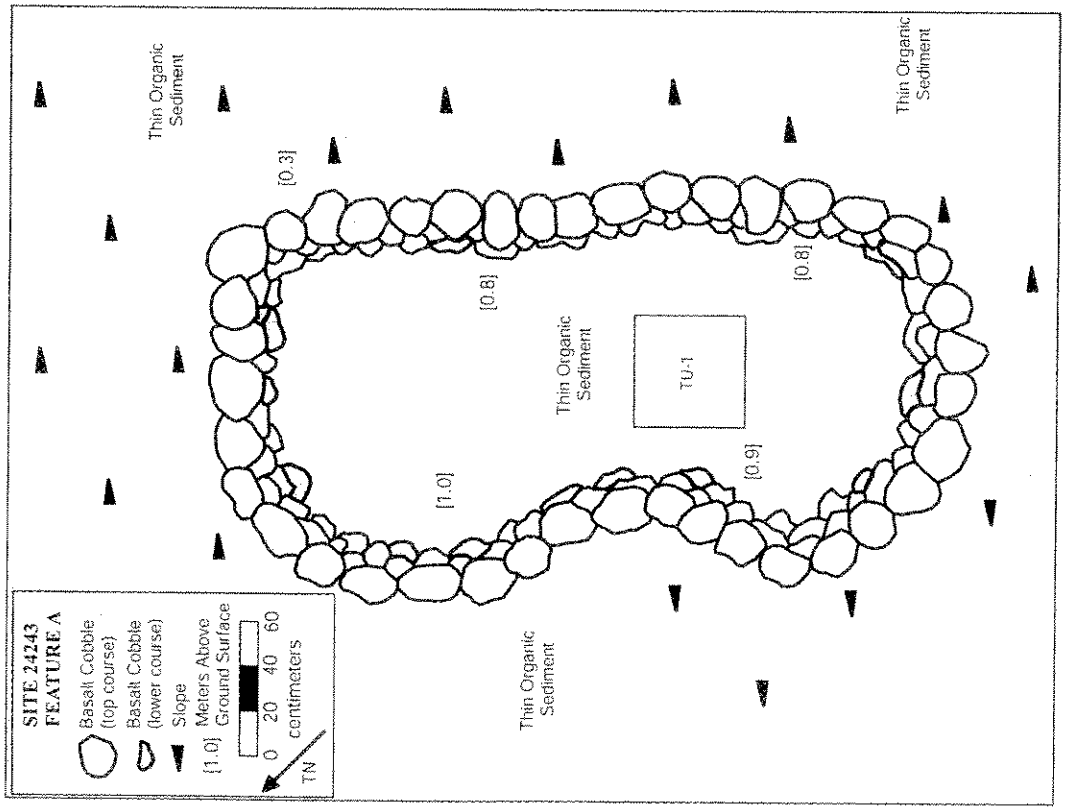


Figure 52: Planview of Site 24243, Feature A.

Site 24243, Feature A, Test-Unit 1

A 0.5 by 0.5 meter test unit was excavated to bedrock in the center of Feature A. A variable 0.8 to 0.1 meters of dark brown (7.5YR 3/2) sandy loam was removed as a single layer from TU-1. All sediment was screened through 1/8-inch mesh. The unit was excavated to bedrock and contained no cultural remains.

Site 24243, Feature B

Feature B is a roughly oval trough located 15.00 meters northwest of Feature A. It measures 3.60 meters long (160°/340°), 1.90 meters wide, and 0.94 to 1.00 meter in depth. The trough is level with the surrounding ground surface (Figure 54). It is constructed of crudely mortared sub-angular *pāhoehoe* cobbles lining a pit excavated into a bedrock outcrop. The feature has an organic shape that follows the bedrock pit into which it was built. The feature is likely a military foxhole, appears unaltered, and is in good condition. meters above the surrounding ground surface on its southeast edge (two to three basalt cobble courses high), and is level with the surrounding ground surface on the remaining three Feature C

Feature C is a rectangular platform located 18.00 meters west of Feature B. The feature measures 7.00 meters long (115°/295°) by 5.00 meters wide (Figure 55). The platform is 0.30 sides. A single course of basalt cobbles marks the outer boundaries of the platform. Two kerbstone-lined trails access Feature C on its north and northwest sides. A single cobble-lined depression is located on the eastern corner of Feature C. The feature is associated with U.S. Army training in the area. The feature appears unaltered, and is in good condition.

Site 24243, Feature C, Test-Unit 2

A one by one meter test-unit was excavated along the platform retaining wall in the south corner of Feature C. A variable 0.70 to 0.11 meters of dark brown (7.5YR3/2) sandy loam "A" horizon was excavated as Layer I. No artifacts were recovered from Layer I. Layer II was excavated to bedrock and consisted of a variable 0.27 to 0.35 meters of reddish brown (5YR5/4) silty sand. Layer II appears to be fill brought in from another location. No artifacts were recovered from Layer II.

Site 24243, Feature D

Feature D is a rectangular trough (Figure 56) located 8.00 meters southwest of Feature C. It measures 3 meters long (44°/226°), 1.20 meters wide, and 0.60 to 0.92 meters in depth (Figure 57). The trough is from 0.48 meters above to level with the surrounding ground surface. It is constructed of crudely mortared sub-angular *pāhoehoe* cobbles lining the southeast and southwest edges of a shallow skylight. The mortar on the inside of the trough displays flat

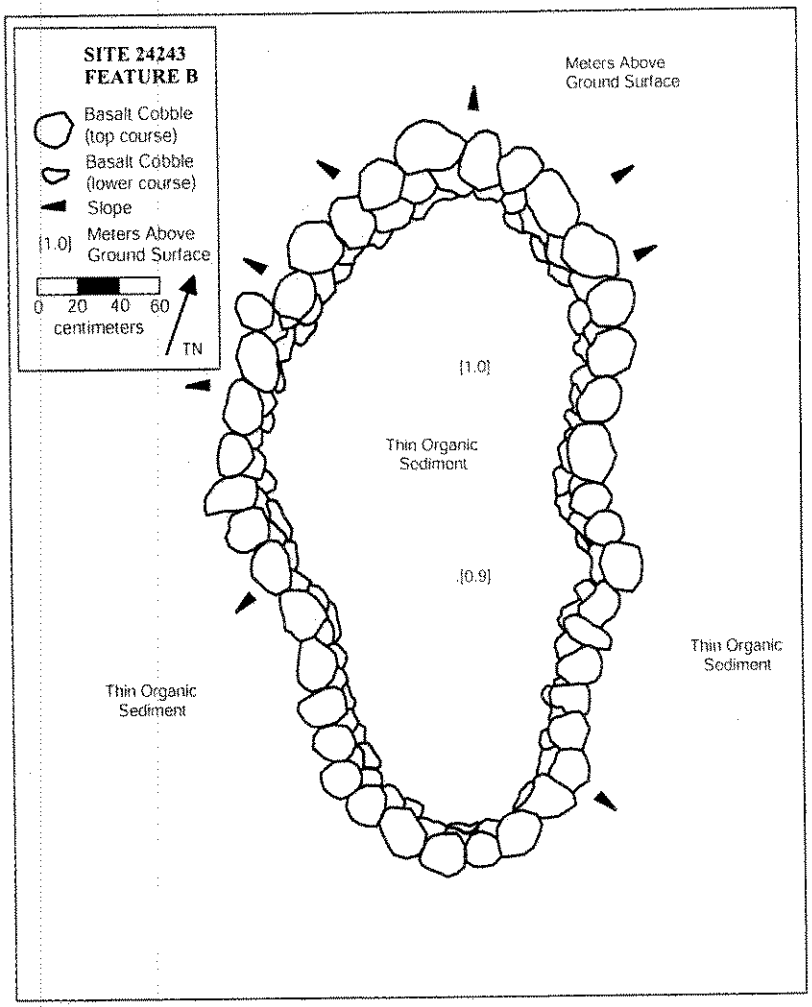


Figure 54: Planview of Site 24243, Feature B.

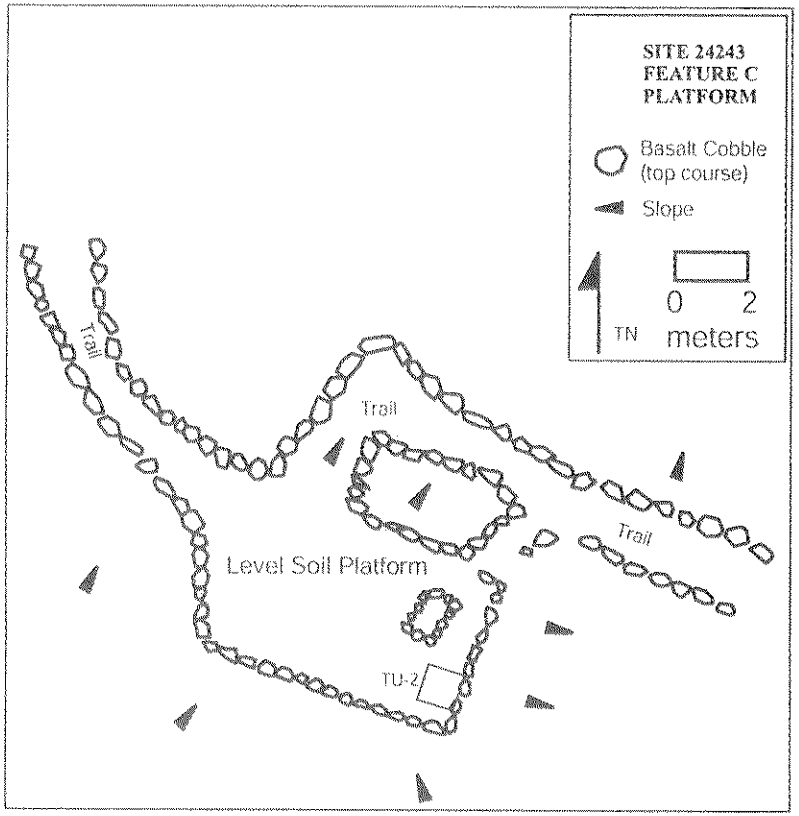


Figure 55: Planview of Site 24243, Feature C Platform.

Figure 56: Photograph of Site 24243, Feature D Looking West.

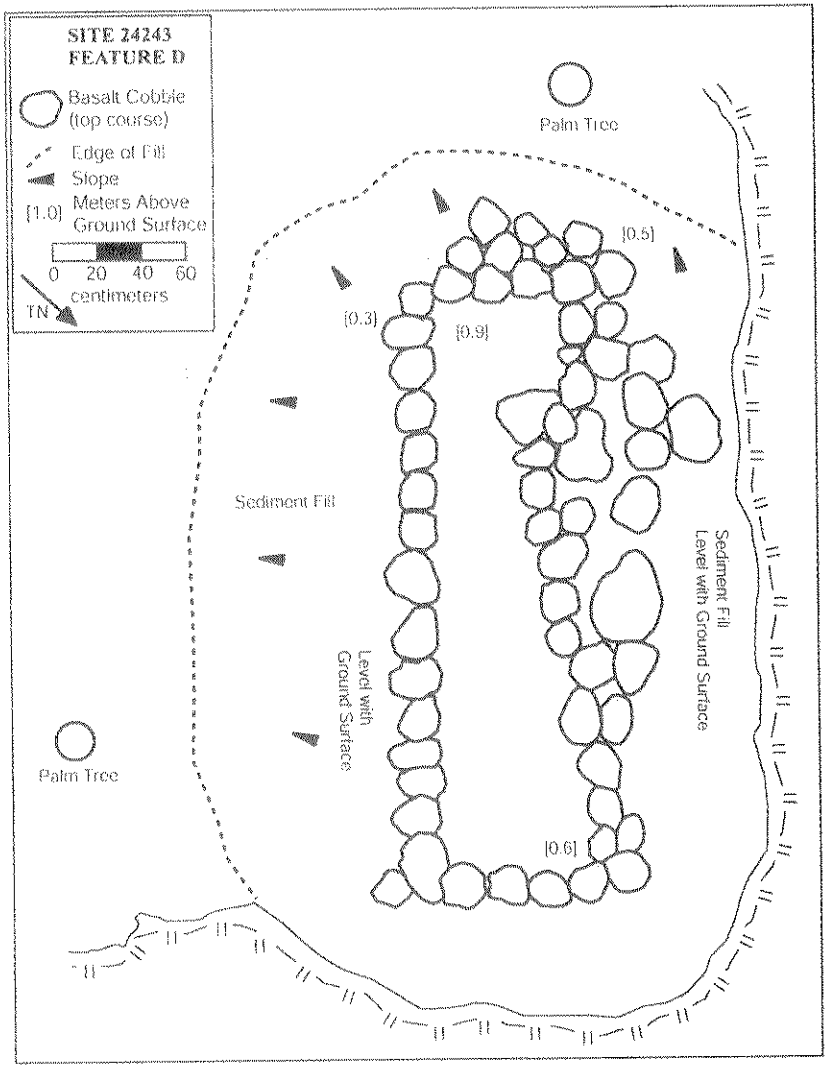


Figure 57: Planview of Site 24243, Feature D.

surfaces in places, suggesting that the feature was constructed using forms. Sediment fill has been piled up around the outside of Feature D. The feature is likely a military foxhole, appears unaltered, and is in good condition.

Site 24243, Feature E

Feature E is a rock mound located 10.0 meters west of Feature D. The feature measures 2.3 meters (east/west), 1.6 meters wide, and 1.3 meter in height (Figure 58). The feature consists of *pāhoehoe* cobbles and boulders piled in the center of a shallow skylight, and are likely materials used during the construction of a military foxhole similar to features A, B, D, and F.

Site 24243, Feature F

Feature F is a roughly rectangular trough located 5 meters west of Feature E. The feature measures 3.20 meters long (178°/355°), 1.60 meters wide, and 1.00 to 1.10 meters in depth (Figure 59). The trough is from 0.25 meters above to level with the surrounding ground surface. It is constructed of crudely mortared *pāhoehoe* cobbles lining a pit excavated into a bedrock outcrop. The feature is likely a military foxhole, appears unaltered, and is in good condition.

Site 24243, Feature F, Test-Unit 3

A 0.5 by 0.5 meter test-unit was excavated to a bedrock terminus in the center of Feature A. A variable 0.09 to 0.15 meters of dark brown (7.5YR3/2) sandy loam was removed as single layer from TU-3. All sediment was screened through 1/8-inch mesh. The unit was excavated to bedrock. Two water worn pebbles were recovered from TU-3; no additional artifacts were present.

Site 24243, Feature G

Feature G is a rock alignment/foot path located 10 meters northeast of Feature F. The feature measures 4.4 meters long (70°/250°), 1.2 meters wide, and ranges from 0.1 to 0.5 meters high (Figures 60 and 61). The alignment is one to three courses high, one course wide on each side, is well faced, and its surface is covered with soil. The alignment is situated within and perpendicular to a shallow bedrock channel and appears to allow foot access across this low swampy area. The feature appears unaltered and is in good condition.

Site 24243, Feature H

Feature H is a concrete building foundation located 10 meters northwest of Feature G. The feature measures 20 feet long (70°/250°), 16 feet wide, and is 1 to 3 feet above the surrounding ground surface (Figure 62). The wall footings along the outside of the foundation are 6 inches wide, 6 inches high, and contain two door openings on the west and east sides. The

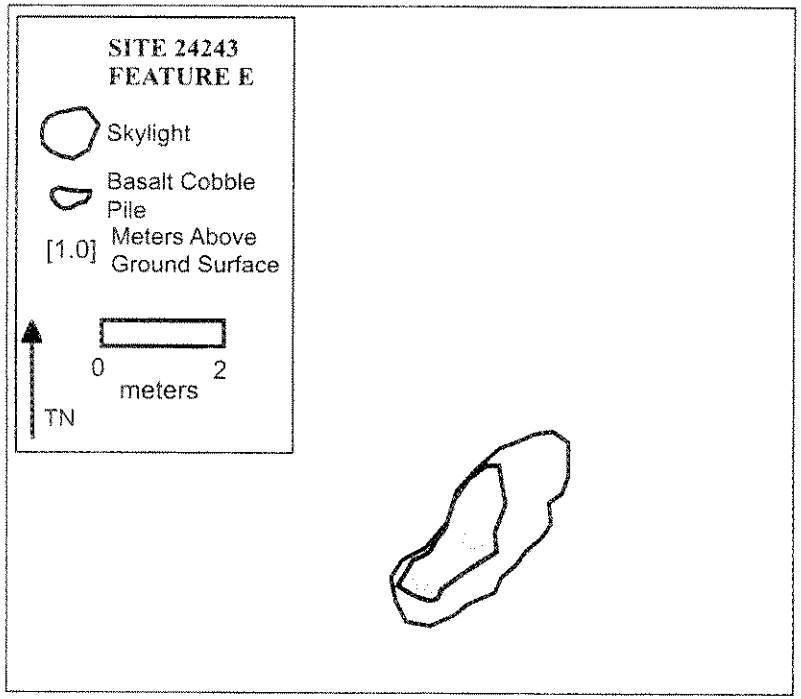


Figure 58: Planview of Site 24243, Feature E.

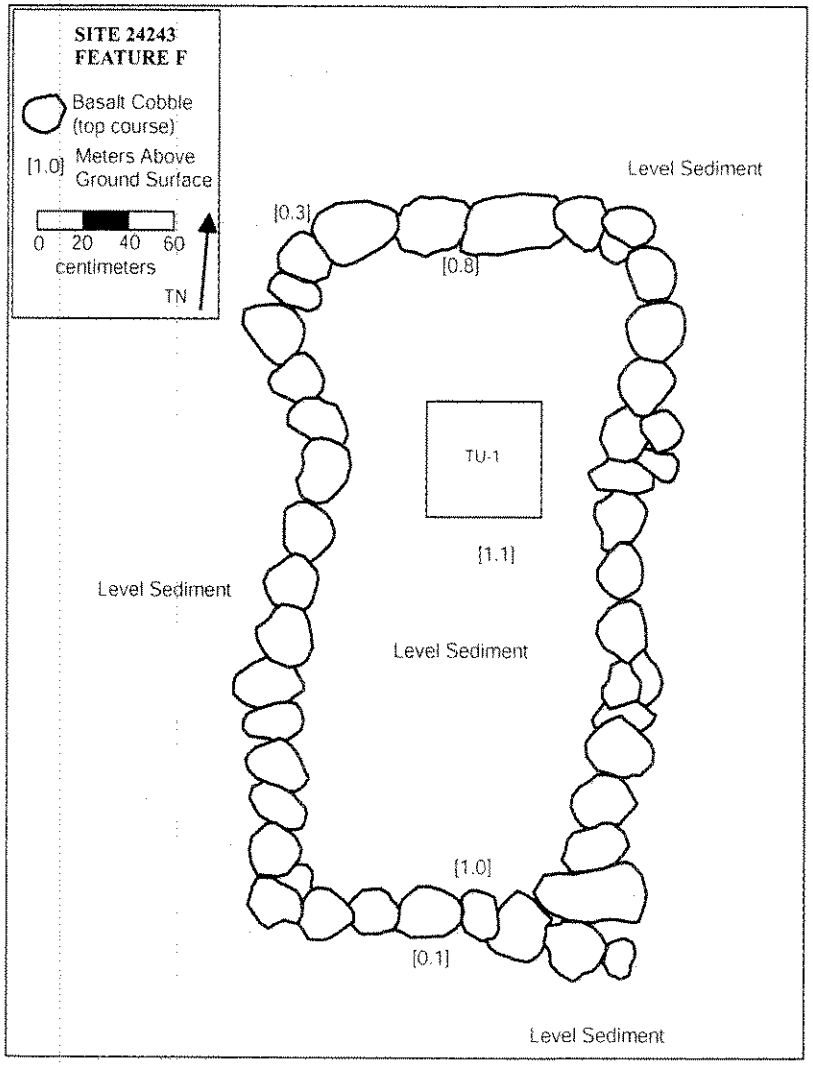


Figure 59: Planview of Site 24243, Feature F.

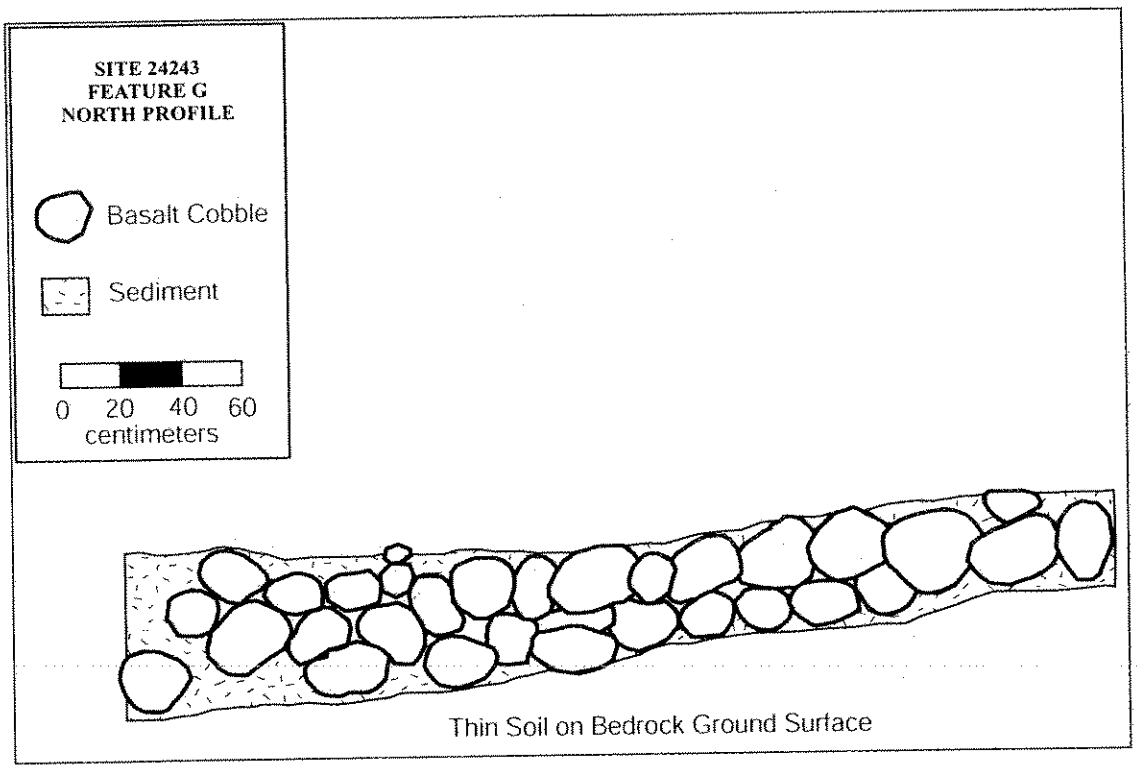


Figure 61: Profile of Site 24243, Feature G.

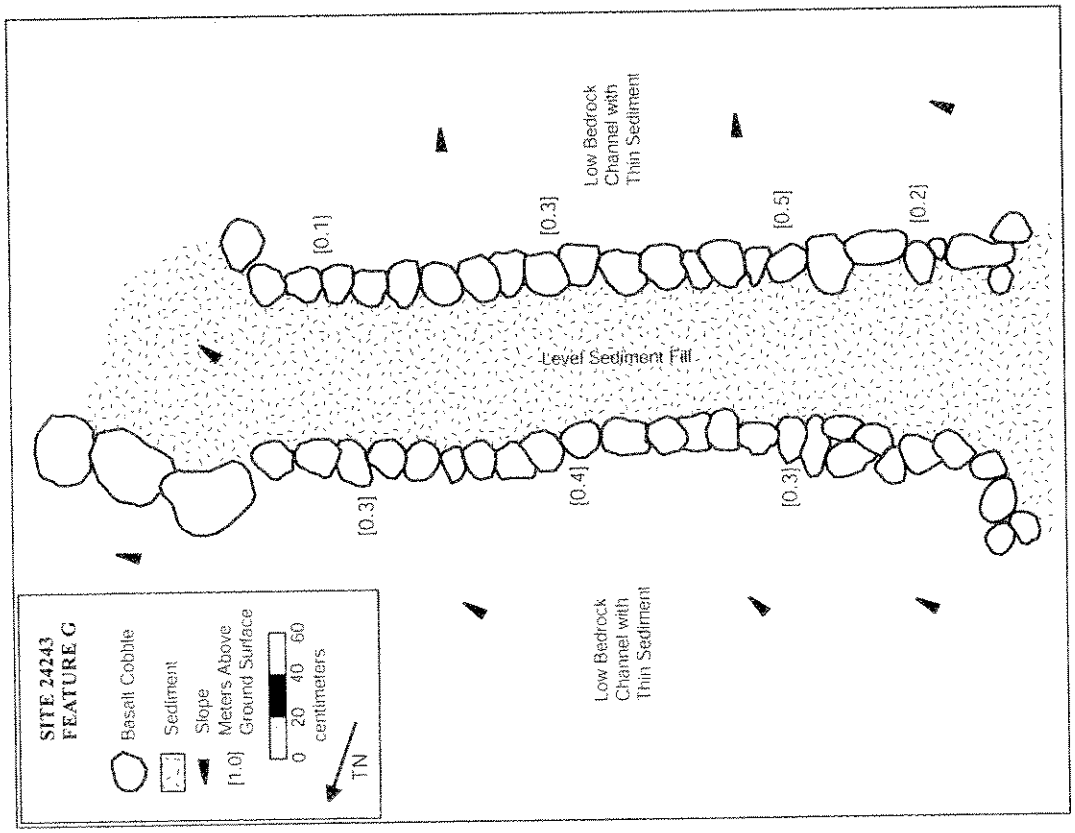


Figure 60: Planview of Site 24243, Feature G.

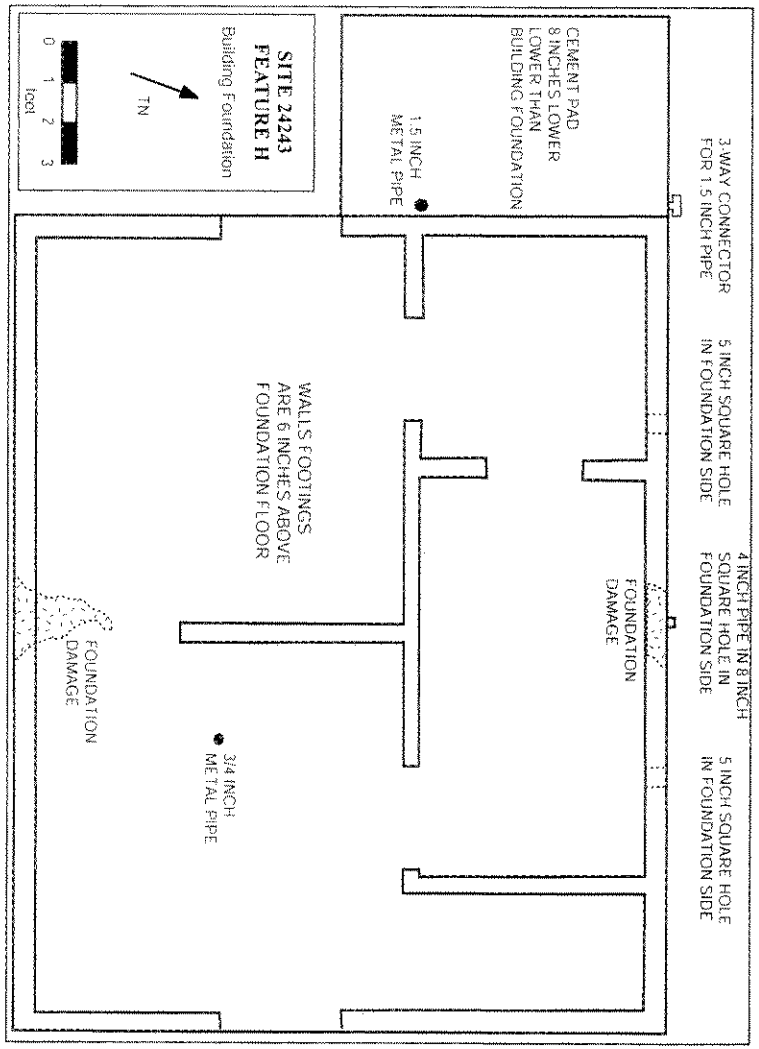


Figure 62: Planview of Site 24243, Feature H Building Foundation.

foundation is divided by interior wall footings (4 inches wide by 6 inches high) into five rooms. The floor in the southeast room contains a 3/4-inch pipe in its surface. Two other pipes (1.5 inch and 4 inch) exist in the north wall of the foundation. A five by eight foot concrete pad is attached to the northeast corner of the building foundation. The foundation is likely a structure associated with military training in the area. The foundation is in an overall good condition but is slightly damaged in two small areas.

Site 24243, Feature I

Feature I is a level clearing located 20.0 meters west of Feature G. The feature measures 9.0 meters long (east/west) by 7.0 meters wide. Several pipe joints, glass bottles, and pieces of foundation is divided by interior wall footings (4 inches wide by 6 inches high) into five rooms. The floor in the southeast room contains a 3/4-inch pipe in its surface. Two other pipes (1.5 inchand 4 inch) exist in the north wall of the foundation. A five by eight foot concrete pad is attached to the northeast corner of the building foundation. The foundation is likely a structure associated with military training in the area. The foundation is in an overall good condition but is slightly damaged in two small areas.

Site 24243, Feature I
Feature I is a level clearing located 20.0 meters west of Feature G. The feature measures 9.0 meters long (east/west) by 7.0 meters wide. Several pipe joints, glass bottles, and pieces of broken concrete slab are located on the ground surface. Two 2-meter square broken slabs (0.1 m thick) of concrete, likely from a water tank, are located on the western edge of the clearing. Feature I is likely a clearing for a military structure associated with U.S. Army training in the area.

Site 24243, Feature J

Feature J is a modified outcrop located 18 meters north of Feature I. The feature measures 2.5 meters long (east/west), by 2.0 meters wide, and is level with the surrounding ground surface (Figure 63). The feature is constructed of sub-angular and angular basalt cobbles and is interpreted as bulldozer push associated with a dirt road (Site 24247) located one meter north of the feature.

Site 24243, Feature K

Feature K is likely the remains of a collapsed concrete ammunition storage bunker (Figure 64) located 10 meters west of Feature J. The ground surface surrounding the top of the underground structure consists of level basalt cobbles. Two collapsed openings in the structure ceiling (0.1 by 0.2 and 1.6 by 0.5 meters) are partially filled by collapsed material and measure

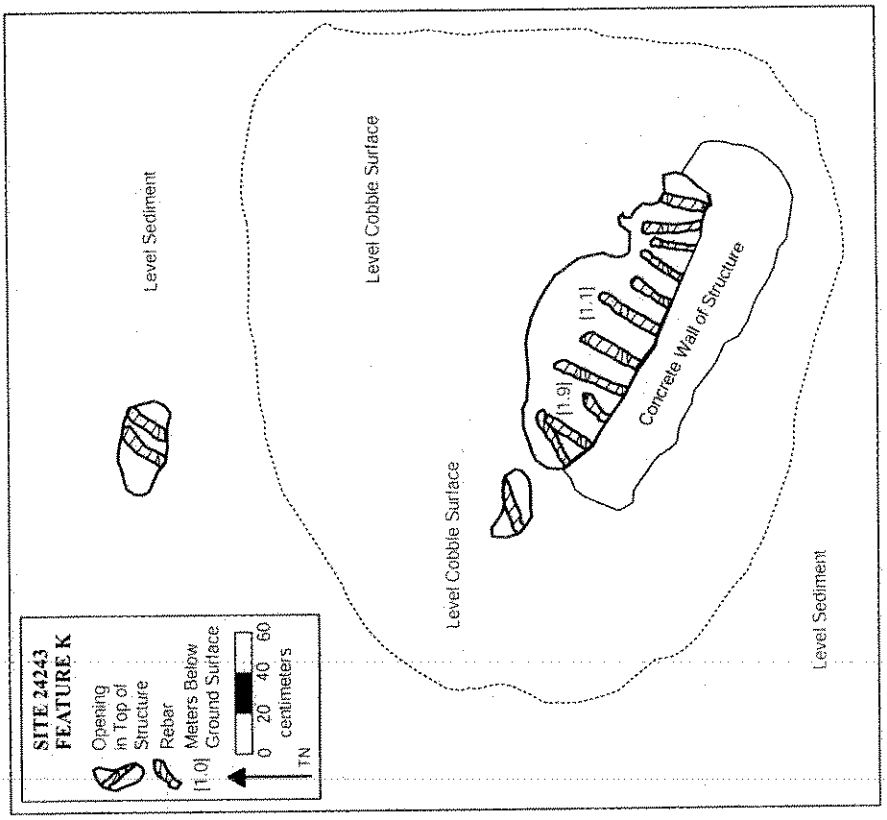


Figure 64: Planview of Exposed Portion of Site 24243, Feature K.

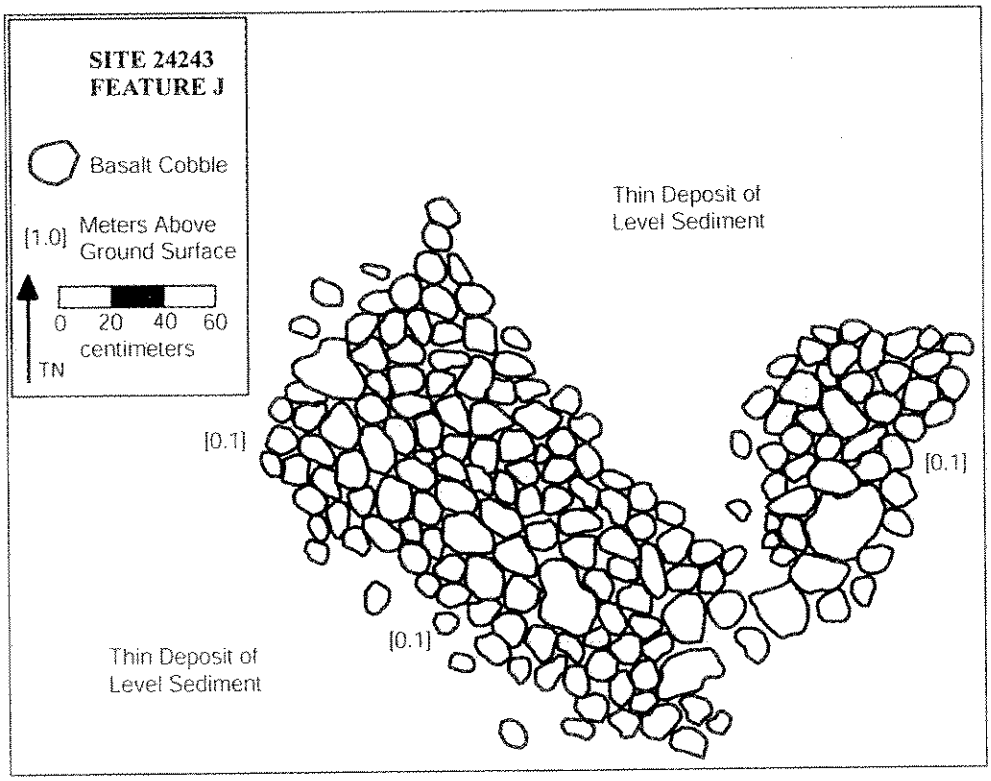


Figure 63: Planview of Site 24243, Feature J.

from 1.0 to 2.0 meters in depth. The top of the feature is exposed where it has collapsed, revealing tar-sealed concrete walls and one-inch thick rebar used in the construction of the bunker ceiling. The feature is in poor condition.

Site 24243, Feature L

Feature L is a cement-capped cesspool located 20.0 meters southwest of Feature I. The cesspool is roughly oval in shape, and measures 3.2 meters long (north/south), 2.6 meters wide, and is 6.0 meters deep. The cesspool appears to be hand-excavated into the bedrock and is covered by a cement cap. The cap was constructed by placing form planks (from 5 to 14 cm wide) over the excavated pit. O these, seven 15.0-foot long 1.5 inch gauge railroad tracks were laid. Four inches of cement was then poured over the railroad track support beams. The surface of the concrete is level and was covered by a thin layer of sediment. A four-inch pipe laid below ground surface is situated from inside the southeast edge of the cesspool to the south edge of the Feature H foundation. The feature is altered and in poor condition.

SITE 50-10-35-24244

Site 24244 is a roughly square enclosure located approximately 35.0 meters north/northwest of Site 24243, Feature H, at an elevation of 100 meters (330 feet) amsl, and occupies an area of level mixed *waiwi* and *uluhe* forest growing in pockets of Pana'ewa very rocky silty clay loam series sediment dispersed between bare *pāhoehoe* outcrops (see Figures 15 and 50). The enclosure is located on the northern edge of a bedrock outcrop and affords an unobstructed view of Hilo Harbor. The feature measures 5.0 meters long (east/west), 4.5 meters wide, and is from 1.0 to 2.0 meters in height (Figures 65 and 66). The feature is constructed of a concrete ring, the center of which is filled with mechanically crushed basalt base course. Basalt boulders and cobbles have been set in the concrete ring. Two additional courses of basalt cobbles and boulders are stacked on those embedded in the concrete ring. Beach sand containing water worn pebbles and small cobbles, possibly originally in sandbags, overlies the entire enclosure. Two pipes (3.5 and 4.5 inches in diameter) are located standing upright in small concrete pads along the southwest edge of the enclosure.

A well-faced stone alignment measuring 1.90 meters long, 0.45 meters wide, and 0.90 meters high is located off of the southeast edge of the enclosure. A second alignment along the southwest edge of the bedrock outcrop (7 meters southwest of enclosure) has been constructed to form a level access path to the enclosure.

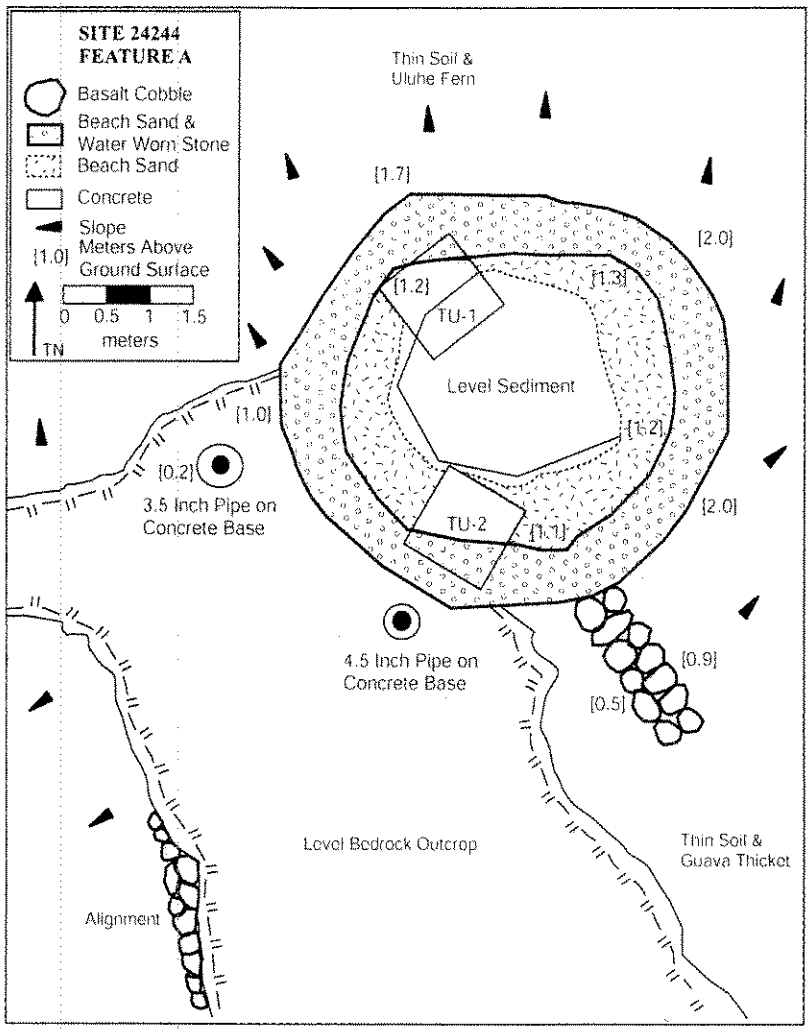


Figure 65: Planview of Site 24244 Enclosure.

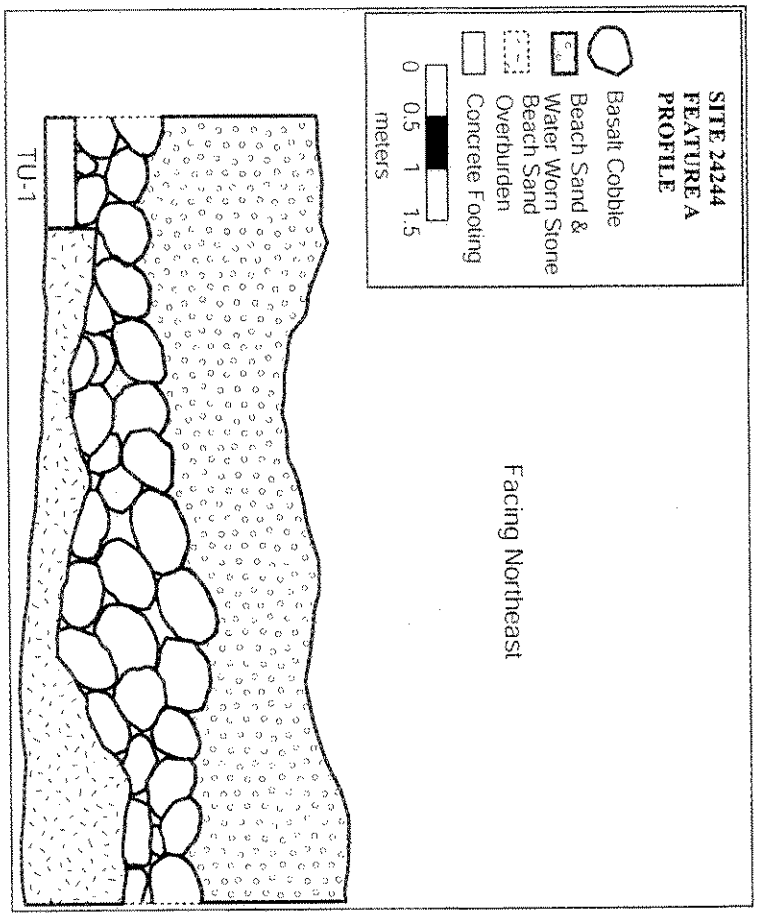


Figure 66: Profile of Site 24244 Enclosure.

Several pieces of metal wire, a piece of cloth screen, pieces of a boot sole, and a possible shell casing (pending positive ID by US Army) were located at Site 24244. The site is interpreted as a military gun emplacement and is in good condition.

Site 24244, Test-Unit 1

A one by one meter test-unit was excavated in the northwest corner of the enclosure. All matrix was screened through 1/8-inch wire mesh. A variable 0.25 to 0.44 meters of very dark brown (10YR2/1) sand was excavated as Layer I from the top of a concrete ring along the interior edge of the enclosure. Layer I continued 0.02 to 0.05 meters below the inside edge of the concrete ring. Layer 1 matrix contained 30 percent water-worn pebbles and is likely beach sand brought to the site in sandbags and used to cover the top of the stone enclosure. Layer I sediment appears to have eroded from the top of the enclosure walls and has been deposited on the ground surface in the interior of the enclosure. A single spent anti-aircraft shell was located at the interface of Layer I and the concrete footing ring in the northwest corner of the unit. The shell is tubular (no shoulder), measures 15.3 centimeters (6 inches) in height and 5.7 centimeters (2 inches) in diameter, and is highly corroded. No other artifacts were recovered from Layer I.

Layer II consisted of a variable 0.07 to 0.15 meters of light gray (10YR7/1) gravel and sand. Layer II is a layer of mechanically crushed base course overlaying angular and subangular basalt cobbles and boulders (Layer III). The concrete footing ring continues below Layer II. No artifacts were recovered from Layer II.Layer III consisted of a variable 0.34 to 0.45 meters of angular and subangular basalt cobbles and boulders, and terminated on bedrock. No artifacts were recovered from Layer III.

Site 24244, Test-Unit 2

A one by one meter test-unit was excavated along the interior southern edge of the enclosure. All matrix was screened through 1/8-inch wire mesh. A variable 0.34 to 0.49 meters of very dark brown (10YR2/1) sand was excavated as Layer I from the top of a concrete ring along the interior edge of the enclosure. Layer I terminated on a concrete footing ring surface. Layer 1 matrix contained 30 percent water-worn pebbles and is likely beach sand brought to the site in sandbags and used to cover the top of the stone enclosure. Layer I sediment appears to have eroded from the top of the enclosure walls and has been deposited on the ground surface in the interior of the enclosure. Several fragments of water-worn glass, metal wire, and pieces of boot sole were recovered from Layer I

Site 24244 is interpreted as an anti-aircraft gun emplacement overlooking Hilo Bay and was likely constructed during World War II while the U.S. Army was using the area for training.

SITE 50-10-35-24245

Site 24245 is an isolated find of three iron fence posts similar to the type used on ranches for pasture animals, located 50 meters northeast of Site 24244, at an elevation of 100 meters (330 feet) amsl, and occupies an area of level mixed *waiwi* and *uluhe* shrubland growing in pockets of Pana`ewa very rocky silty clay loam series sediment dispersed between bare *pāhoehoe* outcrops (see Figure 15). One post is stuck in the ground and the other two are laying roughly 2 meters away from the first. There is no fence wire, or other artifacts located at the site.

SITE 50-10-35-24246

Site 24246 is a rock alignment located 200 meters northeast of Site 24245, at an elevation of 85 meters (280 feet) amsl, and occupies an area of level mixed *ohi`a* and *uluhe* forest growing in pockets of Pana`ewa very rocky silty clay loam series sediment dispersed between bare *pāhoehoe* (1880–1881 flow) outcrops (see Figure 15). The alignment is constructed of *pāhoehoe* cobles and boulders piled on the bedrock surface, measures 3.0 meters long, averages 1.0 meter wide, and is from 0.4 to 0.8 meters in height (Figure 67). The alignment is bulldozer push associated with the dirt road (Site 24248) to the west. This rock alignment was made while making a road visible in a 1950 aerial photograph. It, too, is over 50 years old.

SITE 50-10-35-24247

Site 24247 is a dirt road (visible in an aerial photograph taken in 1950) situated from Komohana Street to a modern trash dump at its *mauka* (western) terminus, at an elevation of 100 meters (330 feet) to 110 meter (360 feet) amsl, and occupies an area of gently sloping mixed *waiwi* and *uluhe* forest growing in pockets of Pana`ewa very rocky silty clay loam series sediment dispersed between bare *pāhoehoe* outcrops (see Figures 15 and 50). The road surface consists of level sandy sediment containing water worn pebbles and was likely brought in from a different location. The road is partially overgrown and there are numerous modern dumpsites located along the roadside.

SITE 50-10-35-24248

Site 24248 is a dirt road situated (163°/343°) across a level ground surface between the corner of Mohouli and Komohana Streets and Site 24248 at an elevation of from 85 meters (280 feet) to 98 meters (320 feet) amsl. The road was visible in a 1950 aerial photograph. It occupies an area of level mixed *ohi`a* and *uluhe* forest growing in pockets of Pana`ewa very rocky silty clay loam series sediment dispersed between bare *pāhoehoe* outcrops (see Figure 15). The road surface is from 2.5 to 3.0 meters wide and consists of level sandy sediment containing water

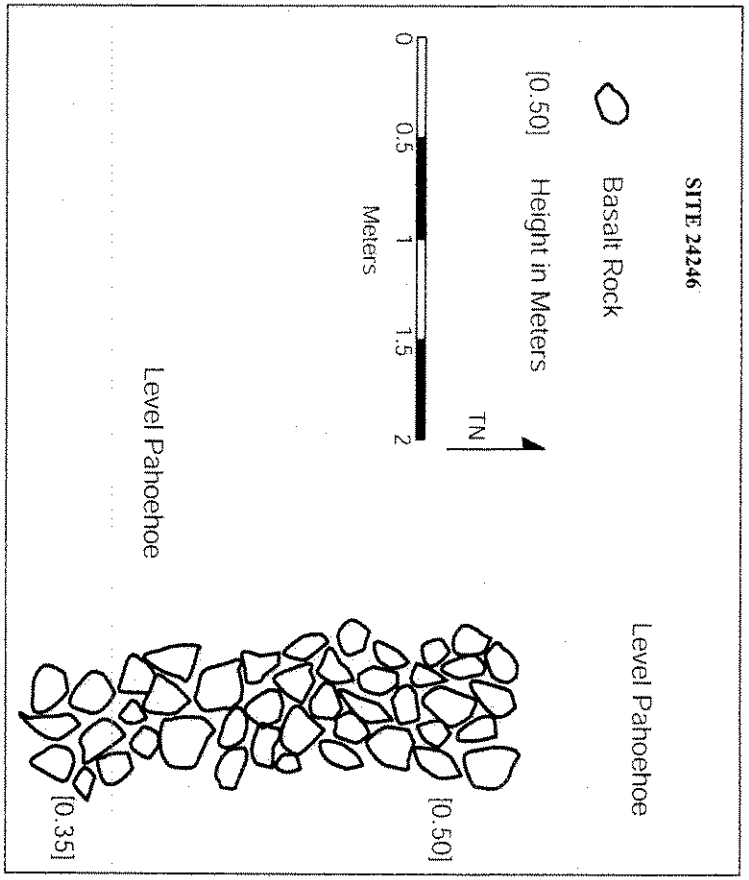


Figure 67: Planview of Site 24246 Stone Alignment.

worn pebbles, and was likely brought in from a coastal location. The road is partially overgrown and there are numerous modern dumpsites located along the roadside.

SIGNIFICANCE ASSESSMENTS AND RECOMMENDED TREATMENTS

Numerous archaeological investigations have occurred in the immediate vicinity (Pu'ainako Street Expansion Project) and in the east central portion of the present project area (U.S.D.A Pacific Basin Research Center). Appendix A summarizes site assessments and recommendation for 18 sites recorded during these investigations.

Sites identified during this project were assessed in accordance with Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8 contained in draft Hawai'i Administrative Rules 13§13-275 (Table 3). To be assessed as significant a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and must be characterized by one or more of the following five criteria:

(A) It must be associated with events that have made an important contribution to the broad patterns of history.

(B) It must be associated with the lives of persons important in the past.

(C) It must embody distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value.

(D) It must yield or may be likely to yield, information important in prehistory or history.

(E) It must have an important value to the native Hawaiian people or to another ethnic group of the State due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

Table 3: Initial Site Assessment of Sites on the UH Hilo Mauka Lands Project.

Site Number	Site Description	Criteria for Significance	Recommended Mitigation
50-10-3524233	Rock Alignment	D	None
50-10-35-24233	Rock Concentration	D	None
50-10-35-24234	Rock Mound	D	None

50-10-35-24235	Sugar Cane Field	D	None
50-10-35-24236	Enclosed Tube	D	None
50-10-35-24237	Water Catchment	D	None
50-10-35-24238	Sugar Cane Field	D	None
50-10-35-24239	Dirt Road	D	None
50-10-35-24240	Military Position	D	None
50-10-35-24241	Enclosure	D	None
50-10-35-24242	Sugar Cane Field	D	None
50-10-35-24243	Dairy/Military	D	Data Recovery
50-10-35-24244	Military	D	Data Recovery
50-10-35-24245	Fence Posts	D	None
50-10-35-24246	Rock Alignment	D	None
50-10-35-24247	Dirt Road	D	None
50-10-35-24248	Dirt Road	D	None
50-10-35-18918	Sugar Cane Field	D	None
50-10-35-18919	Sugar Cane Field	D	None
50-10-35-20681	Sugar Cane Field	D	None

RECOMMENDED TREATMENTS

There are 20 sites located on the UH Hilo *Mauka* Lands Project area. No further work is recommended at eighteen sites (Sites 1-11,14-17, and SIHP Sites 50-10-35-18918, 50-10-35-18919, and 50-10-35-20681). Two sites are recommended for Data Recovery (Sites 24243 and 24244). No sites are recommended for preservation.

NO FURTHER WORK

Eighteen sites will require no further work (Sites 1–11,14–17, and SIHP Sites 50-10-35-18918, 50-10-35-18919, and 50-10-35-20681) because the significant data contained in these sites has been collected in the form of measurements, photographs, descriptions, figures, oral interview, and historical research. The appropriate research has been conducted for these sites, and further study would not contribute any new information. The eighteen sites are associated with historic agriculture and pasture activities. Test excavations at numerous historic agricultural sites in the immediate vicinity have underscored the low excavation potential of these types of features (Borthwick, *et al.* 1993; Hunt and McDermott 1994; Robins and Spear 1996; Eblé, *et al.* 1997; Dega 2000; and McDermott and Hammatt 2001). No prehistoric components were found within tested historic agricultural features. Interviews with informants who remember the construction of these sites have stated that field-clearing activities have removed any large-scale vestiges of prehistoric activity in the area (Maly 1996). The historic sugar cane fields are well documented on historical maps and in historical documents. Soil depths at these sites are very shallow, features are built on bedrock outcrops, and the dismantling

of features during past testing has contributed no new archaeological data to improve our understanding of them.

DATA RECOVERY

Two sites are recommended for Data Recovery work: Sites 24243 and 24244. Data Recovery is recommended for Sites 24243 and 24244 recorded during the present study because of their importance to documenting military defense and training activities in the upland area of Hilo. U.S. Army Corps of Engineer documents indicate the construction of several anti-aircraft gun emplacements and four 155 mm harbor defense guns in the Hilo area, as well as several training facilities (David Cox). Data recovery at Sites 24243 and 24244 will contribute archaeological data to the scant documentary information presently on record.

Site 24244

Site 24244 is an anti-aircraft gun emplacement used during World War II, and ancillary features associated with that function. Documents indicate that there were several anti-aircraft emplacements in the Hilo area. Based on the limited investigations conducted to date at the site, the emplacement at Site 24244 deviates from blueprints of similar Army Corps of Engineers constructed emplacements in being less formal and was likely constructed by the company that manned the gun. Data recovery is recommended at this site to fully expose the architecture of the gun emplacement. Excavations should also be conducted in strategic locations around the gun emplacement to understand the full organization of such sites. Data recovery should also include additional research into military activities of this type in Hilo via investigation of available records, and interviews with individuals and groups involved with this activity. The data recovery effort at Site 24244 should be designed in consultation with individuals and/or groups that have expertise in military history of Hilo.

Site 24243

Site 24243 is a large multi-component site that was originally constructed as dairy facilities after 1939, and was later used as a center for U.S. Army military training during World War II. Excavations should be conducted in strategic locations at the site to fully understand feature construction sequences and to understand the specific functions of features. Data recovery should also include additional research into military activities of this type in Hilo via investigation of available records, and interviews with individuals and groups involved with this activity. The data recovery effort at Site 24243 should be designed in consultation with individuals and/or groups that have expertise in military history of Hilo.

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APPENDIX A: MITIGATION OF CANE FIELD SITES

Archaeological Significance and Recommended Mitigation of Cane Field Sites

Site (50-10-35-)	Relation to Current Project	Function	Significance Assessment	Recommended Mitigation
18911	900 m East	Historic Agriculture	Criterion D	Data Recovery
18912	600 m East	Historic Agriculture	Criterion D	Data Recovery
18913	450 m East	Historic Agriculture	No Longer Significant	No Further Work
18914	380 m East	Historic Agriculture	Criterion C, D	Preservation
18915	250 m East	Historic Agriculture	Criterion C, D	Preservation
18916	180 m East	Historic Agriculture	Criterion (C), D	Data Recovery (Preservation)
18917	180 m East	Historic Agriculture	Criterion D	Preservation
18918	On Project	Historic Agriculture	Criterion D	Data Recovery
18919	On Project	Historic Agriculture/Pasture	Criterion D	Data Recovery
18920	1200 m SW	Historic Agriculture/Pasture	No Longer Significant	No Further Work
18921	3000 m SW	Historic Agriculture	Criterion D	Data Recovery
18922	1000 m East	Clearing	Criterion D	No Further Work
18923	1200 m East	Clearing	Criterion D	No Further Work
20681	On Project	Historic Agriculture	Criterion D	Data Recovery
Boulder Path	East	Transportation	Suggested	Preservation
22734	Near Center of Project	Burial	Burial	No Further Work
22735	Near Center of Project	Historic Agriculture	Criterion D	No Further Work
22080	Near Center of Project	Historic Transportation	Criterion D	Preservation

Appendix D

Economic Impact Analysis

THE HALLSTROM GROUP INC.
REAL ESTATE CONSULTANTS & APPRAISERS

February 2, 2004

Mr. W. Frank Brandt
Chairman
PBR Hawaii
American Savings Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Economic Impact Analysis and Public Costs/Benefits Assessment of the Proposed University of Hawaii at Hilo Mauka Lands Master Plan, Hilo, Hawaii

Dear Mr. Brandt:

At your request, we have completed a defined-scope assignment quantifying the effects on the Hilo/Big Island economy and state and county governments which would be associated with the development and operation of the 267.03-acre UH-Hilo (UHH) Mauka Lands Master Plan, to be located on the mauka frontage of Komohana Street, between the new Puainako and Mohouli Street extensions, upslope from the existing UHH campus and first phase of the University Park development. The mixed-use project, which will require an estimated 28 years to be fully built-out, will contain the 122-acre Hawaii Community College (HCC) Komohana Campus, 118 acres for Phase II of the University Park subdivision, 27.7 acres of expansion area for UHH, and a small reservoir, electrical substation and archeological site.

The larger tract also includes a 30.8-acre United States Department of Agriculture Pacific Studies facility, which is outside of (but abutting) the UHH master planning area. We have, however, included the USDA project

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in our discussion, analysis and modeling in order to assess the economic impacts of all the activities of the development tract. The initial USDA increment is the first undertaking on the parcel in this study.

The development will provide centrally located and well-supported long-term expansion areas for the educational, research, and business constituencies of East Hawaii. According to the UHH Mauka Lands Environmental Assessment, the project is "to build upon the economic and educational synergy created between the university, the research facilities at University Park, (and) the community," while minimizing the environmental impact of the project on the region. Current plans call for the infrastructure emplacement to commence in 2005 with the University Park lots coming on line beginning in late 2006, the first component of the USDA facility by 2007, and the first phase of the HCC Komohana Campus by 2010.

In many respects, the project represents the next, and crucial, step in the on-going evolution of Hilo from an agrarian-based economy (a sector in stagnation since the demise of the sugar industry) into a service and technology-based modern economic structure. The early success of the first phase of University Park, creating construction and permanent employment opportunities and enhancing the status of UHH, demonstrates the meaningful potentials of the concept.

The focus of our study was two fold:

1. Economic Impact Analysis -- Estimating the effects on the Big Island economy which will result from the undertaking of the UHH Mauka Lands Master Plan, including capital investment, employment during construction and operation, wages paid, business operating profits, student and worker expenditures and other regional monetary and employment effects.

2. Public Costs/Benefits Analysis -- Projecting the effects on the public purse arising from the subject project in regards to primary tax revenues which will be received by the state and counties versus the implied costs of providing governmental services to the development and its users.

We have not assessed the environmental impacts associated with the development, but assume that drainage, wildlife, archeological and other non-economic aspects will have minimal effect on the subdivision, improvement and use of the subject parcels.

In completing our study we have viewed the subject property and its environs; interviewed contractors and reviewed data from similar developments throughout the neighbor islands; researched State of Hawaii and Hawaii County employment, wage, budgetary and other public statistical sources; and, constructed computer models depicting the commencement, construction, sales and operation of the project.

We have not completed a market study forecasting the specific demand/supply, pricing and absorption levels for the saleable components of the master plan, but have made general assumptions based upon our experience in the pertinent sectors. A three decade planning, development and build-out period (with lot "sales"[1] requiring 25 years) was selected for reasonable demonstration purposes. However, we acknowledge the University Park Phase II lands, which represent a significant expansion of the Hilo commercial/industrial land supply, may require additional time, particularly if tenant use restrictions are enforced as proposed. However, the environmental impact of the project will be much less than a standard subdivision. Employment, faculty and student population and timing estimates for the HCC and USDA facilities were provided to us by the UHH/PBR Hawaii project planning team.

(1) For purposes of this study, the terms "sales" and "leasing" are interchangeable. We understand it is highly likely the finished lots will be marketed via leasehold tenure (long-term ground contracts). Although the effective prices achieved and absorption velocity may be dampened by leasehold disposition, the analysis, modeling and conclusions of our study are not meaningfully affected by the underlying land tenure.

Even if there are moderate changes in the absorption, pricing and other variables, there would not be a significant impact on our stabilized conclusions, as all amounts are expressed in constant 2004 dollars and not inflated over time. Thus, whether the build-out requires 15 or 40 years, the total and annualized impact estimates remain valid. This also results in an inherent understatement of economic and governmental benefits, as the combined effects of wages, spending and tax generation have historically (on average) escalated at the rate of, or faster than, the costs of government.

Further, our study is oriented towards the direct (primary and secondary) impacts resulting from development. The subject project is atypical in that it is substantially comprised of uses that have inordinately high, but difficult to quantify, indirect benefits to the Big Island community. Among the primary of these meaningful impacts are providing an advanced education to greater numbers of the populace, assisting the regional agricultural sector, creating basic research and development resources, and generating long-term support for a new technology-oriented businesses.

Conversely, some of the tenants of University Park Phase II will be non-profit, eleemosynary, educational, governmental or similar enterprises which are exempt from some forms of taxation (specifically real property and income taxes) and that do not "sell" a product or service subject to a general excise tax. The USDA and HCC facilities are also of this type. Thus, direct governmental cash flow benefits are less than what would be possible via an open-market development.

PRIMARY STUDY CONCLUSIONS

Based on our analysis of the proposed UHH Mauka Lands Master Plan (HCC and University Park Phase II components) and the adjoining USDA facilities, and utilization of a 30-year construction, sales/leasing and operational model (total planning, development and build out

period), we have reached the following conclusions regarding the economic impacts and public costs/benefits associated with the undertaking:

1. The construction of the UHH Mauka Lands and USDA projects, and their on-going operation will bring some $473.9 million in direct real property capital investment and create some 62,792 "worker-years" of employment generating $2.42 billion in wages over the initial three decade building and operational period of the development. The effort will create meaningful profit opportunities for local contractors and suppliers (circa $65.7 million) and some 2,255 worker-years of direct construction employment.

   On a stabilized operating basis, the development UHH and USDA will create or contribute to 3,851 permanent full-time-equivalent jobs (one FTE worker-year is equal to 2,000 hours of employment) in the regional economy with annual wages of $146.1 million. Of these, 2,567 positions will be in on-site businesses, with annual stabilized wages of $105 million, and the remainder will be in support/supply off-site jobs. The positions will represent approximately 3.9 percent of the total employment on the Big Island by 2035.

2. The total base economic impact on the Big Island from the various entities in the UHH Mauka Lands and USDA developments for the first 30 years of construction and operation is projected at $2.4 billion, with a stabilized base impact of $235.6 million per year thereafter. The total overall economic impact during the first three decades will be in excess of $4.8 billion and $470 million annually over the long-term.

3. The State of Hawaii will receive $254.9 million in primary tax revenues from the projects during the 30-year modeling period used in our analysis, with an additional $15.9 million annually in receipts thereafter. Hawaii County will gain some $27.4 million in taxes during the three decade projection timeframe, and $1.9 million per year following.

4. In no year of the projection or stabilized periods does either the state or county suffer a revenue shortfall (costs exceeding receipts) due to the implementation of the UHH Mauka Lands Master Plan and adjoining USDA facilities, whether analyzed on a per capita or actual cost basis.(2) **The stabilized net annual cash flow "benefit" to Hawaii County from the development will vary between $2.6 to $2.7 million, and to the State of Hawaii from $16.2 to $19.1 million per year.**

THE SUBJECT PROJECT

The proposed UHH Mauka Lands Master Plan and its larger tract are described in detail in the Environmental Impact Statement Preparation Notice, published September 2003, and other documents developed by the University of Hawaii-Hilo and PBR Hawaii planning team.

For the purpose of this assignment, it was necessary to make a series of assumptions regarding the scale, type and orientation of the development, particularly for the University Park Phase II portion. Most of the development variables for the proposed HCC Komohana campus and USDA facilities have been generally determined. Among the primary assumptions:

1. The allowable uses in University Park will be restricted to tenants having some association with the UHH or its objectives, specifically astronomy/scientific research, agricultural or other regional industries, technology, data processing, governmental or community services, office space, other R&D, park related storage and shipping, and

(2) Excluding costs associated with on-going operations of the HCC and USDA government-sponsored facilities.

minor manufacturing (associated with park work). General market uses typical of a neighbor island light industrial park, such as intensive commercial, warehousing, manufacturing, and base yards will not be permitted. This limitation will invariably slow the absorption of the lots and dampen achievable prices. We assume that some minor food service and other non-UHH associated uses would be allowed (especially in the latter stages of sales) to support the on-site businesses and working population.

2. The density of development while ranging greatly among the various use-types, will be low to moderate, with design, quality and costs of construction similar to the improvements built in the first phase of the park. To date, the park tenants have experienced direct construction costs at about $147 per square foot (with another $50 to $75 per square foot estimated in indirect costs), and have built structures having an average ratio of the floor area to the underlying site (or FAR) of .07. While the costs are in-line with market standards for modern high-quality business/commercial development, the FAR is extremely low. Most recent moderate density light industrial projects achieve a much higher FAR, typically ranging from .22 to .32, with allowable densities reaching upwards of .40.

   A summary of the existing park (Phase I) development and assumed density mix for Phase II is shown on Table 1.

3. For purposes of this assignment, we have considered fee simple and leasehold disposal tenure options as generally interchangeable, having no substantial effect on our findings. We acknowledge it is likely UHH will offer the subdivided lots via ground lease contracts.

4. We have utilized the development sizes, workforce and timing estimates for the USDA and HCC components of the subject planning area provided by UHH/PBR Hawaii and assume their construction and use will not have a detrimental effect on the

TABLE 1

SUMMARY OF UNIVERSITY PARK PHASE I DEVELOPMENT AND EMPLOYMENT AND ESTIMATE OF PHASE II DEVELOPMENT DENSITIES
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

1. Existing UHH University Park Phase II Development

		Source/Comment
No. of Tenants	10	
Developed Land Area	43.3 acres	
Total Finished Floor Area	129,384 square feet	(Co. of Hawaii)
Effective Floor Area Ratio (1)	**6.86%**	
Total Direct Construction Costs	$19,065,400	county construction permits
Average Construction Costs	**$147.36 per square foot of finished space**	
No. of Full-Time Employees	343	Compiled by UHH/PBR Hawaii
No. of Part-Time Employees	72	Compiled by UHH/PBR Hawaii
Effective FTE Employees (2)	**391.24**	
Average Floor Area Per Employee	**330.7 square feet/employee**	
Average Land Area Per Employee	**4,821 square feet/employee**	

2. Effective Market Ranges (3)

	Low	High	
Effective Floor Area Ratio (1)	15.00%	30.00%	(4)
Average Floor Area Per Employee	250	400	square feet/employee
Average Land Area Per Employee	1,000	3,000	square feet/employee

3. Projected UHH University Park Phase II
97.9 Net Buildable Acres

	Percent of Project	Effective FAR	Floor Area/ Emp. Ratio (Sq Ft/Emp)	Total Employees	
Low Density Tenants	40%	8%	350	389.9	(5)
Moderate Density Tenants	40%	16%	325	839.8	(6)
High Density Tenants	20%	24%	310	660.3	(7)
Total Phase II On-Site Employees (FTEs)				**1,890.0**	

4. Other Mauka Lands

Use/ID	Acres	Employees	Students
USDA Facilities	30	179	
Hawaii CC Komohana Campus (All Phases)	N/A	392	3,000
Future University Expansion area	23	Unknown	

(1) Ratio of finished floor space to underlying site area.
(2) "Full-Time Equivalent" positions, assuming each part-time position is equal to two/thirds (67%) of a full-time position.
(3) General averages over entire projects. Representative of the modal range of data, excludes extreme examples.
(4) Most moderate intensity commercial/business/industrial zoning permits effective Floor Area Ratios of .32 to as high as .40, although rarely are such upper limits approached in competitive projects.
(5) Similar to existing Phase I tenants.
(6) More intensive laboratory/production/technology research requiring larger labor forces.
(7) Intensive research, production and processing. Likely to have market or quasi-market components.

Source: Various and The Hallstrom Group, Inc.

sale, construction or use of the University Park lands or impact their entitlement, financing or marketability.

5. The 27.7-acre corner parcel, identified on the UHH master plan as "Future University Expansion", may have a higher and better use potential as additional University Park acreage should park demand expand faster than university enrollment. However, the actualization of a business/industrial use on the site is three decades removed; beyond the forecasting horizon of our analysis. By such time, alternative use opportunities in the public sector may have emerged. To the extent this site is developed, our economic and cost/benefit indicators would move upward.

ECONOMIC IMPACT OF THE PROPOSED DEVELOPMENT

The development of the UHH Mauka Lands Master Plan, including University Park Phase II and the HCC Komohana campus, and the adjoining USDA facilities will result in significant expenditures that will favorably impact the Hilo and Big Island economies on both a direct and indirect basis, increasing the level of capital investment and capital flow in the region, which will in turn create employment and widen the tax base.

From a direct perspective, the proposed technology park, campus and government facility parcels and finished buildings thereon will create numerous construction, equipment operator and specialty trade jobs on- and off-site during the planning and emplacement of the infrastructure, and building of the improvements. After completion of the buildings and support facilities, there will be significant additional employment positions created by the tenant businesses in the park, staff and students at HCC, and workers at USDA. Further, the buildings themselves require landscape, service, maintenance, and renovation in the course of their use.

Numerous local businesses will enjoy significant profit opportunities arising for contracting companies constructing the improvements, and for local businesses which would supply a substantial portion of the materials needed in the building efforts.

The general island economy also will benefit from the UHH Mauka Lands development as its employees and constituent operations/businesses will spend large amounts of wage income in off-site shops, restaurants, and service establishments in East Hawaii and throughout the Big Island, and from the purchasing of goods, services and supplies.

Indirectly, as these wages, profits, and expenditures move through the regional economy, they will have a ripple, or "multiplier," effect--increasing the amount of capital flowing to the entire community as a result of the subject.

Construction, operational and other workers earning wages from the UHH Mauka Lands components and associated off-site efforts will spend the majority of their income on living and entertainment expenses while supporting and patronizing other island businesses. Much of this spending would be re-directed by these businesses to other island industries, and significant portions of these secondary profits would in turn be put back through the region's economic and tax structure.

These substantial direct and indirect economic impacts associated with the proposed subject project, as quantified in the following sections, are all the result of the capital investment and entrepreneurship necessary to convert overgrown vacant lands into a vibrant mixed-use educational and research-oriented development which will grow into a focal point of a revitalized, modern Hilo community. The East Hawaii economy will be meaningfully stimulated by the capital investments and business requirements of park tenants, staff, students and consumers who patronize the various facilities comprising the project.

Capital Investment and Construction Costs

The subject development will bring an estimated $473.9 million in direct development capital into Hilo over the 30-year projection model depicting the subject's planning, development and build-out period. A breakdown of the construction categories, their respective costs and expenditure over time is summarized on Table 2, which serves as the template for the remaining forecasts.

Also shown are anticipated contractor and supplier profits flowing to local businesses as a result of the project.

The model focuses on the three major components of the subject planning area: the University Park Phase II subdivision, the HCC Komohana campus, and the USDA facilities. The projected timing of each component's development was forecast by the UHH/PBR Hawaii planning team in conjunction with the appropriate agencies. Basic infrastructure emplacement is assumed to begin in 2005, with the University Park subdivision and USDA agricultural facility opening in 2006 and 2007, respectively. The first phase of the HCC development would open in 2010. Our model timing provides for moderate construction periods prior to opening.

Employment Opportunities Created

Based on indicators provided by the construction of comparable sized projects and Hawaii industry averages, we have estimated the demand for on- and off-site, full-time equivalent employment positions associated with laying of initial infrastructure systems, building of the finished campus, USDA and University Park structures, the on-going businesses in the park, and in providing continuing services to the occupied buildings.

TABLE 2

CONSTRUCTION COSTS AND CONTRACTOR AND SUPPLIER PROFIT ESTIMATES
Economic Impact Analysis and Public Cost/Benefit Assessment of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

Development Year	2004 1	2 HCC Phase IV Opens	3 UHH Park II Subdivision Opens	4 USDA Agricultural Facility Opens	5	6	7 HCC Phase I and USDA Forestry Open	8	9	10
Construction Costs (1)										
Infrastructure (2)		$12,220,000	$12,220,000			$6,252,900	$6,252,900			
University Park Construction (3)			$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000
USDA Construction (4)			$9,190,800	$18,406,200		$2,364,000	$4,535,600			
HCC Construction (5)						$32,344,615	$32,344,615			
TOTAL CONSTRUCTION COSTS	$0	$12,220,000	$26,385,800	$23,381,200	$4,975,000	$45,936,919	$48,108,119	$4,975,000	$4,975,000	$4,975,000
CONTRACTOR'S PROFIT	$0	$1,221,000	$2,639,580	$2,338,120	$497,500	$3,583,097	$3,810,812	$497,500	$497,500	$497,500
SUPPLIER'S PROFIT	$0	$366,900	$533,532	$535,368	$199,000	$1,779,548	$1,461,796	$199,000	$199,000	$199,000
Construction Costs (1)										
Infrastructure (2)	$5,378,450	$5,378,450								
University Park Construction (3)	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$1,079,500	$1,079,500	$4,975,000	$4,975,000	$4,975,000
USDA Construction (4)						$4,975,000	$4,975,000			
HCC Construction (5)	$34,687,230	$34,687,230				$27,672,028	$27,672,028			
TOTAL CONSTRUCTION COSTS	$45,240,680	$45,240,680	$4,975,000	$4,975,000	$4,975,000	$33,726,528	$33,726,528	$4,975,000	$4,975,000	$4,975,000
CONTRACTOR'S PROFIT	$4,524,068	$4,524,068	$497,500	$497,500	$497,500	$3,372,653	$3,372,653	$497,500	$497,500	$497,500
SUPPLIER'S PROFIT	$1,753,843	$1,753,843	$199,000	$199,000	$199,000	$998,266	$998,266	$199,000	$199,000	$199,000

Development Year	21 HCC Phase IV Opens	22	23	24	25	26	27 UHH Park II Sells Out	28	29 Mauka Lands Built-Out	30	Totals
Construction Costs (1)											
Infrastructure (2)	$5,987,750	$5,987,750									$66,257,280
University Park Construction (3)	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000		$134,325,000
USDA Construction (4)											$34,406,000
HCC Construction (5)	$44,766,178	$44,766,178									$238,848,169
TOTAL CONSTRUCTION COSTS	$55,728,928	$55,728,928	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$0	$473,822,309
CONTRACTOR'S PROFIT	$5,572,893	$5,572,893	$497,500	$497,500	$497,500	$497,500	$497,500	$497,500	$497,500	$0	$47,397,233
SUPPLIER'S PROFIT	$2,169,280	$2,169,280	$199,000	$199,000	$199,000	$199,000	$199,000	$199,000	$199,000	$0	$16,394,120

(1) Includes direct costs (construction contracts), 20% allowance for design fees and contingencies, and indirect costs (excluding financing).
(2) Infrastructure for HCC Komohana Campus based on cost and phasing plan from HCC LRFP Update, totaling $44.7 million at four increments. Infrastructure costs for University Park (and expansion lands) subdivision estimated at $18.2 million, or $125,000 per acre. Costs for USDA facility estimated at $250,000 per acre or $7.7 million.
Estimates for HCC and USDA projects include finish landscaping and roadways. University Park subdivision and USDA Ag. Research facility begin construction in 2005.
USDA Pacific Forestry facility at Hoglo construction in 2008 as does phase I of the HCC campus, with subsequent intervals every five years. All phases assumed to take 18 - 24 months.
(3) Finished building construction costs estimated at $225 per square foot ($150/SF direct costs and $75/SF for indirect, misc. design contingency, and FF&E costs). Average Floor Area Ratio of .14 with average construction on 3.63 acres per year (total of 97.9 acres over 27 years); or, 22,110 square feet of floor space and $4,975,000 in construction costs annually.
(4) Finished building construction costs estimated at $225 per square foot ($150/SF direct costs and $75/SF for indirect costs). Agricultural facility to be 122,578 square feet with estimated cost of $27,600,000, and Forestry facility at 30,200 square feet with estimated cost of $6,800,000.

Source: Various, and The Hallstrom Group, Inc.

TABLE 3

EMPLOYEE JOB COUNT AND WAGE ESTIMATES
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

Development Year	1	2	3	4	5	6	7	8	9	10	11
Worker Requirements (1)											
Infrastructure		49	49		25	25					22
University Park Construction			33	33	33	33	33	33	33	33	33
USDA Construction			37	74		9	18				
HCC Construction						89	89				139
University Park Tenant Employees				70	140	210	280	350	420	490	560
HCC and USDA Employees				135	135	135	242	242	242	242	242
Building Maintenance Staff				10	11	13	27	28	30	31	33
Off-Site Employees (2)		24	59	161	172	257	345	327	363	398	515
TOTAL EMPLOYMENT CREATED	0	73	178	482	516	771	1,034	980	1,088	1,195	1,544
Worker Wages											
Infrastructure (3)		$2,828,554	$2,828,554	$0	$1,446,171	$1,446,171	$0	$0	$0	$0	$1,290,184
University Park Construction (3)		$0	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697
USDA Construction (3)		$0	$2,123,335	$4,257,680	$0	$523,710	$1,048,994	$0	$0	$0	$0
HCC Construction (3)		$0	$0	$0	$0	$5,167,863	$5,167,863	$0	$0	$0	$8,022,463
University Park Tenant Employees (4)		$0	$0	$2,856,000	$5,712,000	$8,568,000	$11,424,000	$14,280,000	$17,136,000	$19,992,000	$22,848,000
HCC and USDA Employees (5)		$0	$0	$5,940,000	$5,940,000	$5,940,000	$10,648,000	$10,648,000	$10,648,000	$10,648,000	$10,648,000
Building Maintenance Staff (6)		$0	$0	$290,791	$289,118	$327,446	$701,040	$739,367	$777,695	$816,022	$854,350
Off-Site Employees (7)		$782,720	$1,900,958	$5,143,188	$5,508,771	$8,227,335	$11,034,410	$10,457,662	$11,601,248	$12,744,834	$16,465,424
TOTAL ANNUAL WAGES PAID	$0	$3,611,274	$8,770,544	$20,365,356	$20,813,757	$32,118,222	$41,942,003	$38,042,726	$42,080,639	$46,118,553	$62,046,117

(1) All job counts expressed as "full-time equivalent " (FTE) positions.
(2) Includes all off-site jobs created by work efforts at the project, direct and indirect.
(3) With average annual wage of $52,820 per FTE worker. ($28.91/Hour)
(4) With average annual wage of $40,800 per FTE worker. ($20.04/Hour)
(5) With average annual wage of $44,000 per FTE worker. ($22.00/Hour)
(6) With average annual wage of $26,000 per FTE worker. ($13.00/Hour)
(7) With average annual wage of $32,000 per FTE worker. ($16.00/Hour)

Source: Various, State of Hawaii, and The Hallstrom Group, Inc.

The employment opportunities created by the subject development will not all be "new" jobs requiring new East Hawaii workers (or residents) but will be new opportunities for resident construction trade workers, youths reaching employment age, and existing local businesses.

It is assumed the off-site/indirect work created will also be substantially steered towards existing Hilo area supply, equipment providers, and other service companies, which despite the up-tick in the county economy over the past several years remain in a somewhat "lean" period as the large majority of expansion has been oriented towards the leeward side of the island. With the demise of the sugar industry, failure to renovate or redevelop the Banyan Drive hotels, and the movement of capital and economic power to West Hawaii, the Hilo real estate and commercial construction sectors have failed to capture the vibrant growth being achieved in most neighbor island communities.

The subject development will provide needed employment opportunities in the construction, supply and building support industries during an extended planning, site development and building construction period. The final planning/survey process is assumed to be completed this year; on-site backbone and subdivision infrastructure to require approximately 18 to 24 months following receipt of necessary land approvals, with the finished space construction beginning in year 3 and continuing on for another 26 years.

Our employment estimates on are based on full-time "worker-years," although one worker/year (or circa 2,000 working hours) may be comprised of many employees involved in specialized tasks of a much shorter duration.

Estimates are based on a three decade modeling period of planning (year 1) construction and use (years 2 through 29), with full build-out completed and stabilized operation achieved by year 30. The associated number of employment opportunities created are displayed on the top of Table 3. We acknowledge our timeframe assumption is at the optimistic end of the probable sales and build-out range. However, as the dollar figures are constant (uninflated),

TABLE 3 – Continued

EMPLOYEE JOB COUNT AND WAGE ESTIMATES
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

	23	24	25	26	27	28	29	30	Total Years 1 Through 30	Stabilized
Worker Requirements (1)										
Infrastructure									265	
University Park Construction	33	33	33	33	33	33	33		896	
USDA Construction									138	
HCC Construction									956	
University Park Tenant Employees	1,400	1,470	1,540	1,610	1,680	1,750	1,820	1,890	26,460	1,890
HCC and USDA Employees	571	571	571	571	571	571	571	571	11,439	571
Building Maintenance Staff	96	98	99	100	102	103	105	106	1,708	106
Off-Site Employees (2)	1,050	1,086	1,122	1,157	1,193	1,229	1,265	1,284	20,931	1,284
TOTAL EMPLOYMENT CREATED	3,150	3,258	3,365	3,472	3,579	3,686	3,794	3,851	62,792	3,851
Worker Wages										
Infrastructure	$0	$0	$0	$0	$0	$0	$0	$0	$15,323,965	
University Park Construction	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$0	$51,777,810	
USDA Construction	$0	$0	$0	$0	$0	$0	$0	$0	$7,953,719	
HCC Construction	$0	$0	$0	$0	$0	$0	$0	$0	$55,262,069	
University Park Tenant Employees	$57,120,000	$59,976,000	$62,832,000	$65,688,000	$68,544,000	$71,400,000	$74,256,000 #	$77,112,000	$1,079,568,000	$77,112,000
HCC and USDA Employees	$25,124,000	$25,124,000	$25,124,000	$25,124,000	$25,124,000	$25,124,000	$25,124,000	$25,124,000	$503,316,000	$25,124,000
Building Maintenance Staff	$2,497,900	$2,536,227	$2,574,555	$2,612,882	$2,651,210	$2,689,537	$2,727,865	$2,766,192	$44,418,669	$2,766,192
Off-Site Employees	$33,603,836	$34,747,422	$35,891,008	$37,034,594	$38,178,180	$39,321,766	$40,465,353	$41,078,272	$669,780,153	$41,078,272
TOTAL ANNUAL WAGES PAID	$120,263,432	$124,301,346	$128,339,259	$132,377,173	$136,415,087	$140,453,000	$144,490,914	$146,080,464	$2,427,400,385	$146,080,464

TABLE 3 – Continued

EMPLOYEE JOB COUNT AND WAGE ESTIMATES
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

Development Year	12	13	14	15	16	17	18	19	20	21	22
Worker Requirements (1)											
Infrastructure	22				12	12				24	24
University Park Construction	33	33	33	33	33	33	33	33	33	33	33
USDA Construction											
HCC Construction	139				71	74				179	179
University Park Tenant Employees	630	700	770	840	910	980	1,050	1,120	1,190	1,260	1,330
HCC and USDA Employees	406	406	406	406	406	531	531	531	531	531	571
Building Maintenance Staff	51	52	54	55	57	67	69	70	72	73	95
Off-Site Employees (2)	641	596	632	667	744	847	842	877	913	1,050	1,116
TOTAL EMPLOYMENT CREATED	1,922	1,787	1,895	2,002	2,233	2,542	2,525	2,632	2,739	3,151	3,348
Worker Wages											
Infrastructure	$1,290,184	$0	$0	$0	$712,227	$712,227	$0	$0	$0	$1,384,847	$1,384,847
University Park Construction	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697	$1,917,697
USDA Construction	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
HCC Construction	$8,022,463	$0	$0	$0	$4,087,187	$4,087,187	$0	$0	$0	$10,353,522	$10,353,522
University Park Tenant Employees	$25,704,000	$28,560,000	$31,416,000	$34,272,000	$37,128,000	$39,984,000	$42,840,000	$45,696,000 #	$48,552,000	$51,408,000	$54,264,000
HCC and USDA Employees	$17,864,000	$17,864,000	$17,864,000	$17,864,000	$17,864,000	$23,364,000	$23,364,000	$23,364,000	$23,364,000	$23,364,000	$25,124,000
Building Maintenance Staff	$1,323,972	$1,362,299	$1,400,627	$1,438,954	$1,477,282	$1,752,098	$1,790,426	$1,828,753	$1,867,081	$1,905,408	$2,459,572
Off-Site Employees	$20,498,422	$19,065,005	$20,208,591	$21,352,177	$23,823,861	$27,112,979	$26,928,467	$28,072,053	$29,215,639	$33,607,477	$35,708,501
TOTAL ANNUAL WAGES PAID	$76,620,737	$68,769,001	$72,806,915	$76,844,828	$87,010,253	$98,930,187	$96,840,590	$100,878,503	$104,916,417	$123,940,950	$131,212,138

the net aggregate impacts will be generally similar whether the construction takes 20 or 40 years. The selected time-frame provides a working framework for analysis.

Included in our projections on the table are the full-time equivalent off-site and support employment opportunities which will be provided to Big Island businesses as a result of the project. Also shown are the employees of the HCC campus, USDA facilities and operating park businesses occupying the finished floor space. Maintenance/trade workers for the structures which will be required to service the project improvements over time are also listed.

The construction worker projections are founded on examples provided by various light industrial, business park and retail/business developments undertaken on Maui and the Big Island over the past decade, and via formulae expressing relationships between total worker wages/benefits and construction task costs.

The on-going operational employment estimates for the HCC and USDA components of the master planning area were provided by the respective agencies. The projections for the University Park Phase II tenants were based on market levels and review of Phase I employment.

Wage estimates are taken from averages provided by the State of Hawaii through its Labor and Occupational Information Hawaii website with an effective date of year-end 2003.

Infrastructure and building construction employment forecasts are taken from discussions with developers, review of project records and ratios of construction contract amounts to job creation (assuming an average construction worker wage of $57,820 annually plus benefits equal to 25 percent of wages). Our analysis indicates that for every $250,000 in infrastructure emplacement expense there is the equivalent of one worker-year created, and that every $150,000 in building construction costs equates to demand for one worker-year.

Costly heavy equipment and fill/finish site materials associated with infrastructure development results in the difference in the two ratios.

The Komohana Campus is forecast by HCC to have a staff of 392 upon completion of the fourth phase in 2025, and the USDA facilities a total of 179 FTE positions. The average wage for these workers is estimated at $44,000 per year.

Business operations in University Park Phase II were estimated to have on average one employee per 315 square feet of finished floor space, varying between 350 square feet per worker in the low intensity, educational/non-profit oriented improvements to 310 square feet per employee in the higher intensity R&D and more market-oriented facilities. This is at the middle of the general market range for commercial/industrial parks in Hawaii, which typically have park-wide averages of 250 to 400 square feet of floor space per employee. The average annual worker wage for these individuals was projected at $40,800 per year.

The initial operations in Phase I of the park have an average of one employee for every 331 square feet of finished floor space.

The finished improvements and sites will require building maintenance, the service and repair workers which allow for continued efficient use and preservation of economic value. It is assumed the staffing count for the HCC Komohana campus includes such worker requirements. We have provided estimates for the USDA and University Park properties totaling 106 worker-years annually on a stabilized basis, or one worker-year for every 15,000 square feet of finished floor space. These workers are estimated to be paid on average $26,000 per year.

Off-site employees were estimated at 50 percent of on-site workers, and are comprised of three groups:

- Numerous off-site building industry positions will also be enhanced by the UHH Mauka Lands Master Plan development, including such jobs as administration, office help, material providers, equipment maintenance and specialty tasks. Analysis of Hawaii County labor trends from 1980 through 2002 demonstrate a linkage equal to about 25 to 30 percent between the creation of on-site construction positions and direct off-site employment.

- Off-site support businesses, including contractor/retail/counter sales, fuel providers, shipping, storage and professional services will also benefit. A job creation relationship of 10 to 15 percent relative to on-site positions was used (or, one off-site support worker/year for each six to ten on-site worker-years).

- Extrapolation of state Department of Business Economic Development and Tourism (DBEDT) data, along with indicators provided by other state agencies and First Hawaiian Bank studies, demonstrate that each Hawaii worker creates demand for services (and related employment) during and directly attributable to the work day at up to a ten percent ratio. These positions include food businesses, providers of tools and trade goods, payroll/financial and insurance businesses, medical requirements and other secondary indirect/off-site employment.

During the 30-year modeling period developed for the project, the number of worker-years created on- and off-site by the development varies from 73 to 3,851 positions annually, totaling 62,792 worker-years over the entire projection timeframe. Of this total, 2,255 worker-years (an annual average of 81 positions) are direct construction-oriented, 39,607 total (or 1,366 per year) are on-going campus, USDA and park business operating positions; and 20,931 are off-site worker requirements.

On a stabilized basis, after the completion of construction (year 30 of the model), the various operating components of the project will generate some 3,851 permanent full-time equivalent

and/or enhanced employment opportunities--2,567 directly related to on-site activities, and 1,284 indirect positions throughout the island.

The average annual on-site job count during construction and move to operating stabilization of 1,443 positions represents about a 2.7 percent increase from the total jobs presently available in Hawaii County (1,443 additional jobs per year relative to the December 2003 job count of 58,400).

At build-out in circa 2033, the subject project will contain, on-site, some 2.62 percent of the total jobs on the island (2,567 jobs out of the estimated 98,000 islandwide). The off-site positions created/supported by the subdivision will be another 1.31 percent of the then in-place workforce.

Additional secondary and/or supplementary employment will be created by the operating business within the development. Much of the capital and cash flow of the park businesses will be re-spent on the Big Island; an expansion of economic activity forecast to reach $84.9 million per year on a stabilized basis (quantified in a subsequent section) at build out. Based on DBEDT data stating each $75,000 to $100,000 spent creates one employee position, an additional 849 to 1,132 secondary jobs will be supported on the island as a result of the subject property businesses.

Beyond the quantified levels of specific employment (direct and indirect) created by the proposed subject developments, there will be significant additional employment as the myriad of benefits arising the UHH Mauka Lands components flow through the community. College educational opportunities have direct correlations on wages and entrepreneurship, the USDA facilities will lead to major advancements in East Hawaii agricultural production and marketing, and the University Park operations will provide a stimulus to local business growth and generate professional quality positions.

Wage Income Generated

In accordance with data compiled by the state Department of Labor and Industry Relations, we have estimated the personal income (in the form of wages) which will flow to Hilo area workers as a result of the subject project.

The average wage of a full-time infrastructure construction worker is estimated at $57,820 per year based on DLIR data through December 2003. For finished building construction workers, the average annual pay will also be about $57,820. Average annual wages for HCC staff and USDA workers are estimated at $44,000 per year. Park tenant business operating personnel are assumed to be paid $40,800 per year on average. Building maintenance and grounds/landscape workers are projected to receive average pay equivalent to $26,000 per year. Off-site building and support industry jobs were estimated to receive an average pay of $32,000 annually.

Overall project average wages are equal to $38,658 per worker-year created during the development period, and $37,933 on a stabilized basis.

Application of these wage estimates to the employment forecasts generates personal income (wage) projections directly resulting from subject development. These calculations were shown at the bottom of Table 3. The wage figures are all presented in constant 2004 dollars, and will undoubtedly escalate over time in accordance with inflationary pressures.

In the first year of construction, year 2 of the model (2005) the "Total Annual Wages Generated" by the subject development effort would be $3,611,274, increasing to a high of $146.1 million, as the number of HCC and USDA staff, park, business operations and maintenance/service workers peak in year 30. After completion of all construction, the on-going operational, maintenance, off-site/indirect employment would result in average annual wages of $146 million thereafter in uninflated 2004 dollars.

Over the 30-year model of the development, on- and off-site, direct and indirect worker wages would total $2.43 billion.

Development Costs as Profit Income

While the significant majority of the materials needed to build the HCC campus, USDA facilities and University Park structures must be imported to the Big Island, a portion of the construction costs spent in the development will flow to local businesses in the form of contractor profits and supplier profits.

Typically, within the industry net contractor profit margins are expected to be at 8 to 20 percent of total construction costs. We have used a conservative ten percent figure. Supplier profits were extrapolated at four percent of total costs; generally supplies/materials equate to 50 to 60 percent of total cost, with a profit margin for the supplier of six to eight percent.

Application of these estimates to the forecast development parameters of the subject project was shown on Table 2.

The total Contractor's Profit ranges from $1,223,000 to $3,810,812 per year, with a cumulative profit of $47.4 million over the construction period. The total annual Supplier's Profit ranges from a low of $366,900 to a high of $1,461,796, and equates to $18.3 million over the 30-year modeling time-frame.

Population and Business Operations

As an educational, governmental services and mixed-use industrial/business park development, the proposed UHH Mauka Lands Master Plan project will not have a resident population and the attendant needs associated with a residential-oriented project.

TABLE 4

SUMMARY OF ECONOMIC IMPACTS ASSOCIATED WITH DEVELOPMENT
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

Development Year	1	2	3	4	5	6	7	8	9	10
ANNUAL WAGES GENERATED	$0	$3,611,274	$8,770,544	$20,365,356	$20,813,757	$32,118,222	$41,942,003	$38,042,726	$42,080,639	$46,118,553
CONTRACTOR'S PROFIT	$0	$1,223,000	$2,619,580	$2,338,420	$497,500	$3,583,692	$3,810,812	$497,500	$497,500	$497,500
SUPPLIER'S PROFIT	$0	$366,900	$933,532	$935,368	$199,000	$1,270,948	$1,461,796	$199,000	$199,000	$199,000
UNIVERSITY PARK OPERATIONS (1)				$4,975,200	$9,950,400	$14,925,600	$19,900,800	$24,876,000	$29,851,200	$34,826,400
HCC STUDENT EXPENDITURES							$408,240	$408,240	$408,240	$408,240
TOTAL BASE ECONOMIC IMPACT	$0	$5,201,174	$12,343,656	$28,614,344	$31,460,657	$51,998,461	$67,523,651	$64,023,466	$73,036,579	$82,049,693
Multiplier Effect Ratio	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
TOTAL OVERALL IMPACT	$0	$10,402,349	$24,687,313	$57,228,687	$62,921,314	$103,996,922	$135,047,302	$128,046,931	$146,073,159	$164,099,386

Development Year	11	12	13	14	15	16	17	18	19	20
ANNUAL WAGES GENERATED	$62,046,117	$76,620,737	$68,769,001	$72,806,915	$76,844,828	$87,010,253	$98,930,187	$96,840,590	$100,878,502	$104,916,417
CONTRACTOR'S PROFIT	$4,524,068	$4,524,068	$497,500	$497,500	$497,500	$2,572,653	$2,572,653	$497,500	$497,500	$497,500
SUPPLIER'S PROFIT	$1,753,843	$1,753,843	$199,000	$199,000	$199,000	$998,266	$998,266	$199,000	$199,000	$199,000
UNIVERSITY PARK OPERATIONS (1)	$34,834,200	$34,883,000	$34,911,300	$34,939,600	$34,967,900	$34,996,200	$35,024,500	$35,052,800	$35,081,100	$35,109,400
HCC STUDENT EXPENDITURES (2)	$408,240	$1,077,120	$1,077,120	$1,077,120	$1,077,120	$1,077,120	$1,811,520	$1,811,520	$1,811,520	$1,811,520
TOTAL BASE ECONOMIC IMPACT	$103,586,967	$118,858,768	$105,453,921	$109,520,135	$113,586,348	$126,654,492	$139,337,126	$134,401,410	$138,467,623	$142,533,837
Multiplier Effect Ratio	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
TOTAL OVERALL IMPACT	$207,173,934	$237,717,536	$210,907,842	$219,040,269	$227,172,696	$253,308,984	$278,674,252	$268,802,819	$276,935,247	$285,067,674

Development Year	21	22	23	24	25	26	27	28	29	30	Total 1 Through 30
ANNUAL WAGES GENERATED	$123,940,950	$131,212,138	$120,263,432	$124,301,346	$128,339,259	$132,377,173	$136,415,087	$140,453,000	$144,490,914	$148,528,827	$2,429,848,748
CONTRACTOR'S PROFIT	$5,572,893	$5,572,893	$497,500	$497,500	$497,500	$497,500	$497,500	$497,500	$497,500		$47,392,251
SUPPLIER'S PROFIT	$2,169,286	$2,169,286	$199,000	$199,000	$199,000	$199,000	$199,000	$199,000	$199,000		$18,294,320
UNIVERSITY PARK OPERATIONS (1)	$40,084,600	$45,059,800	$50,035,000	$55,010,200	$59,985,400	$64,960,600	$69,935,800	$74,911,000	$79,886,200	$84,861,400	$1,113,856,100
HCC STUDENT EXPENDITURES	$1,811,520	$2,160,000	$2,160,000	$2,160,000	$2,160,000	$2,160,000	$2,160,000	$2,160,000	$2,160,000	$2,160,000	$35,924,400
TOTAL BASE ECONOMIC IMPACT	$173,579,243	$186,174,111	$173,154,932	$182,168,046	$191,181,159	$200,194,273	$209,207,387	$218,220,500	$227,233,614	$235,550,227	$3,645,315,799
Multiplier Effect Ratio	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
TOTAL OVERALL IMPACT	$347,158,485	$372,348,221	$346,309,864	$364,336,091	$382,362,319	$400,388,546	$418,414,773	$436,441,000	$454,467,227	$471,100,455	$7,290,631,599

(1) Includes facility operation budgets, R&D and other grants, consulting fees, product manufacturing, and all other sources of Park "income/revenues" estimated at $225 in operations/"sales" per square foot per year. This is about half the "sales" levels for a neighbor island light industrial/business park. Excludes USDA facilities.
(2) For on-site and near-campus purchases associated with school life. Includes books, supplies, food & beverage, and misc. Estimated at $6 per student per class day, or $720 per student per year (assuming average of 120 class days per year).

Source: Various, and The Hallstrom Group, Inc.

The project does present traffic, environmental and recreational issues which will be addressed in the planning/approval process and implemented via off- and on-site infrastructure and mitigation. It will not represent substantial going-forward operational costs.

Upon build-out and stabilization, the cumulative business operations in University Park Phase II are projected to annually generate some $84.9 million in gross sales/business activity based on an estimate of $225 of "sales" or basic economic activity per square foot of finished floor area. The estimate reflects the research, scientific, service (and often non-profit) orientation of the probable tenants. It is about half the sales/business activity level achieved in most neighbor island, newer light industrial and business parks.

Summary of Direct, Local Economic Impacts

The various direct, local economic impacts which will flow to the subject region as a result of the subject development are summarized on Table 4.

In addition to the activities previously described, the table also shows the estimated expenditures by HCC students at on and near campus businesses as part of their educational day. Our projects are based on outlays averaging $6 per student per class day, or $720 per student annually assuming 120 on-campus days. The total annual expenditures by the 3,000 student population at completion of the campus would reach $2.2 million for books, supplies, food and beverage, and other minor items.

The annual Total Base Economic Impact increases from $5.2 million in year 2 of the model (2005) as the construction commences to a high of $227.2 million by year 30. Over the three decade development and stabilization period, the total is $3.6 billion. Fueled by business operations, the estimated stabilized annual base impact thereafter is $235.6 million.

These dollars will be spent, then re-spent, on goods and services on the island, diminishing in impact on the local economy with each turnover as a portion flows off the Big Island for goods, services and financing commitments. First Hawaiian Bank studies have concluded the appropriate economic multiplier rates in Hawaii are from 1.2 to 3.5 times (or 20 to 250 percent) of the base impact amount. Mainland studies (by the Urban Institute and others) tend toward the upper end of this range, and reach multipliers as high as 4.0.

Due to the need to import more than 85-plus percent of supplies/goods used in East Hawaii, the multiplier impact for the island is not as great as for mainland locales, particularly for construction-based expenditures. We have therefore tested multiplier rates at the mid-point of the market spectrum, ranging from 1.5 to 3.5 times.

On a conservative basis, using a relatively low-end multiplier effect ratio of 2.0, the total overall direct impact on the Island of Hawaii economy resulting from the UHH Mauka Lands project and adjoining HCDA facility would be $7.29 billion over the 30-year projection period (in constant 2004 dollars). On a stabilized annual basis thereafter, the overall impact would be at $454.5 million.

PUBLIC COST/BENEFIT ASSESSMENT

The purpose of this analysis is to delineate the direct areas in which the various components proposed subject development will potentially impact the sphere of public agency resources, and quantify (where possible) the costs of providing expanded services to the project, versus the economic benefits that accrue to the community through an increase in local and state tax payments.

For most developments, potential direct costs to governmental services and programs include:

- Police Protection
- Fire Protection
- Public Oversight Agencies
- Infrastructure Services
- Recreational Demands
- Educational Needs
- Infrastructure Costs
- Various Other Services and Financial Commitments

Given the non-residential, governmental services and technology/research orientation of the project components, many of these costs will not be meaningfully increased on the state or county levels as a direct result of the proposed UHH Mauka Lands Master Plan or USDA facility. In other words, the difference in overall service requirements to the Hilo/East Hawaii community is not substantially added to, or dependent upon, the envisioned use of the subject planning area.

The fundamental community demands created by the project (traffic, drainage, recreational and environmental) will be addressed in the planning/approval process and "solved" through on- and off-site infrastructure improvements. There will be no substantially increased going-forward operating costs attributable to the subject development.

Direct tax benefits to the state and county coffers will primarily flow from the project and its operation over time from three major sources:

- Real Property Taxes
- General Excise Tax Receipts
- State Income Taxes

Some cost/benefit issues are considered as off-setting, or "a wash," as the cost of the services to the government is theoretically directly reimbursed in the form of user fees. Building permits and utility hook-up fees are two prime examples. Other such items include workers compensation premiums and benefits, utility operations and associated use billing rates, and business oversight/registration verses licensing fees. These items are excluded from this study.

A concern of this analysis is the integration of the subject project into the overall state and Hawaii governmental services plan on both an actual and pro rata perspective.

From an actual public service cost perspective to the Hawaii County and state agencies, the UHH Mauka Lands will represent only a fraction of the county and state educational and industrial/commercial plant, and overall urban lands, in use. Given the vast number of housing units, resorts, businesses, and agricultural lands on the island, it is difficult to assert that of themselves the subject improvements and users will create the need for meaningful expansion of existing public services.

The impact on the total regional land base as a direct result of the UHH Mauka Lands master plan and adjoining HCDA facility will be minimal, in that the impacts will not be substantially less without the projects. Public safety facilities in central Hilo are proximate, generally have the personnel and equipment to service the campus, USDA facility and businesses and buildings in the University Park, and will expand with overall community growth over the next three decades as the project is built. Further, most public infrastructure systems in the area were designed with, or are in the process of being upgraded to have, the capacity to service development in the neighborhood.

However, the need for additional services is a cumulative effect, each project, each resident, tourist and, to a lesser degree, business adds a little bit to the community base until increased "need thresholds" are reached.

In regard to some services, the effective actual impact may not be apparent from a cost perspective, merely creating nominally greater demands which can be readily met through existing agencies and facilities without the need for additional workers or funds.

As an alternative to actual cost estimates, which are often disparate as they inherently cannot provide for unexpected and/or atypical items, it is most common to project public costs on a per capita allocation.

While this is wholly appropriate for residential developments, as public costs and services generally accrue to where a person lives (or in the case of a tourist, where they are lodging), it may not be fully insightful for an industrial or commercial project, and can be problematic for a public facility like a community college campus. By their very nature, industrial/commercial businesses are private enterprises responsible for their own costs and benefits, and public services are the reason for a school's existence.

Conversely, government services are holistic in nature, providing a foundation throughout a community, regardless of actual, specific impact on any given land holding. A business may not have a need for parks or schools, but they are essential to the patrons and workers and create the climate in which the business operates. Similarly, government administration, capital projects and public welfare items may have no direct relation to a particular project, but provide the economic underpinnings that enhances overall commercial success.

In order to meaningfully quantify public costs that may be associated with the subject development, we have therefore looked at the issue from both perspectives, on an actual cost basis, which we believe to be most appropriate for the subject project and is the focus of our conclusions; and on a per capita allocation basis.

Public Costs

Actual Costs

The Hawaii County will directly incur several areas of cost increases as a result of the second phase of the University Park subdivision; primarily in regards to emergency services. The USDA facility and HCC campus will likely have some in-house security, emergency service and assistance procedures that will mitigate the impacts of these projects on the local agencies. Further, the campus environment is a complex community with highly specific and well addressed emergency service issues. It was beyond the scope of our assignment to comprehensively analyze the public costs/benefits of a community college institution and the unique concerns it will possess.

We have therefore viewed the HCC campus and USDA facilities as typical industrial/business projects with emergency service requirements commensurate with the number of employees, density of development and activity on site. We consider this an appropriately moderate measurement of a non-residential land use.

Based on analysis of response frequencies, time/cost data, and past discussions with affected agencies, we have made general allowances for the county-provided emergency services for the components of the UHH Mauka Lands development from a general use perspective as summarized below.

Police/Enforcement -- Using a base cost of $140 per hour for a responding officer (wages, benefits, overhead and amortized equipment), we estimate the annual additional police/enforcement cost to Hawaii County on a stabilized basis after project build-out will be $422,800.

This is comprised of:

- Two miscellaneous calls per day at an average of two total officer hours each. (2 hrs. x $140/hr. x 2 x 365 = $204,400)
- Two "minor" incidents/traffic accidents each week requiring on average five hours of officer time. (5 hrs. x $140 x 2 x 52 - $72,800)
- One "major" incident/traffic accident each week requiring on average of 20 hours of officer time. (20 hrs. x $140 x 52 = $145,600)

This demand is the equivalent of 1.5 officer work/years (3,020 total hours).

Fire Protection -- These forecasts are based on a crew cost of $800/hour (four to five firemen, wages, benefits, overhead and amortized equipment). We estimate that at build-out, the yearly additional costs to the Hawaii County resulting from the project is $201,600 per year.

This is comprised of:

- One "minor" fire/rescue per week requiring one crew for a total of three hours (response and/or clean-up). (3 hrs. x $800/hr. x 52 = $124,800)
- One "major" fire/rescue every other month requiring two crews for a total of eight hours each. (2 crews x 8 hrs. x $800/hr. x 6 = $76,800)

Emergency Medical Response -- This is based on average cost per response of $500, with an average of four calls per week. The total cost to the county would be $104,000 per year on a stabilized basis after build-out. ($500/response x 4 per week x 52 = $104,000)

Road Maintenance -- An allowance of $50,000 per year was made for this item.

From this "general" use perspective, relating county services demand to employment and land use activity loads, the total annual "actual" cost to the county on a stabilized basis at build out of the subject development is estimated at $778,400. This cost was reached on an escalating basis over time, beginning at five percent in year 4 and increasing in accordance with the opening of the HCC campus, USDA facility, and number of operating businesses in the business park.

State of Hawaii costs would include highway frontage work, health inspections of food service establishments and other minor oversight duties. An allowance of $250,000 per year was made for these items, increasing to the stabilized level as the park is built out.

Per Capita Costs

An alternative method for determining public costs is through per capita expenditures incurred by the State of Hawaii and Hawaii County in accordance with the de facto population area of the jurisdiction. This is founded on the principal that each individual on the island equitably benefits from all governmental costs, regardless of type or focus throughout the day, with each new member of the community (whether resident or visitor) creating a proportionate new cost burden in their daily home and working life.

As previously noted, this is an atypical application as most costs are viewed as accruing to residential aspects of a persons lifestyle and land use. We have included it as a means of demonstrating the overall public fiscal impact potential of the proposed subject project even when viewed from this maximum potential cost perspective. We consider this as setting the upper limit on all public costs (actual, indirect and inferred).

According to the state Department of Budget and Finance database,[3] the state expects to spend a total of $7.43 billion on services, salaries, infrastructure, and financing in fiscal 2004. The total de facto population in the state on an average daily basis at year-end 2003 was about 1,463,735 persons, including residents, tourists, and military personnel.

The per capita expenditure by the state will thus be about $5,076 for 2004, a slight decrease from 2003. From 1979 to 2004, state government expenditures have increased at a rate of about four percent annually compounded.

The stabilized average daily worker population on-site at the subject at build-out (including HCC, USDA and University Park Phase II) will be 2,461 persons, a figure reached in year 30 of the development model. Assuming that each worker spends about one-quarter of their life on the job (or at their place of employment), the allocated state cost per worker would be $1,269 per year. The total annual "costs" to the public purse at stabilization by the project using the per capita allowance method would be $3.12 million in constant year 2004 dollars.

Analyzed on a similar basis, Hawaii County's budget for the island government in fiscal year 2003-2004[4] is $221,086,063, which represents an escalation over time of about four percent compounded annually since 1995.

The current de facto population on the Big Island is some 178,506 persons. The resulting de facto per capita county expenditure for this year is therefore anticipated to be $1,239.

Using a 25 percent of total county cost share as being attributable to each worker while on the job, the average annual amount spent by Hawaii County to support the workers within the proposed UHH Mauka Lands Master Plan components is $310 per worker.

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(3) "Executive Branch All Funds Appropriations by Department (FY 04)."
(4) "Summary of Revenues and Appropriations by Funds (FY 2003-04)."

Application of this figure to the total on-site worker population at subject build out would be $762,295 annually in costs to the county government on a stabilized basis.

Total Public Costs -- On an actual cost basis, which we believe to be the preferred analytical method for a non-residential project with a business park as a primary component, the state and county expenses associated with the subject development apart from operating government facilities would range from $51,420 in year 4 of the project (the first year of business occupancy) to a stabilized maximum of $1,028,400 at build-out in year 30 in year 2004 dollars.

On a per capita allowance basis, the direct, indirect and inferred costs, the total governmental costs at build-out to the state and county would be $3.89 million annually.

Public Fiscal Benefits

Real Property Taxes -- The HCC campus and USDA facilities are assumed to be exempt from real property taxes as state and federal ownerships. Similarly, a meaningful portion of the University Park Phase II tenants will also be non-profit, eleemosynary, trust and/or public concerns who also qualify for real property tax exemptions. This is the case thusfar for all of the initial tenants in the first phase of the park. We have assumed that two-thirds of the tenants in the second phase of the park would be subject to property taxes, a level which will solidify as the later stages of the project are filled by more market-oriented applications. Property taxes paid by these "for profit" landowners in the subject project were calculated using the 2003-2004 tax rates for both land and buildings, improved and unimproved.

Assessed values for the taxable subdivided subject lots are based on an equivalent fee simple land value (whether lots are sold or leased) of $7 per square foot. The most valuable lots would be those having direct arterial frontage/exposure or located near the entrance points. The improvement assessments are based on the projected development/construction costs of

the finished buildings. This may result in a slight understatement of assessments on the improvements, as market value often exceeds reproduction expense.

It was estimated the land would be classified as business/industrial and be taxed at the rate of $9.85 annually per $1,000 of assessed value. The improvements are also ascribed a tax rate of $9.85 per $1,000 of assessment.

It is assumed that the subdivided University Park lots are not subject to taxation while under UHH ownership. For the two-thirds of the park properties considered taxable, the assessed values of the underlying lot and finished improvements are added as of the year of their construction.

All real property value of the subject holding is assumed to be vested in the completed "salable/leaseable" components, with no assessment placed against open spaces, roads, or other community systems.

The total real property tax to be paid to Hawaii County in 2004 dollars ranges from $72,643 in year 4 of the development model, to a stabilized level of $1,888,719 at build-out in year 29 and beyond. The aggregate real property taxes paid over the 30-year study time-frame will be $27.4 million.

State Income Tax -- The state will receive income taxes from two sources:

- the wages of the workers associated with the construction, maintenance, and operation of the UHH Mauka Lands Master Plan components (including the HCC and University Park and HCDA facilities); and

- the corporate profits from contractors and suppliers serving the construction and maintenance phases of the development, and as generated by the for-profit, on-going University Park operations.

According to DBEDT data, individual State of Hawaii income tax liability as a ratio to gross income has ranged from 5.5 to 5.9 percent during the past decade, with the more current figures tending toward the mid to upper-end of the range. We have employed an effective tax rate of 5.80 percent of gross income for individual workers and full-time residents.

The effective tax rate for the corporate income is estimated at 2.00 percent of gross operating profits, based on available DBEDT statistics.

We have assumed there are no corporate profit/taxes for the HCC and USDA components of the master plan. Among University Park Phase II operations, it was estimated that some two-thirds would be for-profit entities (see real property tax sections) and that about half of all the businesses would be sufficiently profitable so as to be subject to income taxes.

The total income tax revenues to be received by the state are projected at $209,454 in the first year of construction (year 2 of our model) increasing to a maximum level at year 30 of $9.4 million annually in constant 2004 dollars.

On a stabilized basis, after build-out, the permanent on-site, building maintenance and off-site workers, and for-profit University Park Phase II operating businesses, would pay an annual state income tax of $9.4 million. Over the 30-year modeling period, the cumulative income taxes paid are estimated at $152.3 million.

State General Excise Tax -- This 4.166 percent of expenditures tax was applied against:

- the total estimated University Park Phase II construction contract costs;

- the total gross "sales" (or business activity) of the University Park Phase II businesses; and

- the discretionary expenditures of the worker population of the subject (estimated at 50 percent of total wages).

For projection purposes, it was assumed all University Park Phase II operations whether private or mixed public/private enterprises will generally be subject to excise taxes on their daily operations. Conversely, it is assumed the large majority of HCC student expenditures are spent at on-campus locations (bookstore and food services) which are exempt from excise tax collection.

The anticipated state excise tax receipts arising from the subject development grow from an estimated $75,223 in the first year of development to a peak of $6.6 million. Over the 30-year study period, the receipts total $102.6 million and stabilize at circa $6.6 million per year.

We have not included any excise tax revenues associated with the direct, local "multiplier effect" expenditures on the Big Island, or those created in the secondary market by the suppliers to the operating businesses or secondary worker expenditures.

Total Public Benefits (Revenues) -- In constant 2004 dollars, the aggregate annual tax revenues flowing from the subject development at full project build-out range from:

- $72,643 to $1,888,719 per year for Hawaii County, stabilizing over time at the higher figure, totaling $27.4 million over the 30-year modeling projection model;

- $284,677 to $15,941,295 annually for the State of Hawaii, stabilizing at $15.9 million per year, and cumulatively at $254.9 million over the 30-year forecast period; and

- $284,677 to $17,830,414 per year for total tax receipts (county and state), totaling $282.3 million for the initial 30 years of the UHH Mauka Lands Master Plan community.

Correlation

Table 5 summarizes our costs/benefits findings on both an actual cost and per capita allowance basis for the entire project.

Our public cost/benefit assessment is comprehensively displayed on Table 6, which also contains the correlation of public service costs (per capita basis) with the anticipated tax revenue benefits.

As can be seen, regardless of the cost methodology adopted, in no single year does public coffers suffer a net loss.

CERTIFICATION

The undersigned do hereby certify that, to the best of our knowledge and belief, the statements of fact contained in this report are true and correct. It is further certified that the reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are our personal, impartial, and unbiased professional analyses, opinions, and conclusions. We further certify that we have no present or prospective interest in the property that is the subject of this report, and have no personal interest with respect to the parties involved. We have no bias with respect to the property that is the subject of this report or the parties involved with this assignment. Our engagement in this assignment was not contingent upon developing or reporting predetermined results. Our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the

TABLE 5

SUMMARY OF ANNUAL PRIMARY GOVERNMENTAL TAX RECEIPTS AND PUBLIC SERVICE COSTS
PUBLIC COSTS/BENEFITS SUMMARY TABLE
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

	State of Hawaii							
	Actual Cost Comparison				Per Capita Allocation Comparison			
On Stabilized Basis At Build-Out	Receipts	- Costs	= Net Benefits or (Costs)		Receipts	- Costs	= Net Benefits or (Costs)	
Amount per Year	$15,941,295	$250,000	$16,191,295		$15,941,295	$3,123,009	$19,064,304	

	Hawaii County							
	Actual Cost Comparison				Per Capita Allocation Comparison			
On Stabilized Basis At Build-Out	Receipts	- Costs	= Net Benefits or (Costs)		Receipts	- Costs	= Net Benefits or (Costs)	
Amount per Year	$1,888,719	$778,400	$2,667,119		$1,888,719	$762,295	$2,651,014	

Source: The Hallstrom Group, Inc.

TABLE 6 – Continued

PUBLIC COST/BENEFIT SUMMARY TABLE
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

Development Year	12	13	14	15	16	17	18	19	20	21	22
PUBLIC BENEFITS (Revenues)											
1. REAL PROPERTY TAXES											
Cumulative Assessed Values											
Improvements	$29,864,925	$33,183,250	$36,501,575	$39,819,900	$43,138,225	$46,456,550	$49,774,875	$53,093,200	$56,411,525	$59,729,850	$63,048,175
Land	$6,644,487	$7,382,763	$8,121,039	$8,859,315	$9,597,592	$10,335,868	$11,074,144	$11,812,421	$12,550,697	$13,288,973	$14,027,249
Total Assessed Value	$36,509,412	$40,566,013	$44,622,614	$48,679,215	$52,735,817	$56,792,418	$60,849,019	$64,905,621	$68,962,222	$73,018,823	$77,075,424
TOTAL REAL PROPERTY TAXES	**$653,787**	**$726,430**	**$799,073**	**$871,716**	**$944,359**	**$1,017,002**	**$1,089,645**	**$1,162,288**	**$1,234,931**	**$1,307,574**	**$1,380,217**
2. STATE INCOME TAXES											
Taxable Personal Income	$76,620,737	$68,769,001	$72,806,915	$76,844,828	$87,010,253	$98,930,187	$96,840,590	$100,878,503	$104,916,417	$123,946,950	$131,212,138
Taxable Corporate Profits (2)	$34,883,000	$17,455,650	$17,469,800	$17,483,950	$17,498,100	$17,512,250	$17,526,400	$17,540,550	$17,554,700	$20,042,300	$22,529,900
Personal Taxes Paid	$4,444,003	$3,988,602	$4,222,801	$4,457,000	$5,046,595	$5,737,951	$5,616,754	$5,850,953	$6,085,152	$7,188,575	$7,610,304
Corporate Taxes Paid	$697,660	$349,113	$349,396	$349,679	$349,962	$350,245	$350,528	$350,811	$351,094	$400,846	$450,598
TOTAL STATE INCOME TAXES	**$5,141,663**	**$4,337,715**	**$4,572,197**	**$4,806,679**	**$5,396,557**	**$6,088,196**	**$5,967,282**	**$6,201,764**	**$6,436,246**	**$7,589,421**	**$8,060,902**
3. STATE GROSS EXCISE TAX											
Taxable Transactions											
University Park Construction Contracts (3)	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000
University Park Operations (4)	$34,883,000	$34,911,300	$34,939,600	$34,967,900	$34,996,200	$35,024,500	$35,052,800	$35,081,100	$35,109,400	$40,084,600	$45,059,800
Discretionary Expenditures (5)	$38,310,369	$34,384,500	$36,403,457	$38,422,414	$43,505,126	$49,465,094	$48,420,295	$50,439,252	$52,458,208	$61,970,475	$65,606,069
Total Taxable Transactions	$78,168,369	$74,270,800	$76,318,057	$78,365,314	$83,476,326	$89,464,594	$88,448,095	$90,495,352	$92,542,608	$107,030,075	$115,640,869
TOTAL STATE EXCISE TAX ES	**$3,256,494**	**$3,094,122**	**$3,179,410**	**$3,264,699**	**$3,477,624**	**$3,727,096**	**$3,684,748**	**$3,770,036**	**$3,855,325**	**$4,458,873**	**$4,817,599**
TOTAL GROSS PUBLIC REVENUES											
To Hawaii County (Item #1)	$653,787	$726,430	$799,073	$871,716	$944,359	$1,017,002	$1,089,645	$1,162,288	$1,234,931	$1,307,574	$1,380,217
To State (Items #2 & 3)	$8,398,157	$7,431,837	$7,751,607	$8,071,378	$8,874,186	$9,815,291	$9,652,030	$9,971,801	$10,291,571	$12,048,294	$12,878,501
AGGREGATE TAX REVENUES	**$9,051,944**	**$8,158,267**	**$8,550,681**	**$8,943,094**	**$9,818,540**	**$10,832,293**	**$10,741,675**	**$11,134,089**	**$11,526,503**	**$13,355,868**	**$14,258,718**
PUBLIC COSTS (Expenses)											
State			$1,492,344	$1,581,174	$1,670,004	$1,917,459	$2,006,289	$2,095,119	$2,183,949	$2,272,779	$2,412,369
County			$364,266	$385,949	$407,631	$468,032	$489,715	$511,397	$533,080	$554,762	$588,835
TOTAL PUBLIC COSTS			**$1,856,610**	**$1,967,123**	**$2,077,635**	**$2,385,491**	**$2,496,004**	**$2,606,516**	**$2,717,029**	**$2,827,541**	**$3,001,204**
TOTAL NET PUBLIC BENEFITS											
To State	$8,398,157	$7,431,837	$6,259,263	$6,490,204	$7,204,176	$7,897,832	$7,645,741	$7,876,682	$8,107,622	$9,775,515	$10,466,132
To Hawaii County	$653,787	$726,430	$434,807	$485,768	$536,728	$548,970	$599,931	$650,891	$701,852	$752,812	$791,383
AGGREGATE NET BENEFITS	**$9,051,944**	**$8,158,267**	**$6,694,071**	**$6,975,972**	**$7,740,905**	**$8,446,802**	**$8,245,671**	**$8,527,573**	**$8,809,474**	**$10,528,327**	**$11,257,514**

TABLE 6

PUBLIC COST/BENEFIT SUMMARY TABLE
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars

Development Year	1	2	3	4	5	6	7	8	9	10	11
PUBLIC BENEFITS (Revenues)											
1. REAL PROPERTY TAXES (1)											
Cumulative Assessed Values											
Improvements				$3,318,325	$6,636,650	$9,954,975	$13,273,300	$16,591,625	$19,909,950	$23,228,275	$26,546,600
Land	$0	$0	$0	$738,276	$1,476,553	$2,214,829	$2,953,105	$3,691,381	$4,429,658	$5,167,934	$5,906,210
Total Assessed Value	$0	$0	$0	$4,056,601	$8,113,203	$12,169,804	$16,226,405	$20,283,006	$24,339,608	$28,396,209	$32,452,810
TOTAL REAL PROPERTY TAXES	**$0**	**$0**	**$0**	**$72,643**	**$145,286**	**$217,929**	**$290,572**	**$363,215**	**$435,858**	**$508,501**	**$581,144**
2. STATE INCOME TAXES											
Taxable Personal Income		$3,611,274	$8,770,544	$20,365,356	$20,813,757	$32,118,222	$41,942,003	$38,042,726	$42,080,639	$46,118,553	$62,046,117
Taxable Corporate Profits (2)				$2,487,600	$4,975,200	$7,462,800	$9,950,400	$12,438,000	$14,925,600	$17,413,200	$17,427,350
Personal Taxes Paid		$209,454	$508,692	$1,181,191	$1,207,198	$1,862,857	$2,432,636	$2,206,478	$2,440,677	$2,674,876	$3,598,675
Corporate Taxes Paid				$48,752	$99,504	$149,256	$199,008	$248,760	$298,512	$348,264	$348,547
TOTAL STATE INCOME TAXES	**$0**	**$209,454**	**$508,692**	**$1,230,943**	**$1,306,702**	**$2,012,113**	**$2,631,644**	**$2,455,238**	**$2,739,189**	**$3,023,140**	**$3,947,222**
3. STATE GROSS EXCISE TAX											
Taxable Transactions											
University Park Construction Contracts (3)			$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000
University Park Operations (4)				$4,975,200	$9,950,400	$14,925,600	$19,900,800	$24,876,000	$29,851,200	$34,826,400	$34,854,700
Discretionary Expenditures (5)		$1,805,637	$4,385,272	$10,182,678	$10,408,878	$16,059,111	$20,971,002	$19,021,363	$21,040,320	$23,059,276	$31,023,058
Total Taxable Transactions	$0	$1,805,637	$9,360,272	$20,132,878	$25,332,278	$35,959,711	$45,846,802	$48,872,363	$55,866,520	$62,860,676	$70,852,758
TOTAL STATE EXCISE TAX ES	**$0**	**$75,223**	**$389,949**	**$838,736**	**$1,055,343**	**$1,498,682**	**$1,909,978**	**$2,036,023**	**$2,327,399**	**$2,618,776**	**$2,951,726**
TOTAL GROSS PUBLIC REVENUES											
To Hawaii County (Item #1)				$72,643	$145,286	$217,929	$290,572	$363,215	$435,858	$508,501	$581,144
To State (Items #2 & 3)		$284,677	$898,641	$2,069,678	$2,362,045	$3,510,194	$4,541,622	$4,491,261	$5,066,588	$5,641,916	$6,898,948
AGGREGATE TAX REVENUES	**$0**	**$284,677**	**$898,641**	**$2,142,321**	**$2,507,331**	**$3,728,123**	**$4,832,194**	**$4,854,476**	**$5,502,446**	**$6,150,417**	**$7,480,092**
PUBLIC COSTS (Expenses)											
State				$266,145	$348,975	$437,805	$662,418	$751,248	$840,078	$928,908	$1,017,738
County				$63,499	$85,181	$106,864	$161,690	$183,372	$205,055	$226,737	$248,420
TOTAL PUBLIC COSTS			**$0**	**$323,644**	**$434,156**	**$544,669**	**$824,108**	**$934,626**	**$1,045,133**	**$1,155,645**	**$1,266,158**
TOTAL NET PUBLIC BENEFITS											
To State		$284,677	$898,641	$1,809,533	$2,013,070	$3,072,389	$3,879,204	$3,740,013	$4,226,510	$4,713,008	$5,881,210
To Hawaii County				$9,144	$60,105	$111,065	$128,883	$179,843	$230,804	$281,764	$332,725
AGGREGATE NET BENEFITS	**$0**	**$284,677**	**$898,641**	**$1,818,678**	**$2,073,174**	**$3,183,455**	**$4,008,087**	**$3,919,856**	**$4,457,314**	**$4,994,772**	**$6,213,934**

(1) Assumes that HCC Campus and USDA facilities pay no real property tax and that one-third of University Park Phase II buildings are also tax exempt.
(2) Assumes no corporate profits/taxes for USDA and HCC projects, and that only one-half of the University Park Phase II tenants are for-profit (and profitable) enterprises which pay income taxes.
(3) Assumes HCC and USDA constructions are not subject to sales tax. All constructions in University Park Phase II are assumed to be liable for all appropriate excise taxes.
(4) All University Park Phase II operations are assumed to be private or quasi-private enterprises generally subject to excise taxes in day-to-day operations.
(5) Employee wages being spent in community; estimated at 50 percent of total pay.

Source: The Hallstrom Group, Inc.

value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal. The appraisal analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute, and the Uniform Standards of Professional Appraisal Practice. The use of this report is subject to the requirements of the Appraisal Institute relating to review by duly authorized representatives. The undersigned certify that they have made personal inspections of the property that is the subject of this report. No other persons provided significant real property appraisal assistance other than the undersigned.

The Appraisal Institute conducts programs of continuing education for their designated members. As of the date of this report, James E. Hallstrom, Jr. has completed the requirements of the continuing education program of the Appraisal Institute.

James E. Hallstrom, Jr., MAI, CRE
Hawaii State Certified
General Appraiser, CGA-178
Exp. Date December 31, 2005

Tom W. Holliday

Tom W. Holliday / srt

/as

4480_R01

TABLE 6 -- Continued

PUBLIC COST/BENEFIT SUMMARY TABLE
Economic Impact Analysis and Public Costs/Benefits Assessments of the Proposed UH Hilo Mauka Lands Master Plan
Hilo, Hawaii
In Constant 2004 Dollars
In Constant Mid-Year 2001 Dollars

Development Year	23	24	25	26	27	28	29	30	Stabilized	Total 1 Through 30
PUBLIC BENEFITS (Revenues)										
1. REAL PROPERTY TAXES										
Cumulative Assessed Values										
Improvements	$66,366,500	$69,684,825	$73,003,150	$76,321,475	$79,639,800	$82,958,125	$86,276,450	$86,276,450	$86,276,450	
Land	$14,765,526	$15,503,802	$16,242,078	$16,980,355	$17,718,631	$18,456,907	$19,195,183	$19,195,183	$19,195,183	
Total Assessed Value	$81,132,026	$85,188,627	$89,245,228	$93,301,830	$97,358,431	$101,415,032	$105,471,633	$105,471,633	$105,471,633	
TOTAL REAL PROPERTY TAXES	$1,452,860	$1,525,504	$1,598,147	$1,670,790	$1,743,433	$1,816,076	$1,888,719	$1,888,719	$1,888,719	$27,386,420
2. STATE INCOME TAXES										
Taxable Personal Income	$120,263,432	$124,301,346	$128,339,259	$132,377,173	$136,415,087	$140,453,000	$144,490,914	$146,611,131	$146,611,131	$2,427,931,052
Taxable Corporate Profits (2)	$25,017,500	$27,565,100	$29,992,700	$32,480,300	$34,967,900	$37,455,500	$39,943,100	$42,430,700	$42,430,700	$574,369,550
Personal Taxes Paid	$6,973,279	$7,209,478	$7,443,677	$7,677,876	$7,912,075	$8,146,274	$8,380,473	$8,503,446	$8,503,446	$140,820,001
Corporate Taxes Paid	$500,350	$550,102	$599,854	$649,606	$699,358	$749,110	$798,862	$848,614	$848,614	$11,487,391
TOTAL STATE INCOME TAXES	$7,475,629	$7,759,580	$8,043,531	$8,327,482	$8,611,433	$8,895,384	$9,179,335	$9,352,060	$9,352,060	$152,307,392
3. STATE GROSS EXCISE TAX										
Taxable Transactions										
University Park Construction Contracts (3)	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000	$4,975,000			$134,325,000
University Park Operations (4)	$50,035,000	$55,010,200	$59,985,400	$64,960,600	$69,935,800	$74,911,000	$79,886,200	$84,861,400	$84,861,400	$1,113,856,100
Discretionary Expenditures (5)	$60,131,716	$62,150,673	$64,169,630	$66,188,586	$68,207,543	$70,226,500	$72,245,457	$73,305,565	$73,305,565	$1,213,965,526
Total Taxable Transactions	$115,141,716	$122,135,873	$129,130,030	$136,124,186	$143,118,343	$150,112,500	$157,106,657	$158,166,965	$158,166,965	$2,462,146,626
TOTAL STATE EXCISE TAX ES	$4,796,864	$5,088,186	$5,379,557	$5,670,934	$5,962,310	$6,253,687	$6,545,063	$6,589,236	$6,589,236	$102,573,628
TOTAL GROSS PUBLIC REVENUES										
To Hawaii County (Item #1)	$1,452,860	$1,525,504	$1,598,147	$1,670,790	$1,743,433	$1,816,076	$1,888,719	$1,888,719	$1,888,719	$27,386,420
To State (Items #2 & 3)	$12,272,493	$12,847,761	$13,423,088	$13,998,416	$14,573,743	$15,149,071	$15,724,398	$15,941,295	$15,941,295	$254,880,420
AGGREGATE TAX REVENUES	$13,725,293	$14,373,264	$15,021,235	$15,669,205	$16,317,176	$16,965,146	$17,613,117	$17,830,014	$17,830,014	$282,266,840
PUBLIC COSTS (Expenses)										
State	$2,501,199	$2,590,029	$2,678,859	$2,767,689	$2,856,519	$2,945,349	$3,034,179	$3,123,009	$3,123,009	$45,375,633
County	$610,517	$632,200	$653,882	$675,565	$697,247	$718,930	$740,612	$762,295	$762,295	$11,075,731
TOTAL PUBLIC COSTS	$3,111,716	$3,222,229	$3,332,741	$3,443,254	$3,553,766	$3,664,279	$3,774,791	$3,885,304	$3,885,304	$56,451,364
TOTAL NET PUBLIC BENEFITS										
To State	$9,771,234	$10,257,732	$10,744,229	$11,230,727	$11,717,224	$12,203,722	$12,690,219	$12,818,286	$12,818,286	$209,504,787
To Hawaii County	$842,343	$893,304	$944,264	$995,225	$1,046,185	$1,097,146	$1,148,106	$1,126,424	$1,126,424	$16,310,689
AGGREGATE NET BENEFITS	$10,613,577	$11,151,035	$11,688,493	$12,225,951	$12,763,410	$13,300,868	$13,838,326	$13,944,710	$13,944,710	$225,815,477

THE HALLSTROM GROUP INC
REAL ESTATE CONSULTANTS & APPRAISERS

PROFESSIONAL BACKGROUND AND SERVICES

The Hallstrom Group, Inc. is a Honolulu based independent professional organization that provides a wide scope of real estate consulting services throughout the State of Hawaii with particular emphasis on valuation studies. The purpose of the firm is to assist clients in formulating realistic real estate decisions. It provides solutions to complex issues by delivering thoroughly researched, objective analyses in a timely manner. Focusing on specific client problems and needs, and employing a broad range of tools including after-tax cash flow simulations and feasibility analyses, the firm minimizes the financial risks inherent in the real estate decision making process.

The principals and associates of the firm have been professionally trained, are experienced in Hawaiian real estate, and are actively associated with the Appraisal Institute and the Counselors of Real Estate, nationally recognized real estate appraisal and counseling organizations.

The real estate appraisals prepared by The Hallstrom Group accomplish a variety of needs and function to provide professional value opinions for such purposes as mortgage loans, investment decisions, lease negotiations and arbitrations, condemnations, assessment appeals, and the formation of policy decisions. Valuation assignments cover a spectrum of property types including existing and proposed resort and residential developments, industrial properties, high-rise office buildings and condominiums, shopping centers, subdivisions, apartments, residential leased fee conversions, special purpose properties, and vacant acreage, as well as property assemblages and portfolio reviews.

Market studies are research-intensive, analytical tools oriented to provide insight into investment opportunities and development challenges, and range in focus from highest and best use determinations for a specific site or improved property, to an evaluation of multiple (present and future) demand and supply characteristics for long-term, mixed-use projects. Market studies are commissioned for a variety of purposes where timely market information, insightful trends analyses, and perceptive conceptual conclusions or recommendations are critical. Uses include the formation of development strategies, bases for capital commitment decisions, evidence of appropriateness for state and county land use classification petitions, fiscal and social impact evaluations, and the identification of alternative economic use/conversion opportunities.

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PROFESSIONAL QUALIFICATIONS OF JAMES E. HALLSTROM, JR., MAI, CRE

Business Background

President	The Hallstrom Group, Inc. Honolulu, Hawaii (1980 - Present)
Former Senior Vice President and Treasurer	Hastings, Martin, Hallstrom and Chew, Ltd., Honolulu, Hawaii (1972-1980)
Former Real Property Appraiser and Analyst	Administration, Inc., a subsidiary of C. Brewer and Company, Limited Honolulu, Hawaii (1971-1972)
Former Senior Real Property Appraiser and Analyst	Opitz Realty, Madison, Wisconsin (1969-1971)

National Designations and Memberships

- CRE Designation (1998) - The Counselors of Real Estate
- MAI Designation (1976) - American Institute of Real Estate Appraisers
- SRPA Designation (1975) - Society of Real Estate Appraisers

The American Institute of Real Estate Appraisers (AIREA) and the Society of Real Estate Appraisers (SREA) consolidated in 1991, forming the Appraisal Institute (AI).

Education

- M.S. (Real Estate Appraisal and Investment Analysis) 1971, University of Wisconsin at Madison
- B.A. (Economics) 1969, Brigham Young University at Provo
- Additional numerous specialized real estate studies in connection with qualifying for national professional designations, and uninterrupted Continuing Education.
- Completed Continuing Education requirements with the Appraisal Institute through December 31, 2002.

Professional Involvement

- Former President and Officer for Hawaii AIREA and SREA Chapters
- Instructor for Society of Real Estate Appraisers Course 101, "Introduction to Appraising Real Property" and Course 201, "Principles of Income Property Appraising"
- Contributing author to the "Hawaii Real Estate Investor"
- Lecturer at many professional seminars and clinics.
- Appointed numerous times as an Arbitrator and Mediator.

Qualified Expert Witness

Federal and State Courts
State Land Use and County Hearings
Arbitration Proceedings

State of Hawaii Certification

Certified General Appraiser, License Number CGA-178, Exp. Date December 31, 2005

Community Service

Active registered member of the Boy Scouts of America; former Director of Le Jardin Academy; former Advisory Board Member of the School of Business, Brigham Young University, Hawaii Campus; Director of Hawaii Reserves, Inc.

PROFESSIONAL QUALIFICATIONS OF THOMAS W. HOLLIDAY

Business Background

Supervisor/ Senior Analyst	The Hallstrom Group, Inc. Honolulu, Hawaii
Former Staff Appraiser	Davis-Baker Appraisal Co. Avalon, Santa Catalina Island, California

Education

- B.A. (Communications/Journalism) 1978 California State University at Fullerton
- SREA Course 201- Principles of Income Property Appraising
- Expert witness testimony before State of Hawaii Land Use Commission and various state and county boards and agencies since 1983.
- Numerous professional seminars and clinics
- Contributing author to Hawaii Real Estate Investor, Honolulu Star Bulletin

On January 1, 1991, the American Institute of Real Estate Appraisers (AIREA) and the Society of Real Estate Appraisers (SREA) consolidated, forming the Appraisal Institute (AI).

Recent Maui Assignments (since 2000)

- Market Study, Economic Impact Analyses and Public Costs/Benefits Assessments
  - -- Wailea Ranch (Master Planned Community)
  - -- Palauea Bay (Resort/Residential)
  - -- Upcountry Town Center (Mixed-Use Planned Development)
  - -- Maui Lani (Residential and Industrial Components of Master Planned Community)
  - -- Maui Business Park, Phase II (Industrial/Commercial)
  - -- Four Seasons Private Estates and Residences Club (Resort/Residential)
  - -- Kualono Subdivision (Residential)
  - -- Kapalua Mauka (Master Planned Community)
  - -- Hailiimailii (Commercial)
- Major Valuation Assignments
  - -- Sheraton Maui Hotel
  - -- Outrigger Wailea Resort Hotel
  - -- Maui Lu Hotel
  - -- Coconut Grove Condominiums
  - -- Palauea Bay Holdings
  - -- Wailea Ranch
  - -- Maui Coast Hotel
  - -- Westin Maui Hotel
  - -- Maui Marriott Hotel
  - -- Waihee Beach

Appendix E

Preliminary Engineering Report

PRELIMINARY ENGINEERING REPORT

FOR THE

PROPOSED UH HILO MAUKA PARCEL

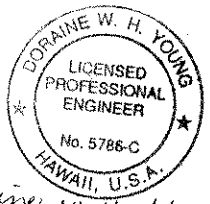
HILO, HAWAII

UHH PROJECT NO. UHH-2002-004

TMK: 2-4-01: Por. of 122

Prepared for:

University of Hawaii at Hilo
Hilo, Hawaii



Doraine W. H. Young

Prepared by:

Engineering Concepts Inc.
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September 2004

TABLE OF CONTENTS

	Page No.
INTRODUCTION	1
Project Description	1
Purpose and Scope	1
Topography	1
Climate	5
Soils	5
ROADWAYS	7
Existing Conditions	7
Proposed Improvements	7
DRAINAGE	12
Existing Conditions	12
Design Criteria	14
Proposed Improvements	16
WATER	17
Existing System	17
Design Criteria	20
Projected Water Demand	22
Proposed Improvements	22
WASTEWATER	27
Existing System	27
Design Criteria	27
Projected Wastewater Flows	28
Proposed Improvements	28
ELECTRICAL, TELEPHONE AND COMMUNICATION SYSTEMS	32
Electrical System	32
Telephone System	34
Communication Systems	37
Roadway Lighting System	39

Page No.

PHASING PLAN 39

Phase 1 39
Phase 2 49
Phase 3 49
Phase 4 50
Phase 5 50

REFERENCES 52

APPENDIX A RUNOFF CALCULATIONS

APPENDIX B WASTEWATER FLOW CALCULATIONS

APPENDIX C PRELIMINARY COST ESTIMATE

TABLES

TABLE 1 UH HILO CAMPUS WATER DEMAND (AS OF 1993) 21

TABLE 2 PROJECTED WATER DEMAND 23

TABLE 3 PROJECTED WATER DEMAND FOR 1.0MG RESERVOIR ALONG PUAINAKO ST. (NEAR SUNRISE ESTATES SUBDIVISION) .. 24

TABLE 4 COST ESTIMATE BY PHASES 51

FIGURES

FIGURE 1 LOCATION MAP 2

FIGURE 2 PROPOSED DEVELOPMENT PLAN 3

FIGURE 3 TOPOGRAPHIC MAP 4

FIGURE 4 SOILS MAP 6

FIGURE 5 ROADWAY ENTRY SECTION 8

FIGURE 6 NOWELO STREET CROSS SECTION 9

Page No.

FIGURE 7 TYPICAL INTERNAL ROADWAY CROSS SECTION 10

FIGURE 8 ROADWAY UTILITY LOCATION 11

FIGURE 9 PROPOSED DRAINAGE SYSTEM 13

FIGURE 10 REGIONAL WATER SYSTEM 18

FIGURE 11 PROPOSED ONSITE WATER DISTRIBUTION SYSTEM 19

FIGURE 12 PROPOSED OFFSITE WATER IMPROVEMENTS 26

FIGURE 13 PROPOSED ONSITE WASTEWATER COLLECTION SYSTEM 30

FIGURE 14 PROPOSED OFFSITE SEWER IMPROVEMENTS 31

FIGURE 15 PROPOSED ELECTRICAL SYSTEM 35

FIGURE 16 PROPOSED TELEPHONE SYSTEM 36

FIGURE 17 PROPOSED TELEVISION SYSTEM 38

FIGURE 18 PROPOSED COMMUNICATIONS SYSTEM 40

FIGURE 19 PROPOSED ROADWAY LIGHTING SYSTEM 41

FIGURE 20 ROADWAY PHASING PLAN 42

FIGURE 21 DRAINAGE SYSTEM PHASING PLAN 43

FIGURE 22 ONSITE WATER SYSTEM PHASING PLAN 44

FIGURE 23 OFFSITE WATER IMPROVEMENTS PHASING PLAN 45

FIGURE 24 ONSITE WASTEWATER COLLECTION SYSTEM PHASING PLAN 46

FIGURE 25 OFFSITE SEWER IMPROVEMENTS PHASING PLAN 47

FIGURE 26 ELECTRICAL AND TELECOMM PHASING PLAN 48

INTRODUCTION

Project Description

The University of Hawaii at Hilo (UHH) 300-acre Mauka Parcel (UHH Mauka Parcel), which includes the existing United States Department of Agriculture (USDA) site, is located to the west or mauka of the existing UH Hilo Campus and University Park (see Figure 1). The site is bounded by Puainako Street Extension to the south, Mohouli Street Extension to the north, Komohana Street to the east and the existing Sunrise Estates subdivision to the west (TMK 2-4-01:122).

The UHH Mauka Parcel involves the expansion of the University Park (for research and technology), future university expansion, and the relocation of Hawaii Community College (Hawaii CC). As shown on Figure 2, the project area is approximately 300 acres, which includes the USDA site (approximately 30.0 acres). The USDA site is comprised of the Pacific Basin Agricultural Research Center (PBARC) and the Institute of Pacific Islands Forestry (IPIF).

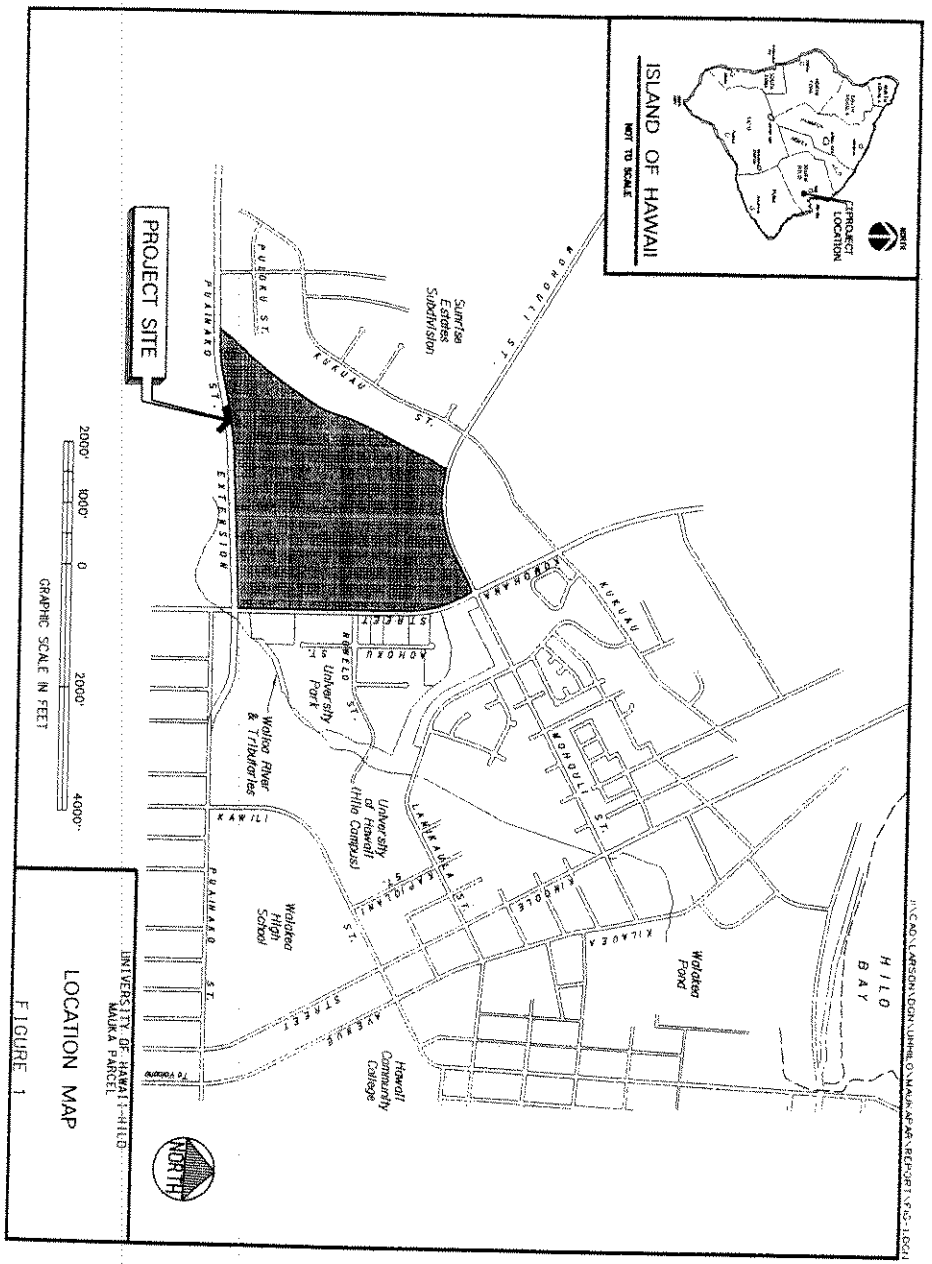
Access to the University Park will be primarily from Komohana Street at the intersection with Nowelo Street. In the future, an additional access point will be from the Mohouli Street Extension. Access to Hawaii CC will be from the Puainako Street Extension or the Nowelo Street Extension.

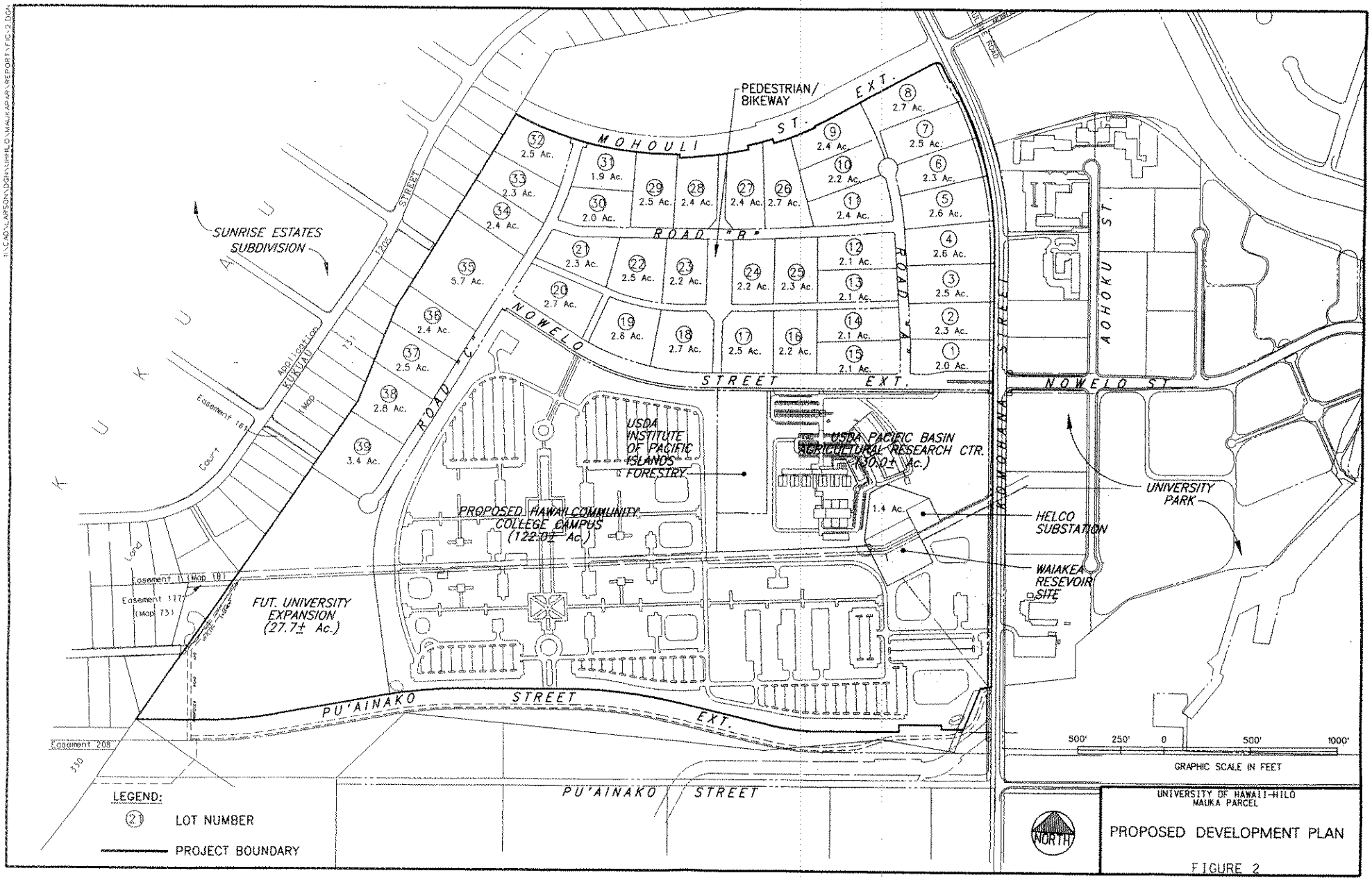
Purpose and Scope

The purpose of this report is to identify the infrastructure requirements for the proposed development, and to establish the basis of design from which future construction plans should be prepared.

Topography

The project slopes from west to east. The elevation of the site varies from about 450 feet above mean sea level at the southwest corner to about 280 feet at the intersection of Mohouli Street Extension and Komohana Street (see Figure 3). In general, the slope of the project site ranges from five to ten percent. Isolated areas throughout the project site have slopes greater than 15 percent.

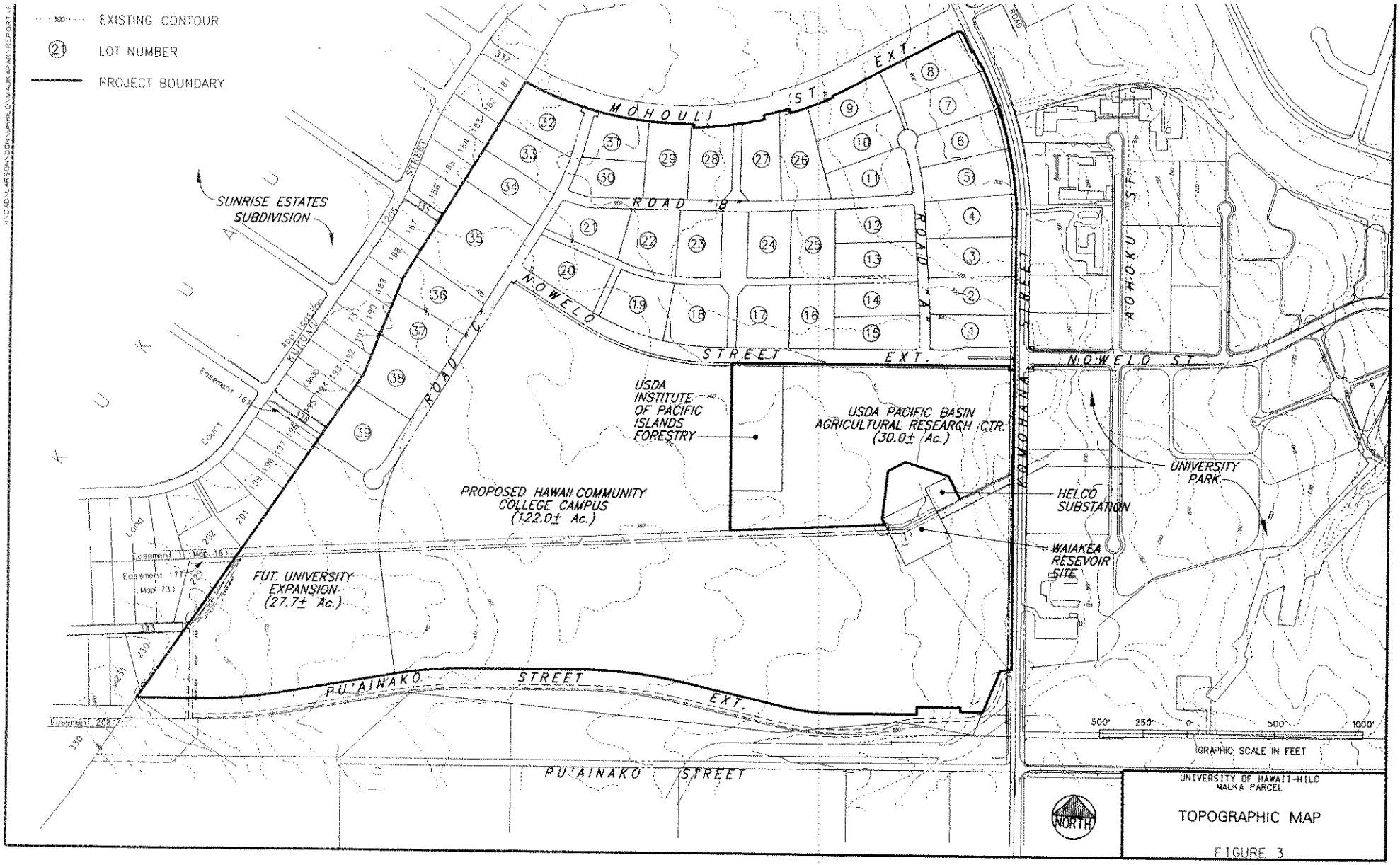




UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL

PROPOSED DEVELOPMENT PLAN

FIGURE 2



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MAUKA PARCEL

TOPOGRAPHIC MAP

FIGURE 3

The project site is densely covered with various shrubs, weeds, grasses and trees. The majority of growth is the ohia trees and uluhe fern. There are also thickets of melastoma and strawberry guava shrubs. Most of this is original vegetative growth after the latest lava flow.

Climate

Hilo, located on the eastern (windward) side of the island, has an average annual rainfall of approximately 141 inches, or 10 to 15 inches per month. Daytime temperatures range from the upper 70's to the low 80's, while temperatures at night range from the low 60's to the upper 70's. Hilo is usually subjected to northeasterly (onshore) winds during the day. These wind speeds predominately range from 4 to 12 miles per hour. However, diurnal heating and cooling occasionally gives rise to offshore (southwesterly) breezes at night.

Soils

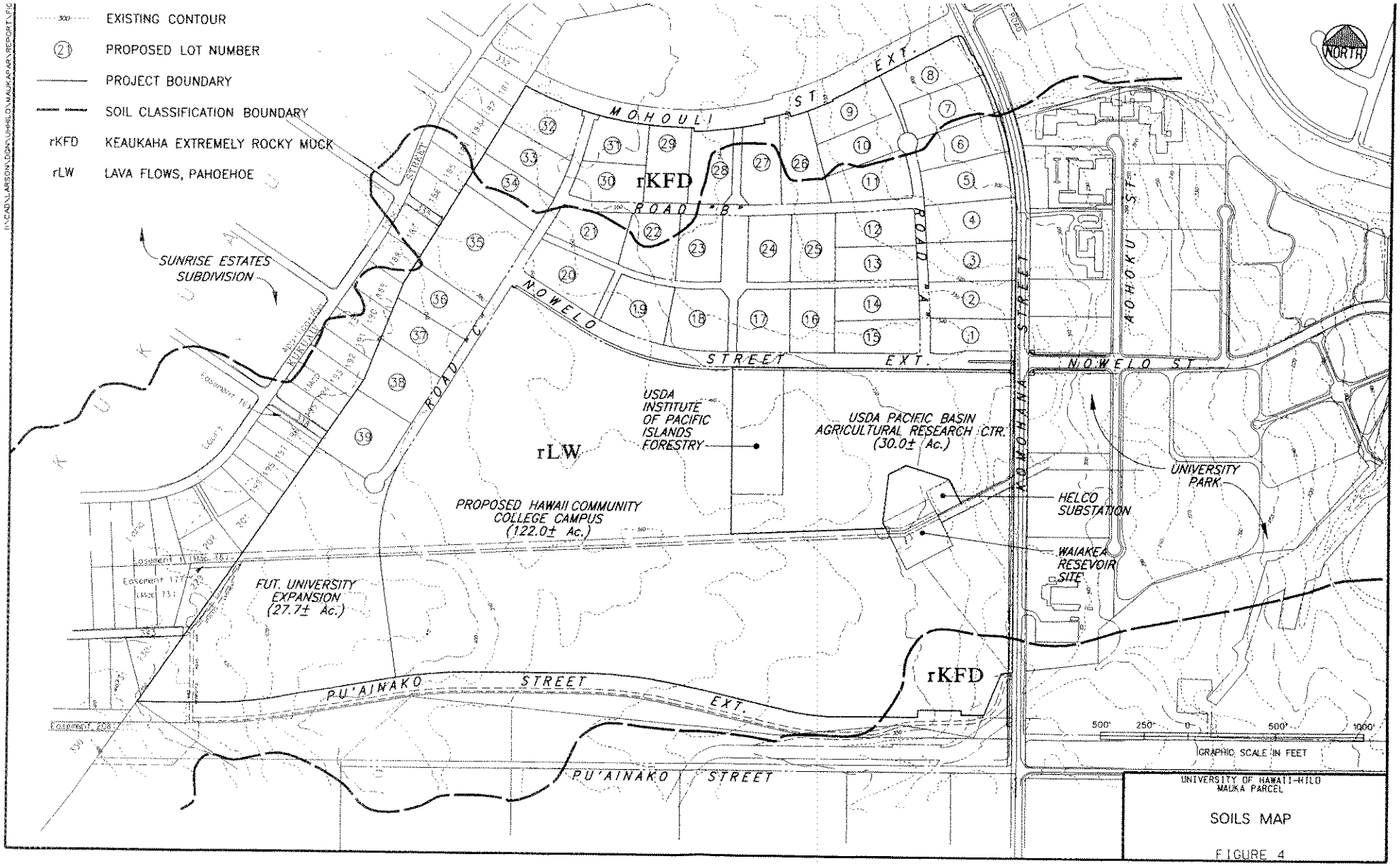
Soil types within the project site are identified in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Island of Hawaii, State of Hawaii, December 1973. The majority of the site consists of lava flows, pahoehoe (rLW) with the northern and southeastern portion of site consisting of Keaukaha extreamely rocky muck (rKFD). The soil types are described below and shown on Figure 4:

Lava flows, pahoehoe (rLW)

This lava has a billowy, glassy surface that is relatively smooth. Pahoehoe lava has no soil covering and is typically bare of vegetation.

Keaukaha extremely rocky muck (rKFD)

Consists of well-drained, thin organic soils overlying pahoehoe lava bedrock. These soils occupy the lower elevations of Mauna Loa. The soil above the lava is rapidly permeable. The pahoehoe lava is very slowly permeable, but water moves rapidly through the cracks. Runoff is medium and the erosion hazard is slight.



UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL

SOILS MAP

FIGURE 4

ROADWAYS

Existing Conditions

There are no existing roadways within the project area. Komohana Street, which borders the project site on the east, is a two-lane roadway with an 80-foot right-of-way. Nowelo Street, the main roadway within the UHH University Park, has an 85-foot right-of-way at its intersection with Komohana Street (9 ft. median and 28-ft. wide pavement, 4-ft. wide planter strips and 6-ft. wide walkways on either side) and tapers to a 60-foot right-of-way. Puainako Street, which borders the project site on the south, was recently extended 4.5 miles west as a two-lane road with a 120-foot right-of-way between Komohana Street and Saddle Road (State Hwy 200, also designated Kaumana Drive). Mohouli Street, which borders the project site on the north is a two-lane road with a varying right-of-way (from 60-ft. to 135 ft.). It extends from Kilauea Avenue in the east to Ainako Avenue in the lower Kaumana community.

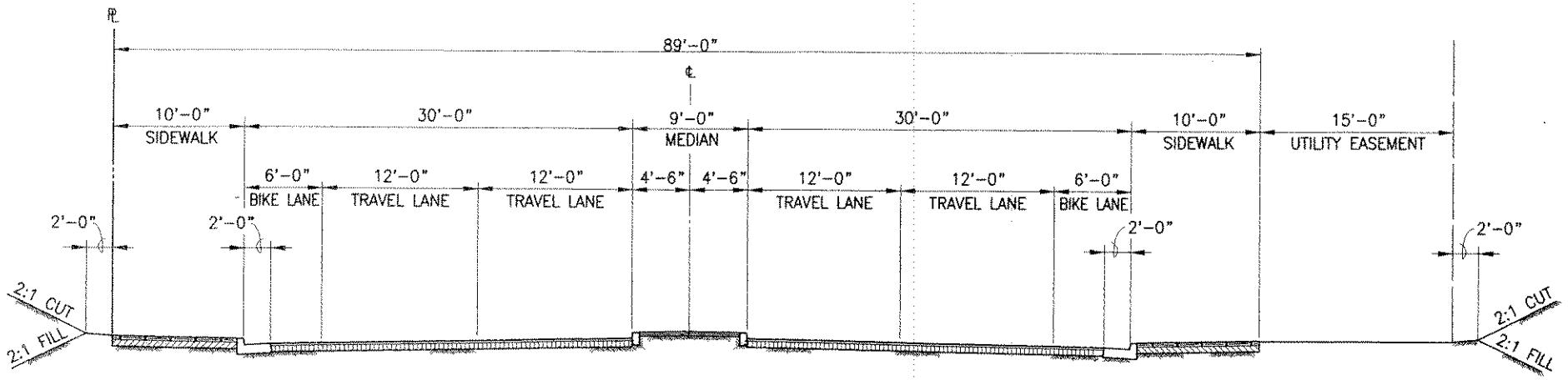
Proposed Improvements

The right-of-way width for the proposed Nowelo Street Extension at the intersection with Komohana Street is 89 feet with 69-ft. wide pavement curb-to-curb (will provide two 12-ft. travel lanes and a 6-ft. wide bike lane in each direction and a 9-ft. median) and 10-ft. wide walkways on either side (see Figure 5). A 15-ft. wide utility easement is proposed on the north side of Nowelo Street. The right-of-way width for the proposed Nowelo Street after the entry is 80 feet with 60-ft. wide pavement curb-to-curb (will provide two 12-ft. travel lanes and a 6-ft. wide bike lane in each direction) and 10-ft. wide walkways on either side (see Figure 6).

The right-of-way width for the proposed internal roadways, Roads "A", "B", and "C", is 60 ft. with 40-ft. wide pavement (one 12-ft. travel lane and one 8-ft. parking lane in each direction) and 10-ft. wide walkways on either side (see Figure 7). A 10-ft. wide utility easement is proposed on both sides of the roadway.

The utilities in the proposed roadways will conform to the utility location shown in the County of Hawaii Standard Details (see Figure 8).

The intersection of Komohana Street and Nowelo Street will be signalized. A 100-ft. long left-turn storage lane will be added to Komohana Street to provide left-turn movements to the UHH Mauka Parcel. Depending on future traffic volumes, the left-turn storage lane may need to be extended later to provide sufficient capacity at an acceptable level of service.



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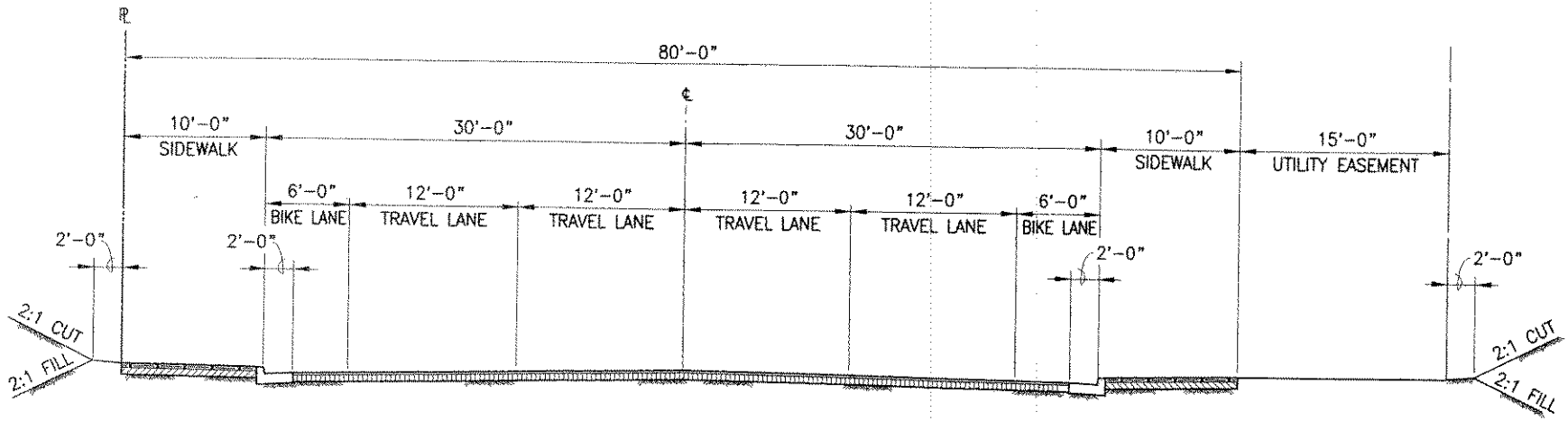
ROADWAY ENTRY SECTION

FIGURE 5



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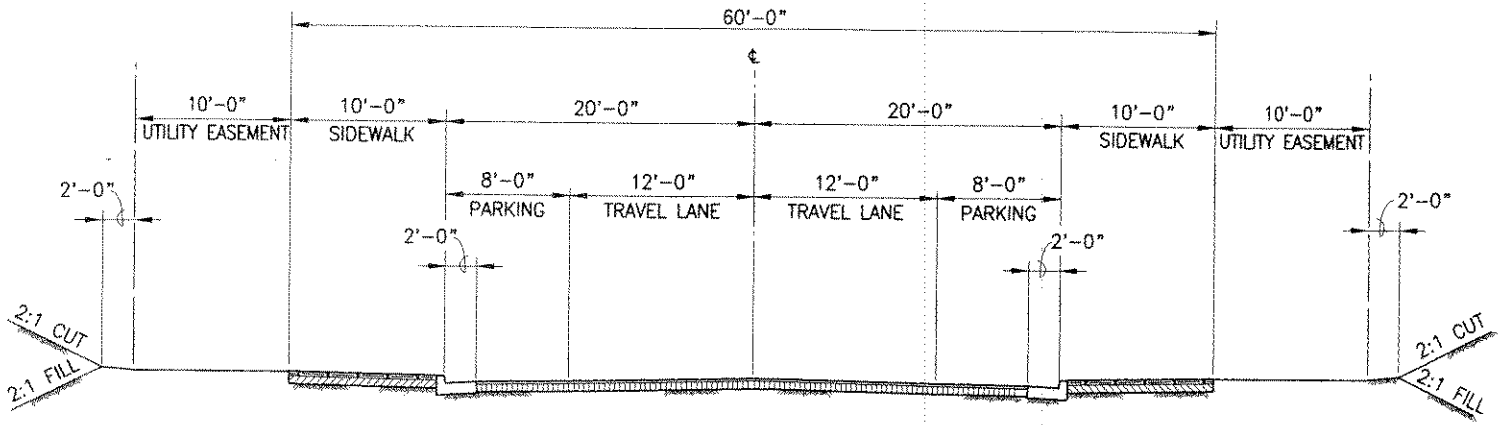
NOWELO STREET
CROSS SECTION

FIGURE 6



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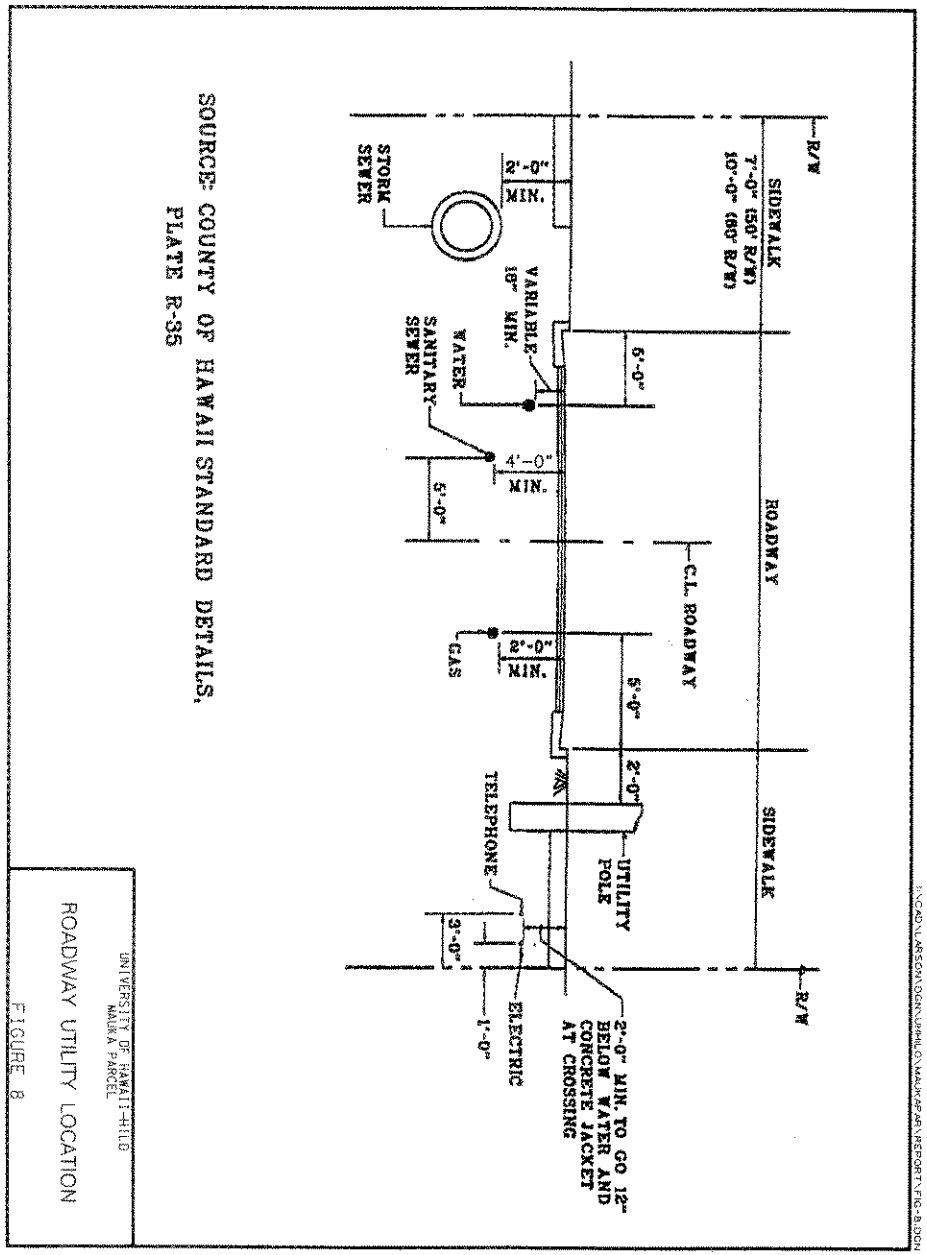
TYPICAL INTERNAL
ROADWAY CROSS SECTION

FIGURE 7



SOURCE: COUNTY OF HAWAII STANDARD DETAILS, PLATE R-35

UNIVERSITY OF HAWAI'I-HILO
MAUKA PARCEL

ROADWAY UTILITY LOCATION

FIGURE 8

Road "A" is an internal roadway that will connect to the Nowelo Street Extension. It will provide access to Lots 1 through 15. Road "C" is located at the end of the Nowelo Street Extension and is proposed to connect to Mohouli Street. This will provide a secondary access to the University Park Expansion. Based on the "Traffic Impact Assessment Report for the University of Hawaii at Hilo Komohana-Mauka, Hawaii Community College Komohana Campus dated August 2004," a median refuge lane on Mohouli Street should be provided to allow drivers the opportunity to first cross the eastbound traffic and then merge with westbound traffic. Road "B" is an internal roadway that connects Roads "A" and "C" and provides access to Lots 21 through 30.

Two major access points are proposed for Hawaii CC. One access point is from the Puainako Street Extension and the other access point is from the Nowelo Street Extension. A secondary entry is proposed from Komohana Street with a restricted right-turn movement.

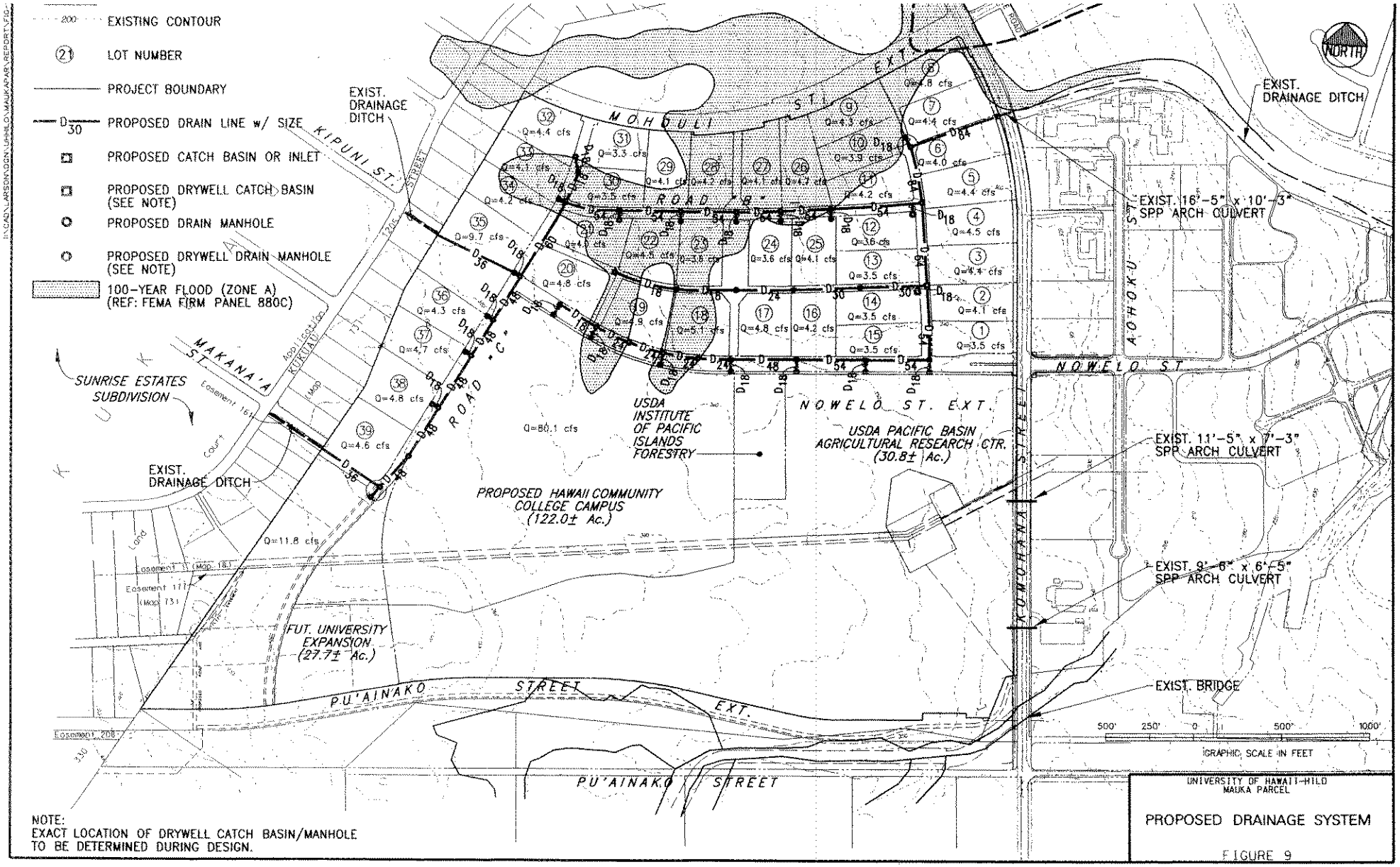
When the project area is fully developed, Komohana Street may be widened to a 4-lane roadway with two through lanes in each direction depending on the traffic volumes. A separate left-turn lane from the Nowelo Street Extension to Komohana Street should be constructed when the UHH Mauka Parcel is approximately 50% occupied and traffic volumes should be evaluated at that time to determine if the left-turn storage lane is warranted.

DRAINAGE

Existing Conditions

There are two major drainageways located below or makai of the UHH Mauka Parcel in the University Park area. One major drainageway is Waiakea Stream which traverses along the southern and eastern boundaries of the UH Hilo University Park, and the other drainageway is a drainage ditch along the northern boundary of the University Park which separates the park from the University Heights subdivision. The drainage ditch discharges into Waiakea Stream near Lanikaula Street Bridge.

There are four drainage crossings along Komohana Street (see Figure 9). One is a lined channel under the bridge over Waiakea Stream, the second is an arch culvert that outlets into an unlined channel that has been diverted along the western boundary of the Komohana Agricultural Complex and discharges into Waiakea Stream, the third is an arch culvert approximately 250 feet south of the Waiakea Reservoir Access Road which discharges into the University Park, and the fourth is an arch culvert located near the intersection of Mohouli Street



NOTE:
EXACT LOCATION OF DRYWELL CATCH BASIN/MANHOLE TO BE DETERMINED DURING DESIGN.

UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL

PROPOSED DRAINAGE SYSTEM

FIGURE 9

and Komohana Street which discharges into the drainage ditch along the northern boundary of the University Park.

Since the property is undeveloped, surface runoff follows natural slope conditions. However, past observations of the drainage crossings at Komohana Street have noted that very little runoff from the UHH Mauka Parcel appears to discharge into the University Park area even during periods of heavy rain. There are two lined trapezoidal drainage ditches located in Kipuni and Makana'a Streets in the Sunrise Estates subdivision that discharge into the UHH Mauka Parcel during times of heavy rainfall. The drainage ditches are downstream of existing drywell inlets.

The majority of the project site is designated Zone X by the Flood Insurance Rate Map (FIRM), indicating areas outside of the 500-year floodplain. A portion of the UHH Mauka Parcel is designated Zone A, indicating areas inside the 100-year floodplain (no base flood elevations determined). However, due to the construction of the Sunrise Estates subdivision west or mauka of the project site and its related drainage improvements, the area contributing to the Zone A floodplain appears to be greatly reduced. When the lots affected by the Zone A designation are developed, a detailed flood study should be performed at that time to determine the 100-year floodplain. If it differs from what is shown on the FIRM, then a Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) should be applied for. Waiakea Stream is designated Zone AE which indicates that base flood elevations have been determined, while the drainage ditch located along the northern boundary of the University Park is designated Zone A which indicates that base flood elevations have not been determined.

Design Criteria

Hydrologic Criteria

The hydrologic criteria used in this report are based on the "Storm Drainage Standard" of the Department of Public Works, County of Hawaii, October 1970. The following list summarizes the hydrologic criteria used:

1. Design Storm Recurrence Interval
   - Tm = 10 years for onsite areas
   - Tm = 50 years for onsite areas with sump condition

   - Tm = 100 years for major drainageway (drainage ditch located along the northern boundary of University Park)
2. Determination of Runoff Quantity
   - Rational Method (Q=ciA) for onsite drainage system
   - Plate 6 (Design Curve for Peak Discharge vs. Drainage Area (more than 100 acres)) of the Department of Public Works, County of Hawaii, Storm Drainage Standard, October 1970 for major drainageway
3. Rainfall Intensity
   - i = 5.1 in/hr for Tm = 10 years
   - i = 6.3 in/hr for Tm = 50 years
4. Runoff coefficients
   - c = 0.25 for existing conditions of lots [c = 0.07(medium infiltration) + 0.03 (rolling relief) + 0.0 (high vegetal cover, 50-90%) + 0.15 (agricultural development)]
   - c = 0.95 for roadways
5. Drywell capacity = 6 cfs

All facilities constructed within the UHH Mauka Parcel will not be allowed to discharge more than the pre-development runoff to the roadways, and drywells will be constructed onsite to retain the increased runoff. The overflow will go to the drainage systems in the roadways.

Plate 6 of the Storm Drainage Standard was used to determine the peak discharge for the drainage ditch downstream of the UHH Mauka Parcel. The project site falls along the boundary near Runoff Zones A and C (Plate 6A of the Storm Drainage Standard). The curve for Zone C was used in determining the peak discharge from Plate 6 based on its location and runoff patterns. Also, the peak discharge for Zone C was similar to the peak discharge given in the Flood Insurance Study, County of Hawaii, revised July 16, 1990, for a similar drainage area for Waiakea Stream.

The runoff computations are located in Appendix A.

Hydraulic Criteria

The onsite storm drainage system will be designed in accordance with the "Storm Drainage Standard" of the Department of Public Works, County of Hawaii, October 1970. Hydraulic analysis for pipe culverts will be based on Manning's formula.

Proposed Improvements

Generally, runoff will be collected by drainage systems consisting of catchbasins and pipe drains within the roadway which will ultimately discharge directly into the two existing drainageways located below the project site. To mitigate increases in storm runoff resulting from the impervious surfaces created by roadways, drywell catchbasins/manholes will be constructed intermittently. The drywell catchbasins/manholes will be constructed on the main drain. A drainage system will also be constructed in the pedestrian/bikeway to accommodate the overflow from Lots 16 to 20. A pipe connection will be provided to each lot to convey overflow from the drywells. To convey the runoff from the existing trapezoidal drainage ditches in Kipuni and Makana'a Streets in the Sunrise Estates subdivision, a headwall, drywell inlet, and drain will be constructed in Lots 35 and 39 to connect to the drainage system in Road "C". Drywell catchbasins will also be constructed in Road "C" to mitigate the impact of the offsite runoff.

The drainage system for the University Park Expansion and a portion of Hawaii CC will discharge into the drainage ditch located along the northern boundary of the University Park via the existing arch culvert. The drainage ditch was evaluated to determine the 100-year flood boundary. The flood boundary is located usually within the banks of the ditch. However, consideration should be given to lining the banks of the ditch since velocities exceeding 5 ft/sec are considered erosive. The slope of the ditch is fairly steep for a major portion of its length, resulting in channel flow velocities that exceed 5 ft/sec. In the "Preliminary Engineering Report for the Proposed UH Hilo University Park", it was proposed that the bank along the University Park be lined with 12-inch thick grouted riprap east of the drain outlet for South Aohoku Street as part of the Phase 3 improvements. This should be considered as the UHH Mauka Parcel is developed and runoff from the roadways is discharged to the drainage ditch. Also, as the drainage ditch approaches Waiakea Stream, it enters the floodplain of Waiakea Stream. If the area located west of Waiakea Stream near the drainage ditch is developed, further evaluation should be done to determine how to contain the 100-yr storm within the main channel of Waiakea Stream.

The drainage system for the remainder of Hawaii CC will discharge to Waiakea Stream via the arch culvert near the Komohana Agricultural Complex. The proposed onsite drainage system and runoff quantities are shown on Figure 9.

WATER

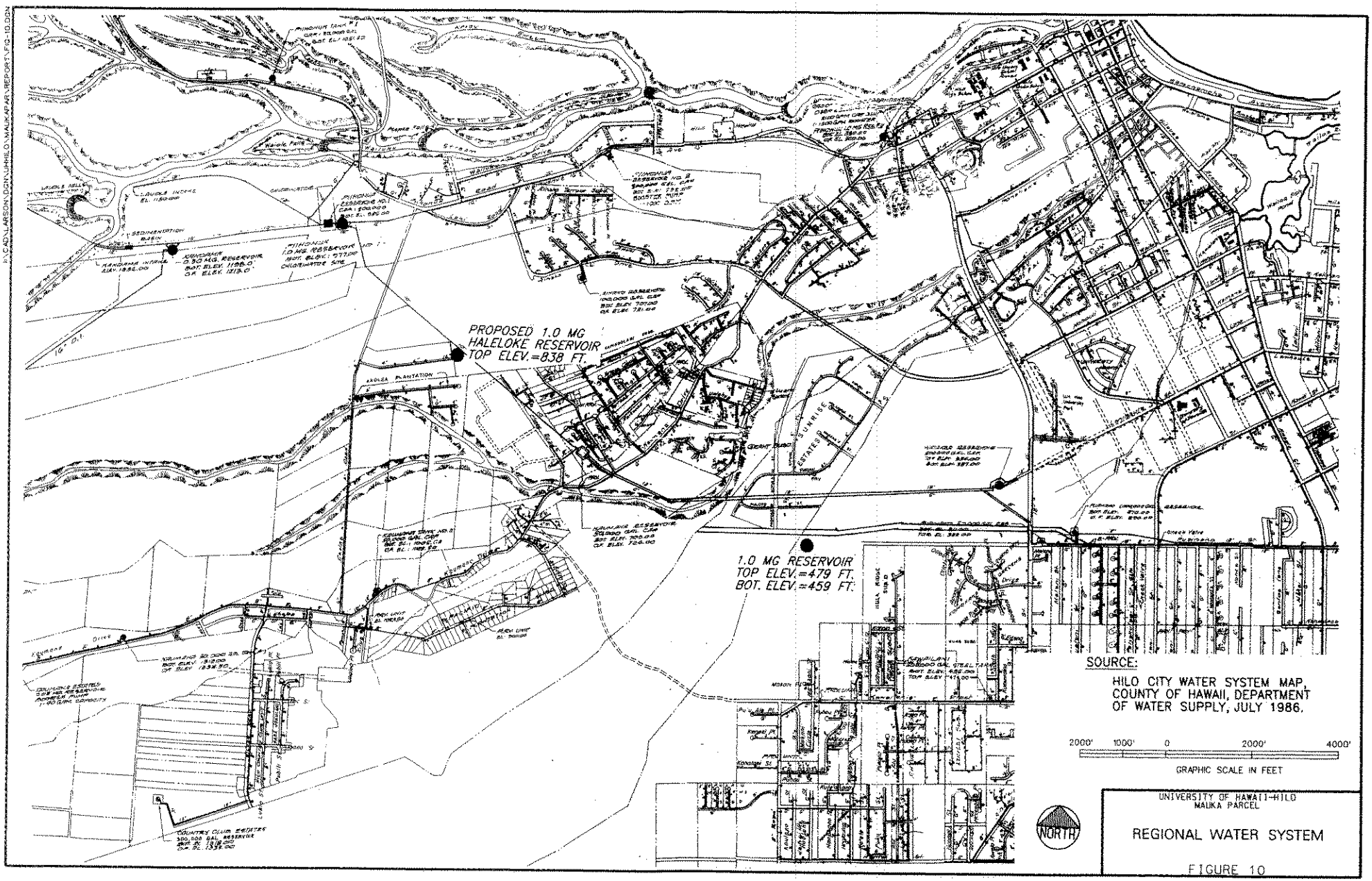
Existing System

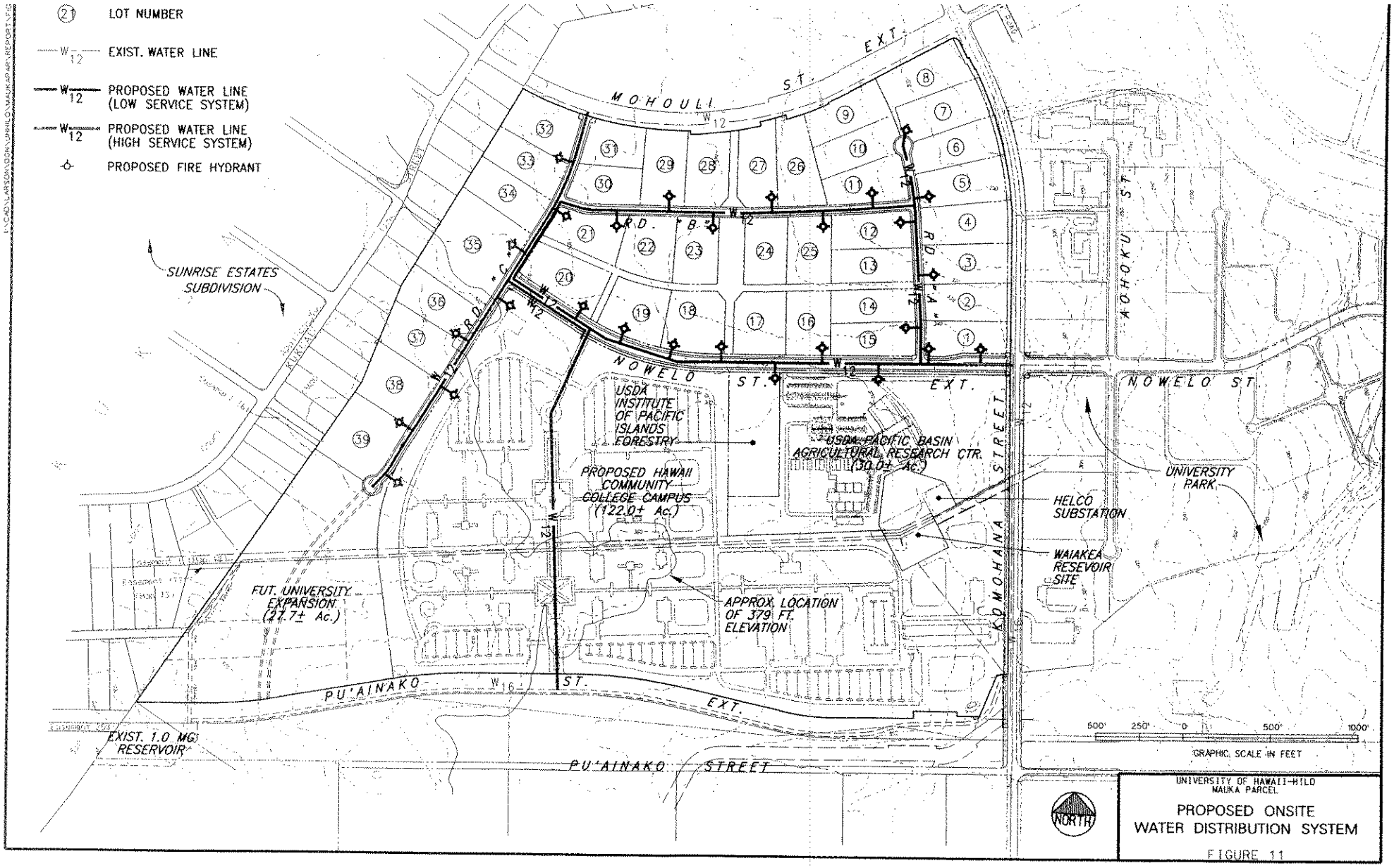
The existing UHH campus and University Park is presently served by the 1.0MG reservoir located along Puainako Street near the Sunrise Estates subdivision (see Figure 10). Although the 1.0MG reservoir is the primary reservoir, the Waiakea Reservoir (0.5MG reservoir with a spillway elevation = 354 ft.) provides a secondary source for the UHH campus through the loop formed between the 8-inch line from Waiakea Reservoir located under Waiakea Stream and Lanikaula Street and the 12-inch line from the 1.0MG Reservoir in the Campus Road. Prior to the UHH campus, there is a pressure reducing valve (PRV) with a setting of 65 psi at an approximate elevation of 204 feet on the 12-inch line from the 1.0MG Reservoir in Nowelo Street. This is equivalent to a reservoir at this location with a spillway elevation of 354 feet (equivalent to the Waiakea Reservoir).

Wells at Piihonua pump water into Piihonua Reservoir No. 3 (a 1.0MG reservoir with a spillway elevation = 300 ft.). A booster pump station at Piihonua Reservoir No. 3 then pumps water up to Piihonua Reservoir No. 2 (a 0.8MG reservoir with a spillway elevation = 646 ft.). Water from Piihonua Reservoir No. 2 flows to Waiakea Reservoir via a PRV located downstream of Piihonua Reservoir No. 2 at elevation 279 ft. The PRV is set at 70 psi which is comparable to a reservoir with a spillway elevation of 441 ft. at the PRV location. From this PRV, the transmission main runs along Komohana Street toward Waiakea Reservoir.

1.0MG Reservoir Located Along Puainako Street Near Sunrise Estates Subdivision

The reservoir is fed by the connection to an existing 12-inch waterline coming from the Kaumana Reservoir (a 50,000 gal reservoir with a spillway elevation = 724 ft.). From this 1.0MG reservoir (spillway elevation = 479 ft.), a 16-inch transmission main runs along the Puainako Street Extension to Komohana Street. The 16-inch transmission main continues along Komohana Street and connects to the 12-inch waterline in Nowelo Street (see Figure 11) from the University Park.


PROPOSED 1.0 MG
HALELOKE RESERVOIR
TOP ELEV.=838 FT.
1.0 MG RESERVOIR
TOP ELEV.=479 FT.
BOT. ELEV.=459 FT.
SOURCE:
HILO CITY WATER SYSTEM MAP,
COUNTY OF HAWAII, DEPARTMENT
OF WATER SUPPLY, JULY 1986.
2000' 1000' 0 2000' 4000'
GRAPHIC SCALE IN FEET
NORTH
UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL
REGIONAL WATER SYSTEM
FIGURE 10



UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL

PROPOSED ONSITE
WATER DISTRIBUTION SYSTEM

FIGURE 11

Design Criteria

Consumption Rate

The consumption rates used for the proposed Mauka Parcel are as follows:

Land Use	Average Daily Demand
Research and Technology Park	2,000 gal/acre*
School Facilities	2,000 gal/acre*
Student Housing**	400 gal/unit

*This rate is 1.77 x the actual UH Hilo water demand determined from DWS meter readings in 1993 (see Table 1).

**Although there are no proposed student housing for the Mauka Parcel, this demand will be used in calculating the proposed water consumption for the existing 1.0MG Reservoir. Average water demand for the student housing is based on the Water System Standards of the Department of Water Supply (DWS), County of Hawaii, 2002 (DWS Water System Standards) for multi-family low rise dwellings.

Fire Flow

Fire flow requirement for school and commercial areas is 2,000 gpm for a duration of 2 hours based on DWS Water System Standards. The fire hydrant spacing is 300 feet.

Demand Factors

Demand factors for the water system are as follows:

Maximum Daily Demand	=	1.5 x average daily demand
Peak Hour Flow	=	5.0 x average daily demand

System Sizing

Distribution Lines

Criteria for sizing the pipes are as follows:

1. Maximum daily flow plus fire flow with a residual pressure of 20 psi at critical fire hydrant.
2. Peak hour flow with a minimum residual pressure of 40 psi.

TABLE 1

UH HILO CAMPUS WATER DEMAND (AS OF 1993)

	Building	Average Daily Demand (GPD)
1.	Hale Kanilehua	4,430
2.	Hale Kehau	18,830
3.	Hale Kauanoe	6,760
4.	Hale Ikena	17,840
5.	Cloud Physics	440
6.	College of Ag	760
7.	UHH Admin Bldg.	80
8.	Learning Resource Center	37,270
9.	Life Science Bldg.	320
10.	Wentworth Bldg.	1,070
11.	Beaumont Exp. Station	950
12.	College of Arts/Science	9,850
13.	Auditorium – Theater	1,000
14.	Bookstore/Computer Center	620
15.	PB 3-4	1,940
16.	Campus Center	17,510
17.	Athletic	9,830
	Total	129,490

Average Daily Demand based on 1993 population of 4,500 students:
129,490 gal/day ÷ 4,500 students ≈ 30 gal/day/student

Average Daily Demand based on campus area of 115 acres:
129,490 gal/day ÷ 115 acres ≈ 1,130 gal/day/acre

Projected Water Demand

Due to the elevation differences within the project site, the water demand is divided into two service zones: a high service zone (elevation above 379 ft.) and a low service zone (elevation below 379 ft.). Refer to Figure 11 for delineation of these water service zones.

A total average daily domestic water demand of approximately 575,900 gallons per day (gpd) is estimated for this project. A breakdown of water requirements by areas is shown on Table 2.

Proposed Improvements

There will be two separate water distribution systems serving the two water service zones.

Low Service System

Areas located below the 379 ft. elevation will be served by a new 12-inch main from the 1.0MG Reservoir. Currently, the maximum daily demand estimated for the UHH Campus and the University Park for the 1.0MG Reservoir is 606,300 GPD based on the ultimate development (see Table 3). The estimated maximum daily demand for the low service zone of the UHH Mauka Parcel is 564,150 GPD bringing the total UHH facilities demand to 1,170,450 GPD. The 1.0MG reservoir will also provide water for the proposed China-U.S. Center located across the existing UHH campus on Kawili Street. The projected maximum daily demand for this facility is 201,150 GPD which brings the projected maximum daily demand for the reservoir to 1,371,603 GPD. Therefore, the 1.0 MG reservoir may not be large enough to serve the total distribution area, including the entire lower half of the Mauka Parcel (reservoir size should meet maximum day consumption). The Waiakea Reservoir also provides service to the UHH Campus, but its storage is primarily allocated to other areas and, therefore, is not included in the above discussion.

As the UHH Mauka Parcel is developed, further evaluation will be required to determine whether a new reservoir is required or if the proposed 2.0MG Piihonua No. 2 Reservoir can be used as a secondary source to service the low service system during emergencies with the use of a PRV located within the UHH Mauka Parcel. The actual water demand should be evaluated at the end of Phase 3 (see Phasing Plan) to determine if additional storage is required.

TABLE 2

PROJECTED WATER DEMAND

LOW SERVICE ZONE (FROM 1.0MG RESERVOIR (ELEV. = 479.0))

Lot No.	Consumption Rate (gal/ac)	Area (ac)	Ave. Daily Demand (GPD)	Max. Daily Demand (GPD)	Peak Flow (GPD)
1 thru 35	2,000	106.8	213,600	320,400	1,068,000
Hawaii Community College	2,000	61	122,000	183,000	610,000
PBARC*			36,000	54,000	180,000
IPIF*			4,500	6,750	22,500
		TOTAL	376,100	564,150	1,880,500

HIGH SERVICE ZONE (FROM PROPOSED PIINOHUA NO. 2 RESERVOIR (MIN. SPILLWAY ELEV. = 550 FT.))

Lot No.	Consumption Rate (gal/ac)	Area (ac)	Ave. Daily Demand (GPD)	Max. Daily Demand (GPD)	Peak Flow (GPD)
36 thru 39	2,000	11.2	22,400	33,600	112,000
Hawaii Community College	2,000	61	122,000	183,000	610,000
Future University Expansion	2,000	27.7	55,400	83,100	277,000
		TOTAL	199,800	299,700	999,000

*Water demand provided by the civil engineer for the project.

The new 12-inch main will be located in the Nowelo Street Extension and will connect to the existing 16-inch line at the intersection of Nowelo and Komohana Streets. 12-inch mains will also be constructed in Roads "A" and "B" (see Figure 11). A 12-inch main will be constructed in Hawaii CC connecting the existing 16-inch main in Puainako Street Extension to the 12-inch main in Nowelo Street Extension to form a loop. Service stubouts will be provided to each lot, including the PBARC and IPIF facilities, with individual meters proposed for each lot. The waterlines are proposed to be dedicated to the Department of Water Supply.

High Service System

Areas located above the 379 ft. elevation will be served by the high service system.

Proposed Reservoir

Piihonua No. 2 Reservoir (800,000 gal capacity) (see Figure 10) will be increased to a 2.0MG reservoir in the future (spillway elevation = 646 ft.). DWS has indicated that the high service system should be served off of this reservoir. The future Haleloke Reservoir, located approximately halfway between the existing Piihonua Reservoir No. 1 and the Kaumana Reservoir, is another option to meet the storage requirement. This proposed reservoir will have a spillway elevation of 838 ft. At the time that lots within the high service zone are developed, the water system should be evaluated again to determine which reservoir should provide the storage requirement for the high service system.

Proposed Distribution System

From Piihonua No. 2 Reservoir, there is an existing 16-inch water main in Wainuenue Avenue until Kaumana Drive where there are 6-inch and 8-inch lines. Waterline improvements in Kaumana Drive are required to increase the line size from Wainuenue Avenue to Mohouli Street Extension (see Figure 12). From the existing 12-inch main in Mohouli Street Extension, it will extend along Road "C" servicing the mauka portion of the University Park Expansion and Hawaii CC.

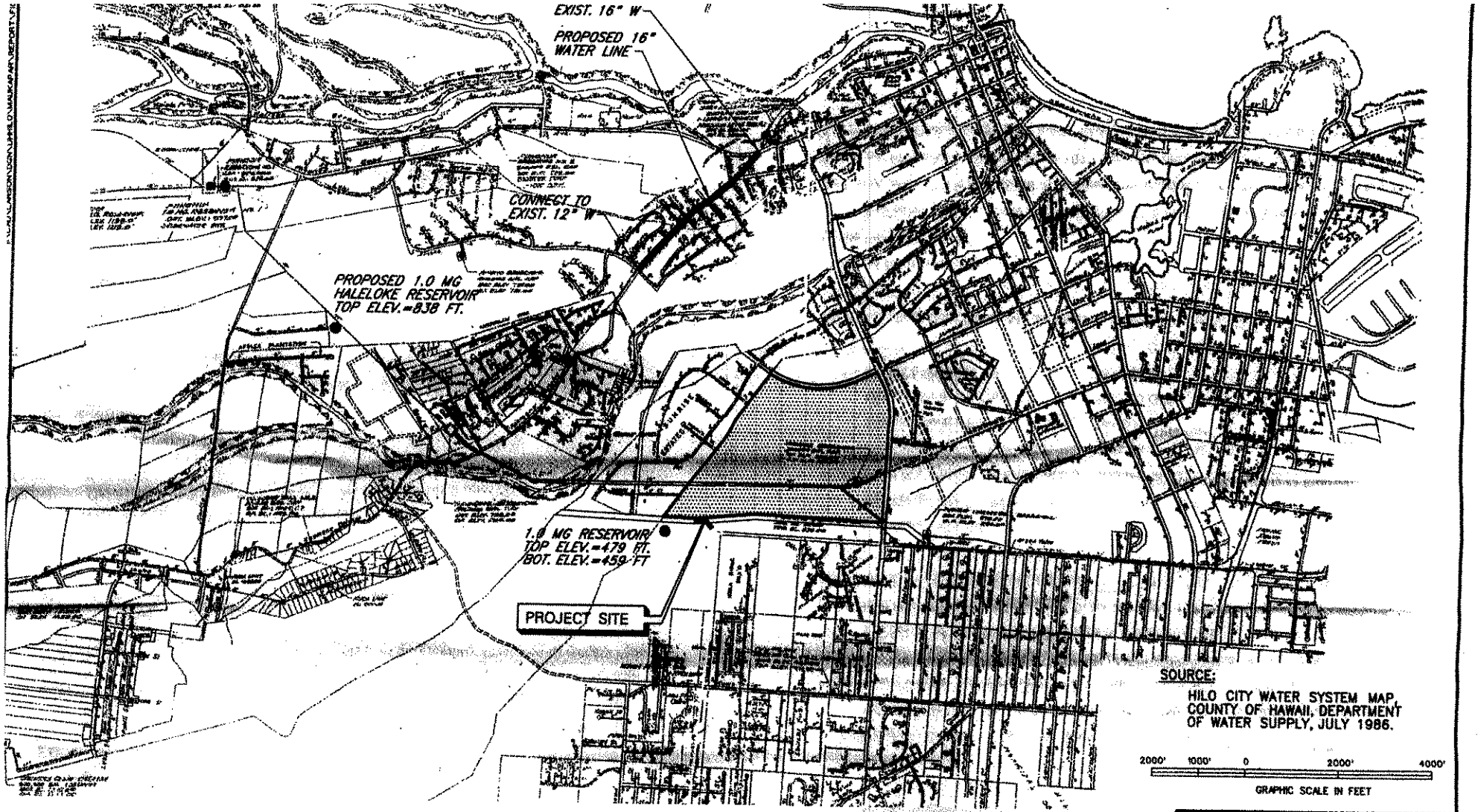
From the future Haleloke Reservoir, a proposed 16-inch transmission man will be extended to existing 8-inch waterlines in Sunrise Estates Subdivision. A proposed 12-inch line will feed the 1.0MG reservoir located on Puainako Street Extension near the

TABLE 3

PROJECTED WATER DEMAND FOR 1.0MG RESERVOIR ALONG PUAINAKO ST. (NEAR SUNRISE ESTATES SUBDIVISION)

Area	Consumption Rate	Quantity	Area (ac)	Ave. Daily Demand (GPD)	Max. Daily Demand (GPD)	Peak Flow (GPD)
UH HILO CAMPUS	30 gal/day/capita	5,000 students*	115	150,000	225,000	750,000
UNIVERSITY PARK						
Research & Technology Lots	2,000 gal/ac		53.5	107,000	160,500	535,000
Student Housing	400 gal/unit	180 units	16.6	72,000	108,000	360,000
Campus Expansion	2,000 gal/ac		37.6	75,200	112,800	376,000
			SUBTOTAL	**404,200**	**606,300**	**2,021,000**
CHINA-U.S. CENTER**						
Commercial	3,000 gal/ac		9.534	28,602	42,903	143,010
Hostel	200 to 400 gal/unit	313 units		90,500	135,750	452,500
Cultural Center	60 gal/day/capita	250 capita		15,000	22,500	75,000
			SUBTOTAL	**134,102**	**201,153**	**670,510**
UH HILO MAUKA PARCEL						
USDA - PBARC				36,000	54,000	180,000
USDA - IPIF				4,500	6,750	22,500
Research & Technology Lots	2,000 gal/ac		106.8	213,600	320,400	1,068,000
Hawaii Community College	2,000 gal/ac		61	122,000	183,000	610,000
			SUBTOTAL	**376,100**	**564,150**	**1,880,500**
			GRAND TOTAL	**914,402**	**1,371,603**	**4,572,010**

*Based on ultimate enrollment of 5,000 students.
**From "Engineering Study for China - U.S. Center" dated March 28, 2002 by SSFM International.



UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL

PROPOSED OFFSITE WATER IMPROVEMENTS

FIGURE 12

Sunrise Estates Subdivision via a pressure regulating valve (PRV). The PRV will be set to establish a pressure head of 724 ft. (similar to the elevation of the existing Kaumana Reservoir). One option would be to connect to the influent line of the 1.0MG reservoir located on Puainako Street Extension if it is determined that the storage for the high service system is the Haleloke Reservoir.

WASTEWATER

Existing System

The existing University Park sanitary sewer system is comprised of 8-inch and 10-inch sewers owned and maintained by the university and is connected to the 8-inch County sewer in Lanikaula Street east of Waiakea Stream. Each lot within the University Park was provided with a sewer service connection. The project site is upland of the presently developed University Park and is not sewered.

Design Criteria

Design Population

School Facilities (Hawaii CC) – 3,000 students

University Park Expansion (including USDA site*) = 148.8 acres @ 40 persons/acre = 5,952 capita (transient)

Future University Expansion – 680 students

Estimated Total Capita = 9,632

*Projected employee counts for the USDA site is 135 for the PBARC facility and 44 for the IPIF facility (approximately 6 persons/acre)

Average Wastewater Flow Quantity

School - 25 gallons per capita per day

University Park Expansion – 30 gallons per capita per day

Maximum Wastewater Flow Factor (MF)

$MF = 5/(P)^{0.2}$ where P = population in thousands

Design Average Flow

Design Average Flow = Average Flow + Dry Weather Infiltration/Inflow

Dry Weather Infiltration/Inflow = Population x 5 gallons per capita per day

Design Maximum Flow

Design Maximum Flow = Average Flow x MF + Dry Weather Infiltration/Inflow

Design Peak Flow Rate

Design Peak Flow = Design Maximum Flow + Wet Weather Infiltration/Inflow

Wet Weather Infiltration/Inflow = Acreage* x 1250 gallons per acre per day

*Area for wet weather infiltration/inflow calculations is assumed to be 80% of the total area since the entire site does not usually contribute to infiltration/inflow.

The design of the sewer system will be in accordance with the "Design Standards of the Department of Wastewater Management, Volume 1, July, 1993", Department of Wastewater Management, City and County of Honolulu.

Projected Wastewater Flows

An average wastewater flow of approximately 207,000 gallons per day (GPD) is estimated for this project. An estimation of tributary flow characteristics is as follows:

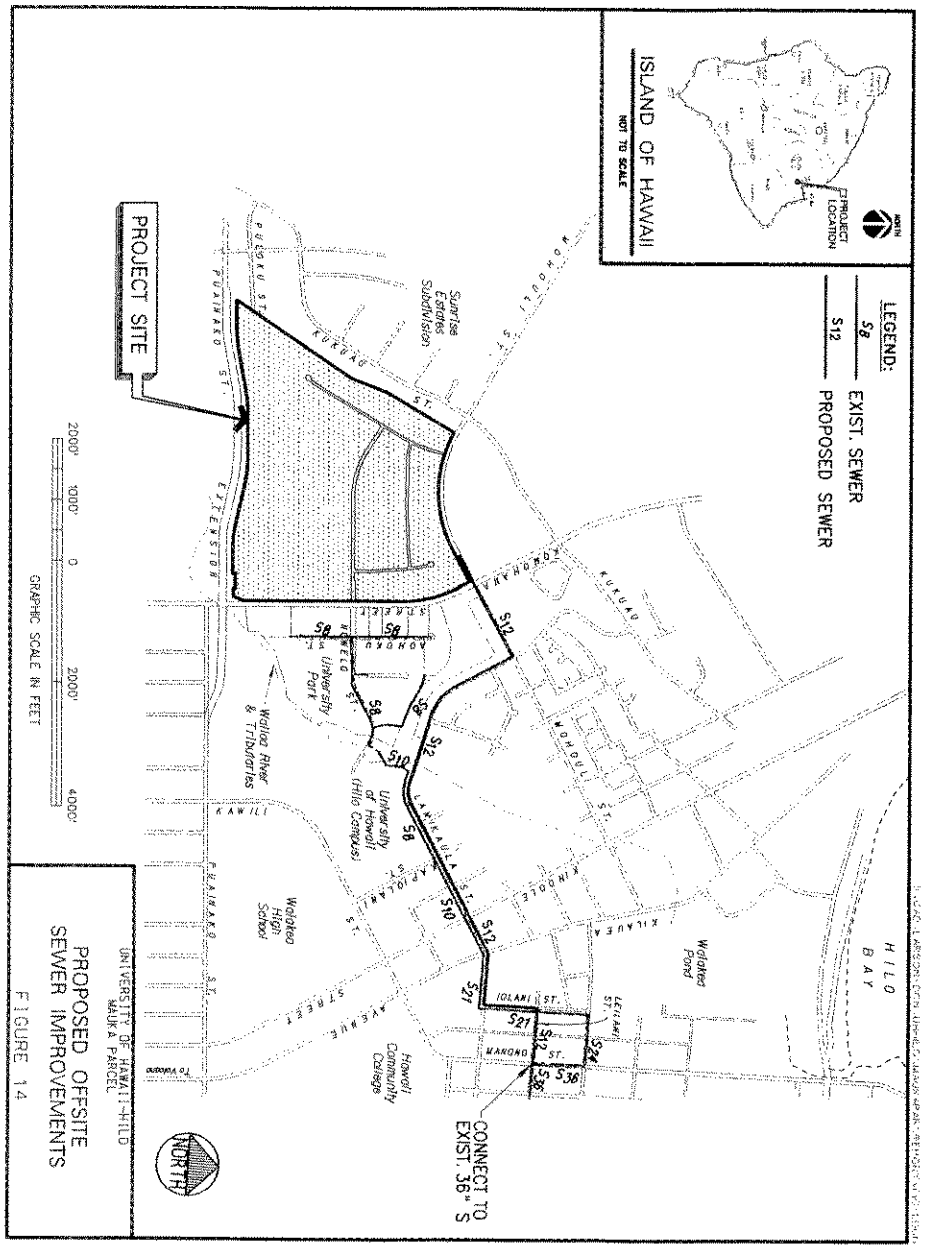
Design Average Flow	244,000 GPD
Design Maximum Flow	731,000 GPD
Design Peak Flow	963,000 GPD

The sewer calculations for the Mauka Parcel is included in Appendix B.

Proposed Improvements

Onsite Improvements

The existing 8-inch sewer in Nowelo Street will be the temporary service connection for the USDA site which is anticipated to complete construction June 2006. Since the University Park is not fully developed (31.7 of the 107.7 acres has been developed with the proposed Mauna Kea Education Center bringing the total number of acres developed to 40.8), the USDA site will



will turn onto Leilani Street and finally connect to the County's existing 36-inch sewer at the intersection of Leilani Street and Manono Street.

The Lanikaula Street route was chosen to address the County's concern that the County sewer downstream of the University Park may be inadequate to accommodate the ultimate development of the University Park. The proposed 12-inch offsite sewer would be a relief sewer that will mitigate the limitations of the existing Lanikaula Trunk Sewer. The proposed alignment in Lanikaula Street could also be beneficial to the future U.S.-China Center on Kawili Street. If additional sewer capacity is required for the U.S.-China Center, a sewer could be constructed along Kapiolani Street to connect to the proposed offsite sewer. The U.S. China Center could participate in the sewer cost downstream of the connection point.

An alternate alignment that was considered was to continue along Mohouli Street until Kilauea Avenue. However, the sewer would need to cross under Waiakea Stream at the intersection of Mohouli and Kinoole Streets. Since the ground between Kilauea Avenue and Kinoole Street is fairly flat, the sewer will have to be deep for a long length. Also, this and any other route would not mitigate the limitations of the existing County Lanikaula Street sewer which is necessary in order to allow the full development of the University Park.

ELECTRICAL, TELEPHONE AND COMMUNICATION SYSTEMS

Electrical System

Existing Electrical Facilities

The Hawaii Electric Light Company, Inc. (HELCO) provides electrical power to the Island of Hawaii. Peak electrical demand currently is 186,700 KW and total generation system capability is 255,100 KW. HELCO's reserve margin is currently at 27% for the entire island and has adequate generation at Komohana Substation to serve the first phase of this development.

There are three levels of transmission voltages to transfer power between areas on Hawaii Island - four cross-island 69 KV, 34.5 KV and 13.8 KV. The cross-island transmission lines are all energized at 69 KV, however, one of the Kaumana to Keamuku transmission lines was constructed for 138 KV. This distribution system basically consists of overhead pole lines and underground systems.

The HELCO Komohana Substation is located on about a half-acre area of land approximately 400 feet from Komohana Street adjacent to the project area in the vicinity of the USDA Pacific Basin Agricultural Research Center (PBARC) site. There are both 69 KV and

12.47 KV overhead electrical lines associated with the substation located in the 50-feet wide utility easement along the southern boundary of the PBARC project site before crossing Komohana Street into the existing University Park Development. The 50-feet wide utility easement also continues west of the Komahana substation, thru the Proposed Hawaii Community College Campus and Future University Expansion. In 1996, HELCO added a 10 MVA substation transformer at Komohana substation to increase the substation capacity to 17.5 MVA to serve existing loads in the area because the original 7.5 MVA transfomer was overloaded. However, this Komohana substation upgrade is not enough to accommodate the load growth anticipated by the subject expansion. Currently, the Komohana 10 MVA and the 7.5 MVA transformers are close to its rated capacity.

Effects on Existing Electrical Facilities

Within the project, new research facilities and a new campus would result in increased demand for electrical power. Although HELCO currently has adequate generation capacity to serve the subject loads in Phase 1, the Komohana substation transformation capacity must be increased to accommodate the future loads. An additional 69 KV to 12.47 KV substation transformer and associated equipment must be added to Komohana substation. In addition, 12.47 KV distribution lines are required to connect the new substation transformer to the subject new loads via Komohana Street. Distribution line easements will be required from the substation to the project site and also within the project site. During the second phase of the UHH Mauka Parcel development, HELCO will assess if an additional transformer will be required at that time.

Proposed Electrical System

The proposed route to serve the UH Mauka Lands will be from Komohana substation via Komohana Street. The new duct system will consist of concrete encased ducts and reinforced concrete manholes and handholes per HELCO requirements. HELCO requires the duct system to be connected to an existing HELCO manhole on Nowelo Street on the east side of Komohana Street. This will connect to a new vacuum switch and switchgear located on Nowelo Street on the west side of Komohana Street that will serve Phases 1 through 4 of the UH Mauka Parcel (see Phasing Plan on Figure 26). Another vacuum switch and switchgear may be added in Phase 5 along Road "C" to feed lots along Road "C" and future lots if HELCO should make a

determination that this is required. Two four-inch and four five-inch ducts will cross Komohana Street and continue to the end of Nowelo Street to provide service to USDA PBARC and Institute of Pacific Island Forestry (IPIF), Hawaii Community College (HCC) and lots along the north side of Nowelo Street. Two four-inch will cross Nowelo Street from a HELCO manhole on the south side of Nowelo Street near the intersection of Nowelo Street and Road "A to feed lots along Roads "A" and "B". Two four-inch and two five-inch ducts will be extended from Nowelo Street to feed Road "C". Roads "A" and "C" will be connected to close the "loop". Service stubouts will be provided to each lot. The proposed electrical system is shown on Figure 15.

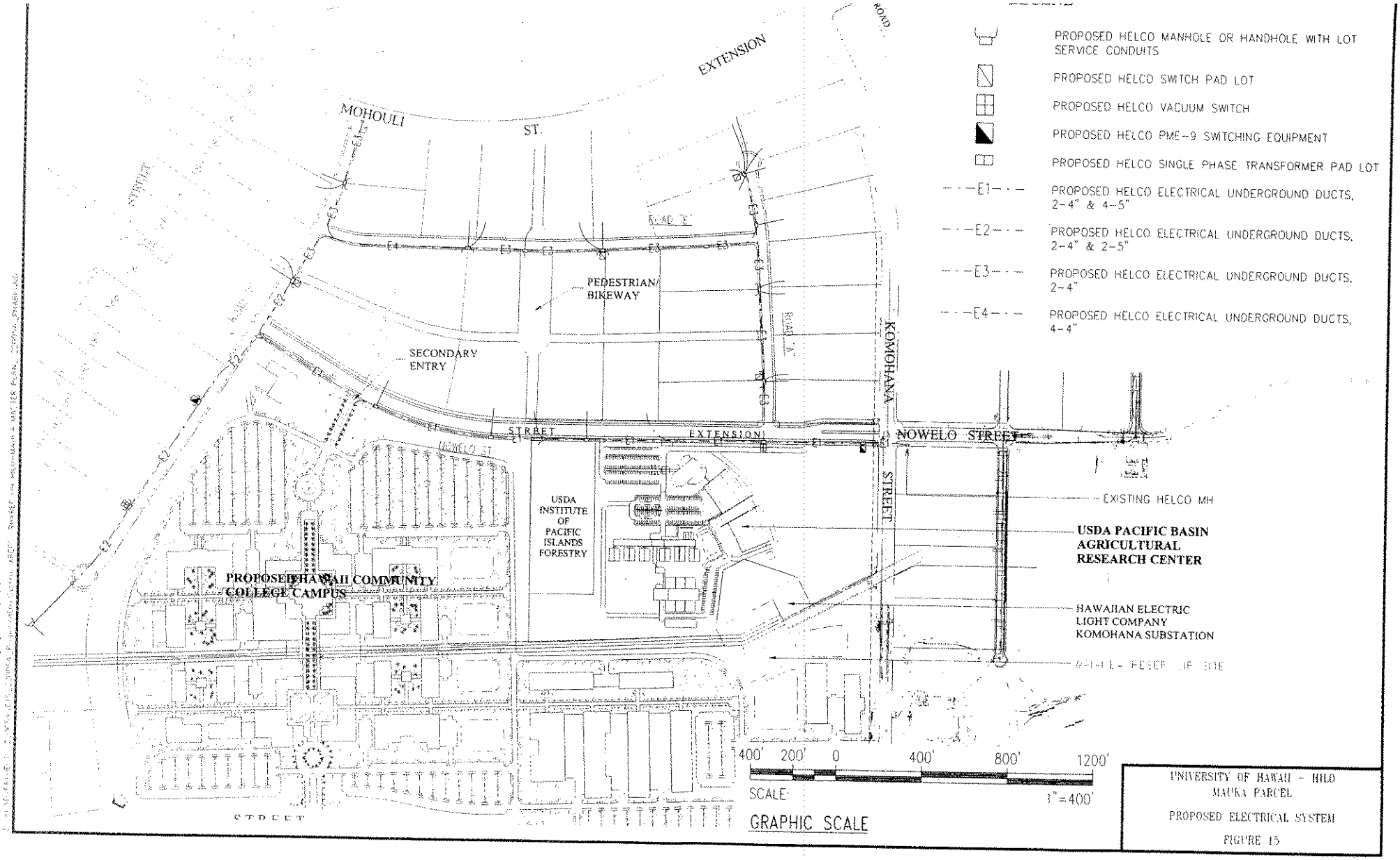
Telephone System

Existing Telephone System

Presently Verizon Hawaii provides telephone service to the nearby University Park area via their central switching station located at the corner of Nowelo and South Aohoku Streets. Per Verizon Hawaii, the existing facilities are adequate to serve the UH Mauka Lands.

Proposed Telephone System

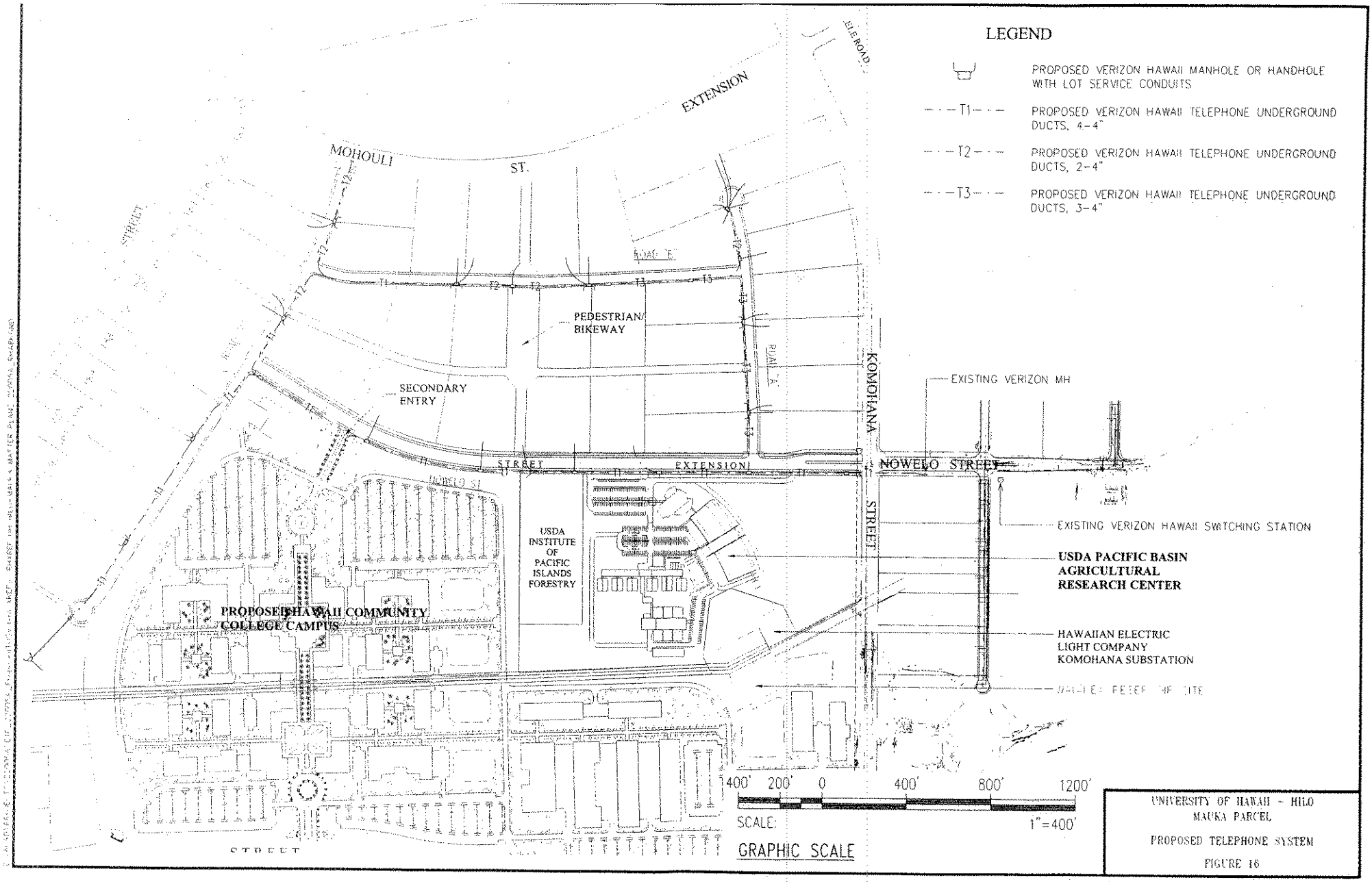
Verizon Hawaii requires the duct system to be connected to an existing Verizon Hawaii manhole on Nowelo Street on the east side of Komohana Street that will connect to the existing switching station. The new duct system will consist of concrete encased ducts and reinforced concrete manholes and handholes per Verizon Hawaii requirements. Four four-inch ducts will cross Komohana Street and continue to the end of Nowelo Street to provide service to USDA PBARC and IPIF, HCC and lots along the north side of Nowelo Street. Four four-inch ducts will cross Nowelo Street from a Verizon Hawaii manhole on the south side of Nowelo Street near the intersection of Nowelo Street and Road "A" to feed lots along Roads "A" and "B". Two four-inch ducts will be extended from Nowelo Street to feed Road "C". Roads "A" and "C" will be connected to close the "loop". Service stubouts will be provided to each lot. The proposed telephone system is shown on Figure 16.



UNIVERSITY OF HAWAII - HILO
MAUKA PARCEL

PROPOSED ELECTRICAL SYSTEM

FIGURE 15



UNIVERSITY OF HAWAII - HILO
MAUKA PARCEL
PROPOSED TELEPHONE SYSTEM
FIGURE 16

Communication Systems

Existing Cable Television System

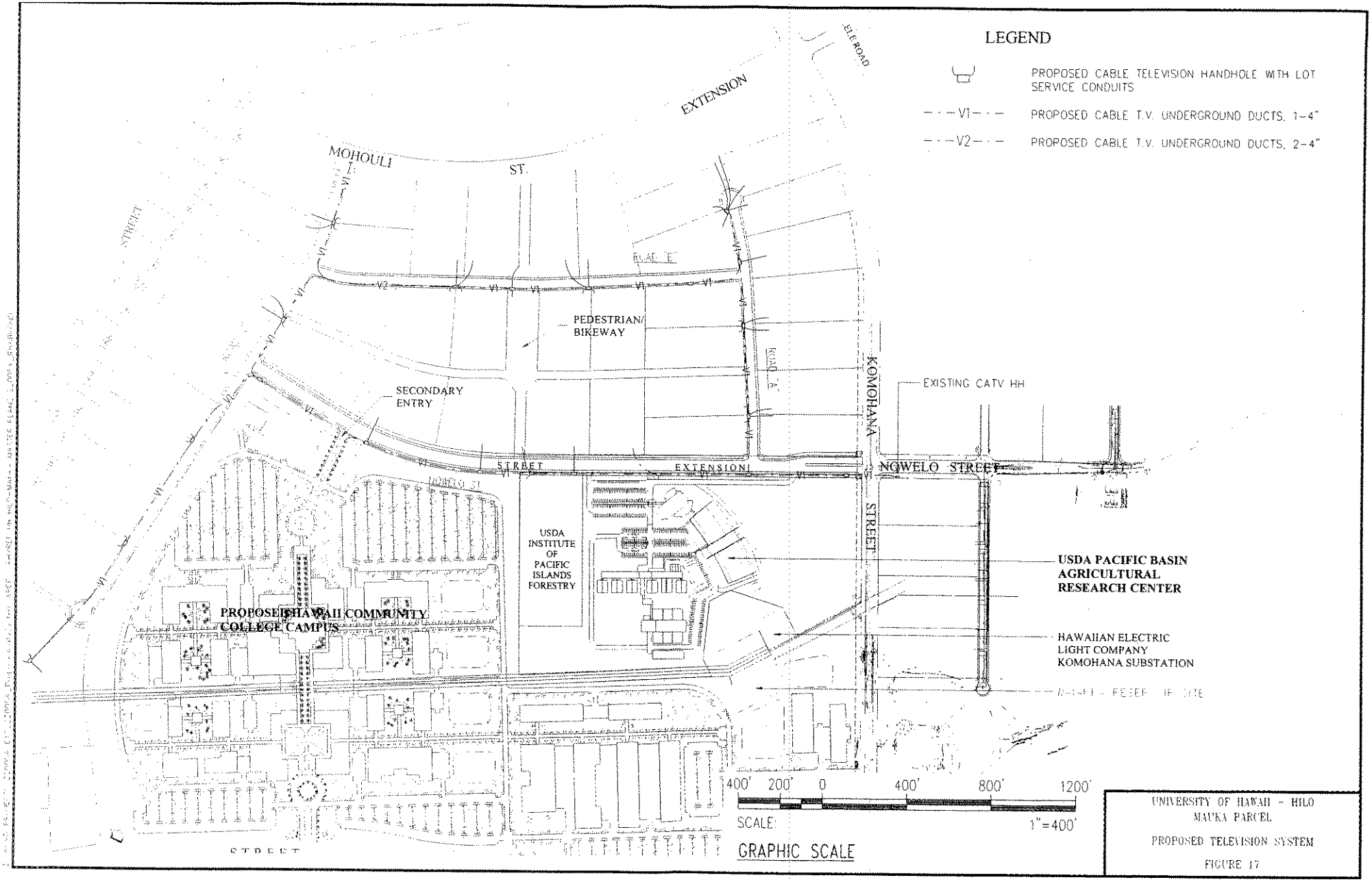
The cable television system is presently being provided by Jones Spacelink from Komohana Street. The service may be adequate to feed the UH Mauka Parcel, but the signal strength within the parcel may need to be upgraded. To boost the signal strength, amplifiers will be located in cable television handholes, as required.

Proposed Cable Television System

The duct system will be connected to an existing cable television handhole on Nowelo Street on the east side of Komohana Street that will connect to existing cable television wiring. The new duct system will consist of concrete encased ducts and reinforced concrete handholes per Jones Spacelink requirements. One four-inch duct will cross Komohana Street and continue to the end of Nowelo Street to provide service to USDA PBARC and IPIF, HCC andlots along the north side of Nowelo Street. One four-inch duct will cross Nowelo Street from a cable television handhole on the south side of Nowelo Street near the intersection of Nowelo Street and Road "A" to feed lots along Roads "A" and "B". One four-inch duct will be extended from Nowelo Street to feed Road "C". Roads "A" and "C" will be connected to close the "loop". Service stubouts will be provided to each lot. The proposed cable television system is shown on Figure 17.

Proposed Communication System

A centralized communications system could be continued from the existing University Park project across Komohana Street to be part of an overall UH Hilo master communications system. The communications system may include: Computer LAN Systems, Public Address System, Energy Management System and Master Clock and Bell system. The duct system will be connected to an existing cable television handhole on the west corner of Nowelo Street and South Aohoku Street intersection. The new duct system will consist of concrete encased ducts and reinforced concrete handholes. Four four-inch ducts will cross Komohana Street and continue to end of Nowelo Street to provide service to USDA PBARC and IPIF, HCC and lots along the north side of Nowelo Street. Four four-inch ducts will cross Nowelo Street from a cable television handhole on the south side of Nowelo Street near the intersection of Nowelo Street and Road "A" to feed lots along Roads "A" and "B". Two four-inch ducts will be extended



UNIVERSITY OF HAWAII - HILO
MAUKA PARCEL

PROPOSED TELEVISION SYSTEM

FIGURE 17

from Nowelo Street to feed Road "C". Roads "A" and "C" will be connected to close the "loop". Service stubouts will be provided to each lot. The proposed communication system is shown on Figure 18.

Roadway Lighting System

Proposed Roadway Lighting System

Roadway, walkway and landscape lighting will be designed in conformance with Hawaii County's Outdoor lighting Ordinance No. 88-122 due to the Mauna Kea Observatory requirement regarding outdoor lighting and its effects on astronomical research. The proposed roadway lighting for the UHH Mauka Parcel will be designed per standards and recommendations from the Illuminating Engineering Society Handbook. The minimum average foot-candle level for the Nowelo Street extension will be 0.9 and 0.6 for Roads "A", "B" and "C". All lighting will maintain a maximum 3 to 1 uniformity ratio. Uniformity ratio is defined as the ratio of average foot-candle to minimum foot-candle (lowest point) taken in a specified area and expresses how evenly the illumination is distributed. Generally, a lower uniformity ratio indicates more even illumination and less dark spots.

The roadway lighting system will consist of steel roadway lighting standards, 30 feet high, low pressure sodium luminaire and underground secondary feeders. Each roadway luminaire will be equipped with a photocontrol switch and cut-off distribution.

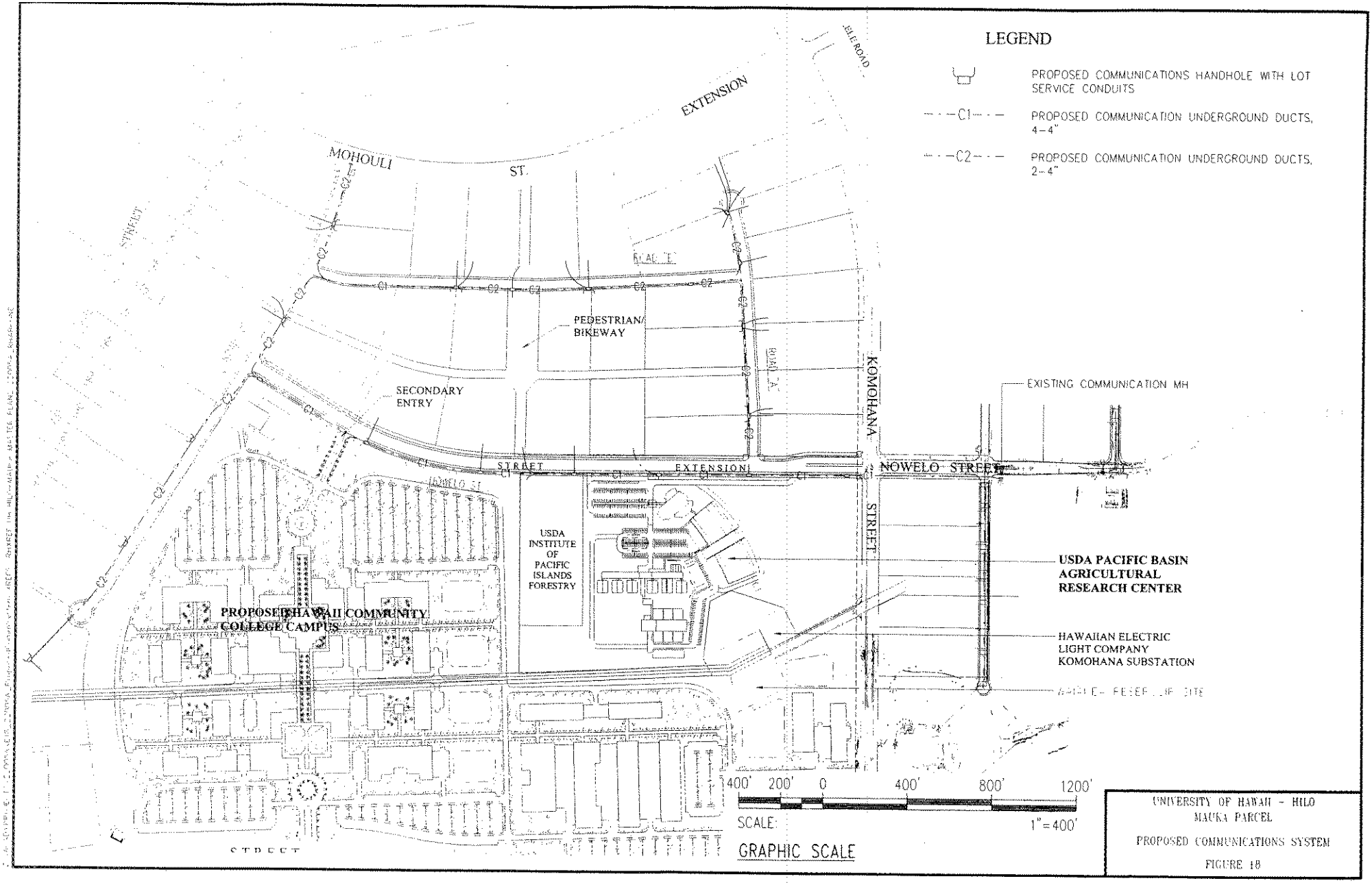
HELCO pad mounted transformers and service equipment will be provided for the roadway lighting system and other lighting and power systems (Irrigation Controller) along the roadway right of way. The transformer will provide 240/120 volt, 1-phase, 3-wire secondary service. The proposed roadway lighting system is shown on Figure 19.

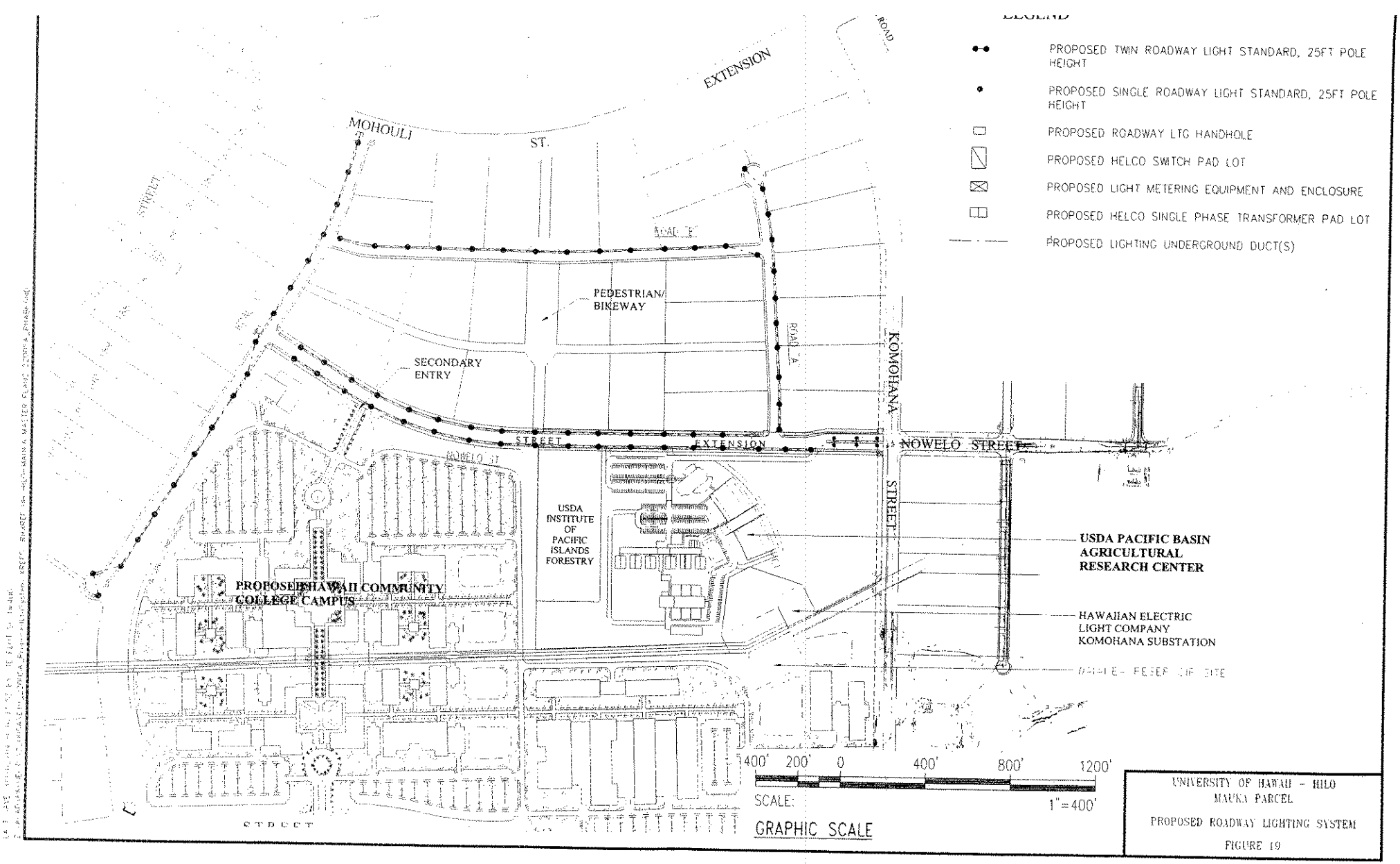
PHASING PLAN

The proposed improvements will be divided into five phases (see Figures 20-26).

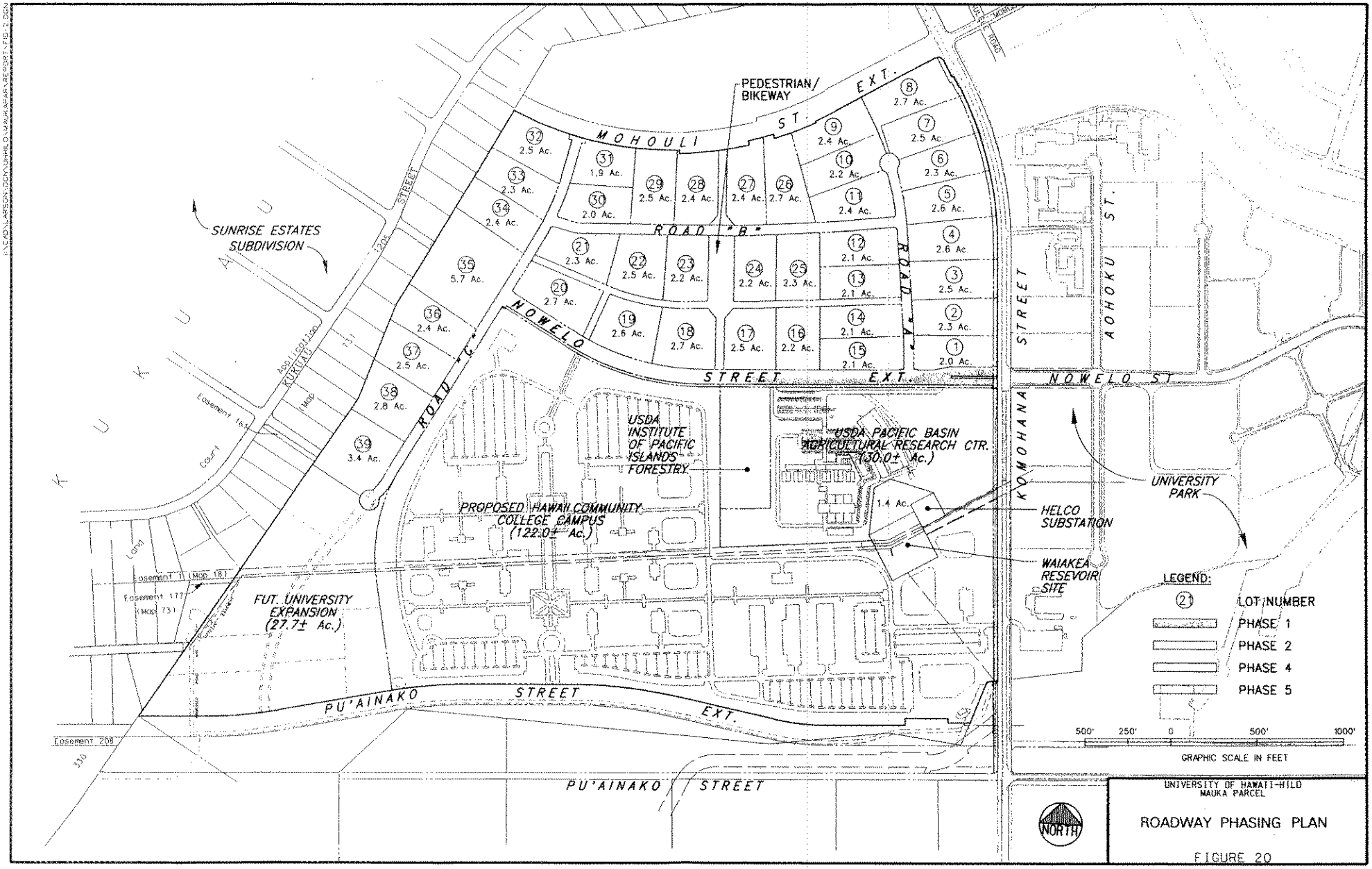
Phase 1

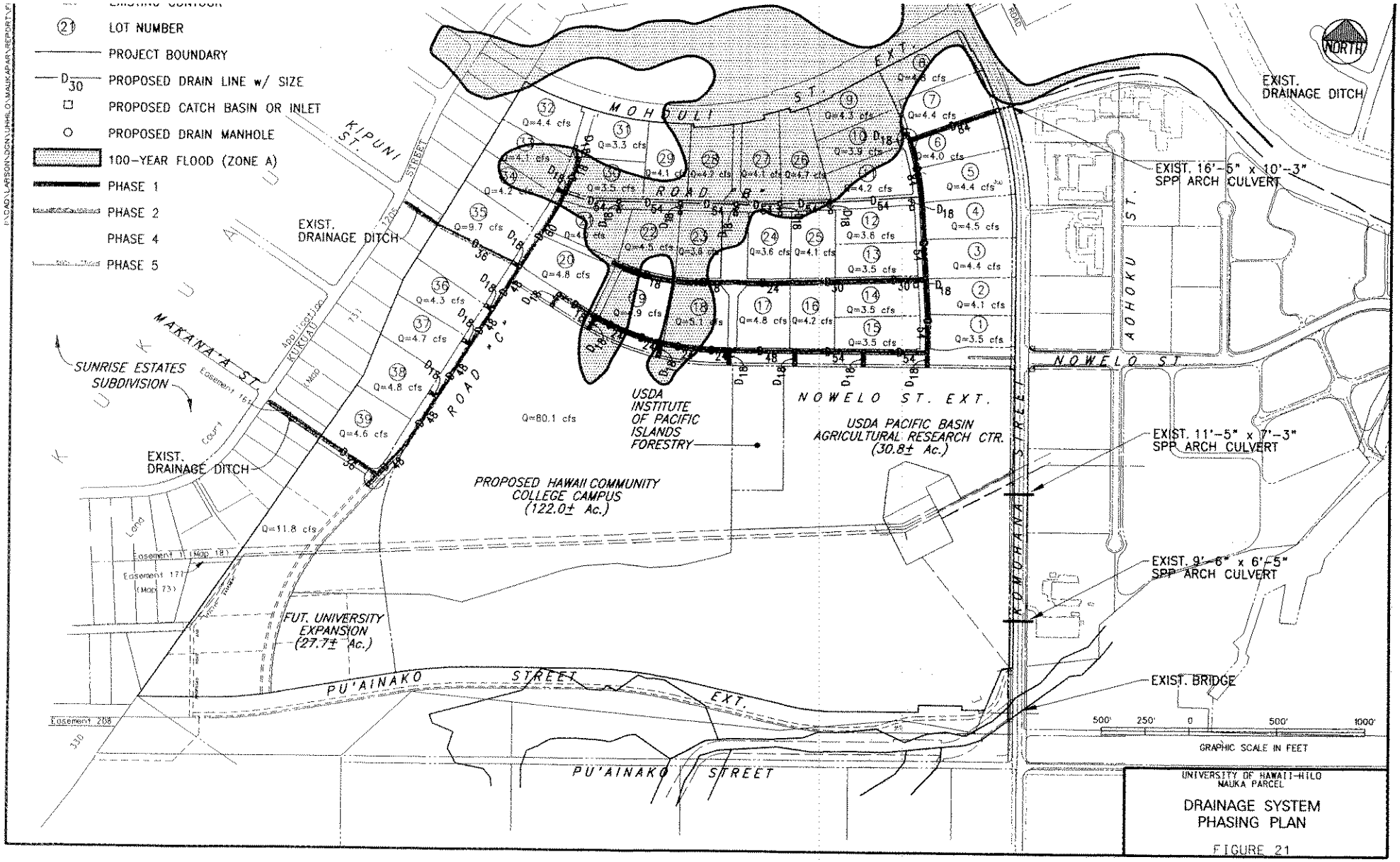
Phase 1 will consist of the construction of the Nowelo Street entry and half of the roadway prism (depending on available funds) to the USDA site (both the PBARC and IPIF facility). A portion of the water (low service system) and electrical improvements will be


LEGEND
PROPOSED COMMUNICATIONS HANDHOLE WITH LOT SERVICE CONDUITS
-C1- PROPOSED COMMUNICATION UNDERGROUND DUCTS, 4-4"
-C2- PROPOSED COMMUNICATION UNDERGROUND DUCTS, 2-4"
EXTENSION
MOHOULI ST.
PEDESTRIAN/ BIKEWAY
SECONDARY ENTRY
ROAD A
KOMOHANA STREET
EXISTING COMMUNICATION MH
NOWELO STREET EXTENSION
NOWELO STREET
USDA INSTITUTE OF PACIFIC ISLANDS FORESTRY
USDA PACIFIC BASIN AGRICULTURAL RESEARCH CENTER
PROPOSED HAWAII COMMUNITY COLLEGE CAMPUS
HAWAIIAN ELECTRIC LIGHT COMPANY KOMOHANA SUBSTATION
1400' 200' 0 400' 800' 1200'
SCALE: 1"=400'
GRAPHIC SCALE
UNIVERSITY OF HAWAII - HILO
MAUKA PARCEL
PROPOSED COMMUNICATIONS SYSTEM
FIGURE 18



UNIVERSITY OF HAWAII - HILO
MAUKA PARCEL
PROPOSED ROADWAY LIGHTING SYSTEM
FIGURE 19

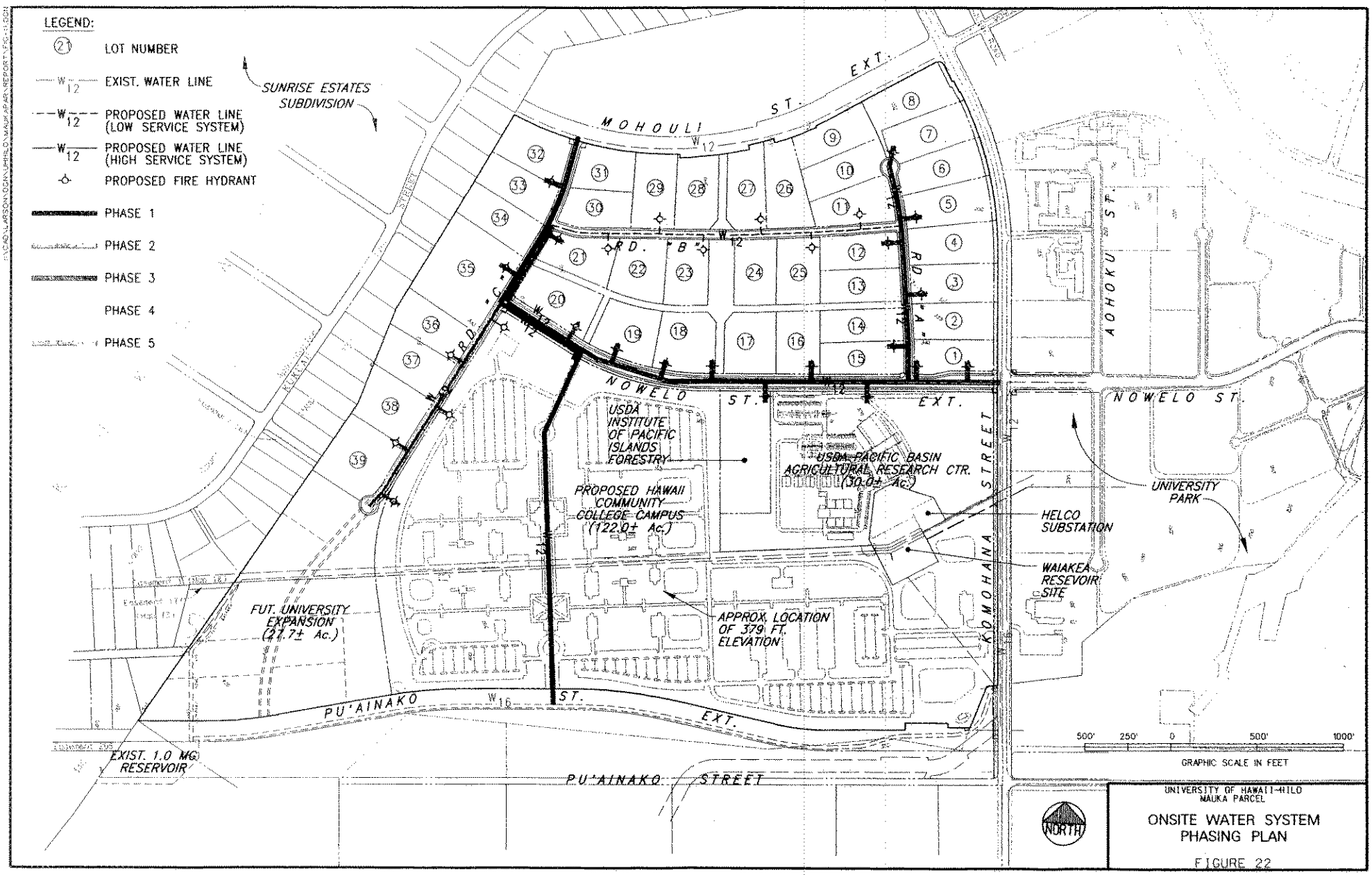

PEDESTRIAN/ BIKEWAY
MOHOULI ST. EXT.
SUNRISE ESTATES SUBDIVISION
ROAD "B"
ROAD "C"
NOWELO STREET EXT.
USDA INSTITUTE OF PACIFIC ISLANDS FORESTRY
USDA PACIFIC BASIN AGRICULTURAL RESEARCH CTR. (30.0± Ac.)
PROPOSED HAWAII COMMUNITY COLLEGE CAMPUS (122.0± Ac.)
FUT. UNIVERSITY EXPANSION (27.7± Ac.)
PU'AINAKO STREET EXT.
PU'AINAKO STREET
KOMOHANA STREET
AOHOKU ST.
NOWELO ST.
UNIVERSITY PARK
HELCO SUBSTATION
WAIAKEA RESEVOIR SITE
LEGEND:
LOT NUMBER
PHASE 1
PHASE 2
PHASE 4
PHASE 5
500' 250' 0 500' 1000'
GRAPHIC SCALE IN FEET
NORTH
UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL
ROADWAY PHASING PLAN
FIGURE 20

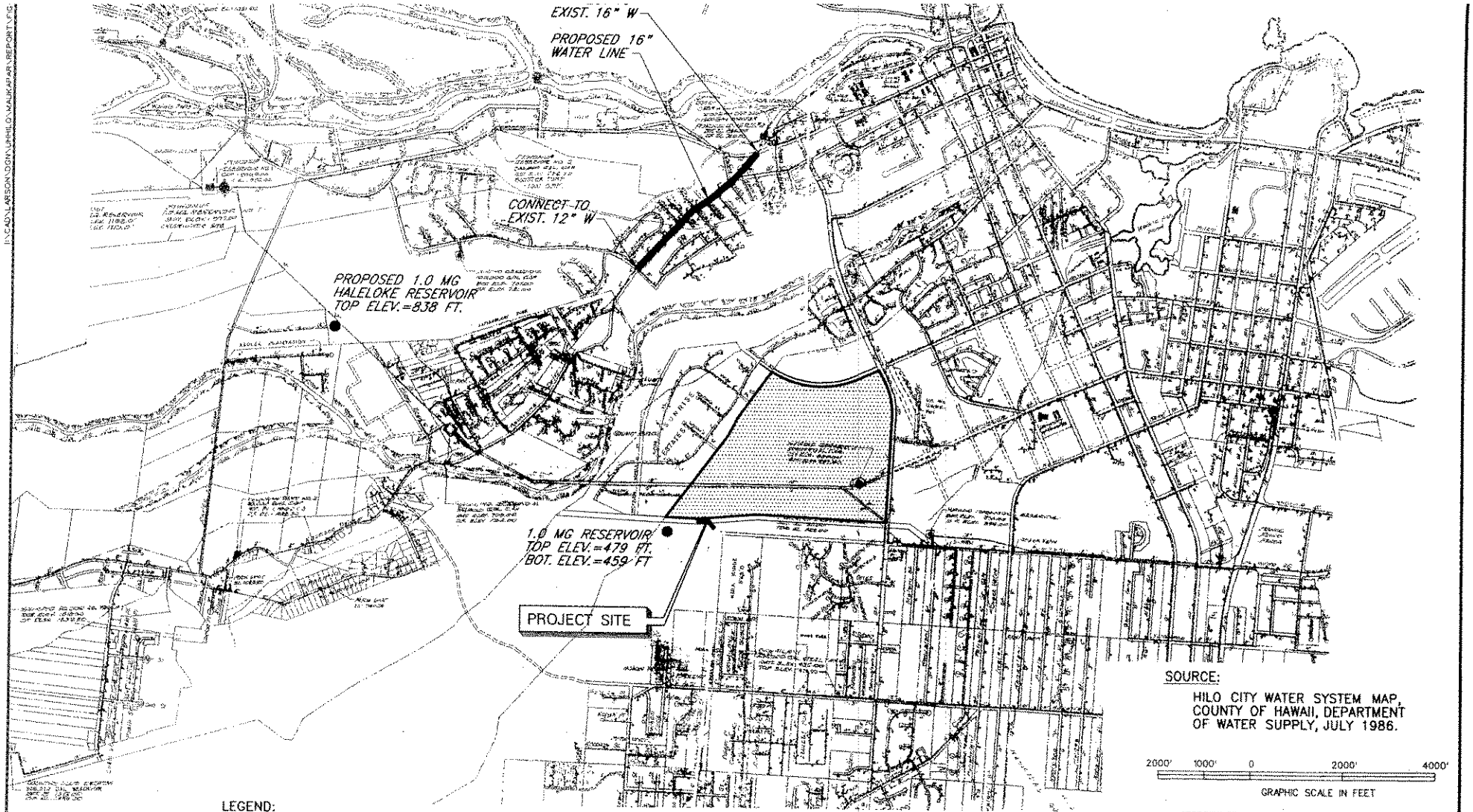


UNIVERSITY OF HAWAII-HILO
NAUKA PARCEL

DRAINAGE SYSTEM
PHASING PLAN

FIGURE 21

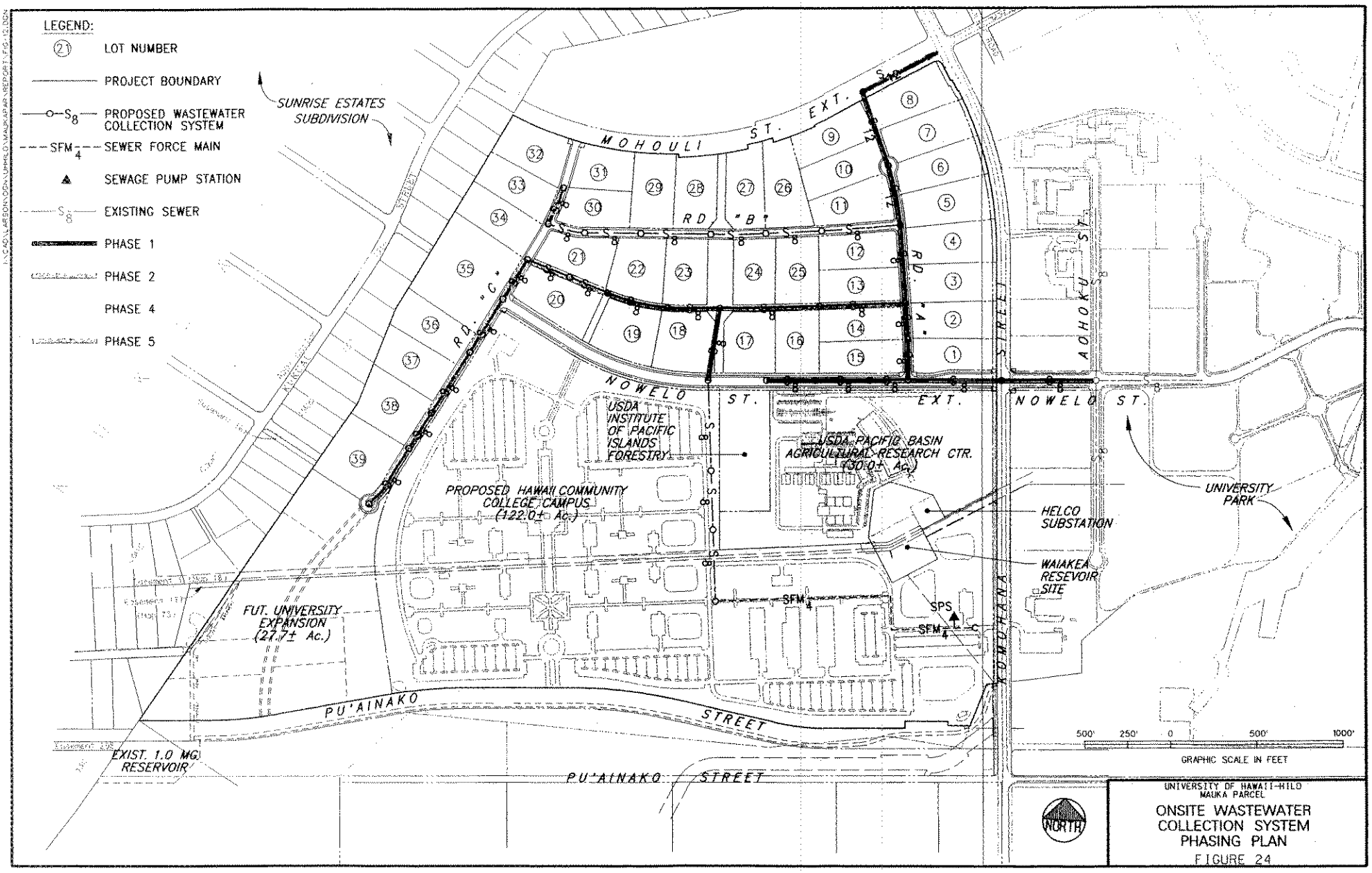

LEGEND:
LOT NUMBER
EXIST. WATER LINE
PROPOSED WATER LINE (LOW SERVICE SYSTEM)
PROPOSED WATER LINE (HIGH SERVICE SYSTEM)
PROPOSED FIRE HYDRANT
PHASE 1
PHASE 2
PHASE 3
PHASE 4
PHASE 5
SUNRISE ESTATES SUBDIVISION
MOHOULI ST. EXT.
NOWELO ST. EXT.
PU'AINAKO ST. EXT.
PU'AINAKO STREET
KOMOHANA STREET
AOHOKU ST.
RD. "A"
RD. "B"
RD. "C"
USDA INSTITUTE OF PACIFIC ISLANDS FORESTRY
USDA PACIFIC BASIN AGRICULTURAL RESEARCH CTR. (30.0± Ac.)
PROPOSED HAWAII COMMUNITY COLLEGE CAMPUS (122.0± Ac.)
FUT. UNIVERSITY EXPANSION (41.7± Ac.)
APPROX. LOCATION OF 379 FT. ELEVATION
EXIST. 1.0 MG RESERVOIR
HELCO SUBSTATION
WAIAKEA RESEVOIR SITE
UNIVERSITY PARK
NOWELO ST.
500' 250' 0 500' 1000'
GRAPHIC SCALE IN FEET
NORTH
UNIVERSITY OF HAWAII-HILO
WAIAKA PARCEL
ONSITE WATER SYSTEM
PHASING PLAN
FIGURE 22

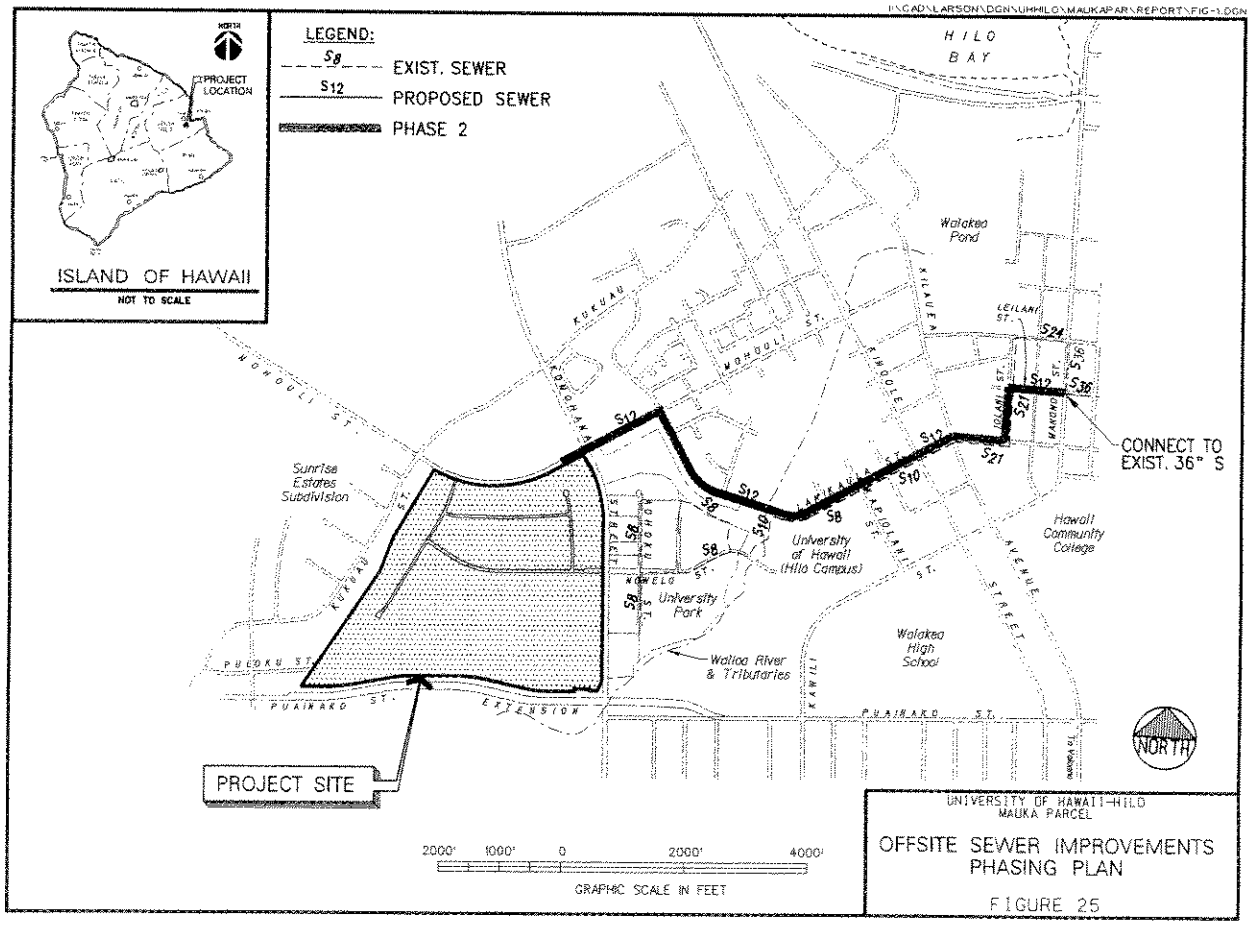


UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL

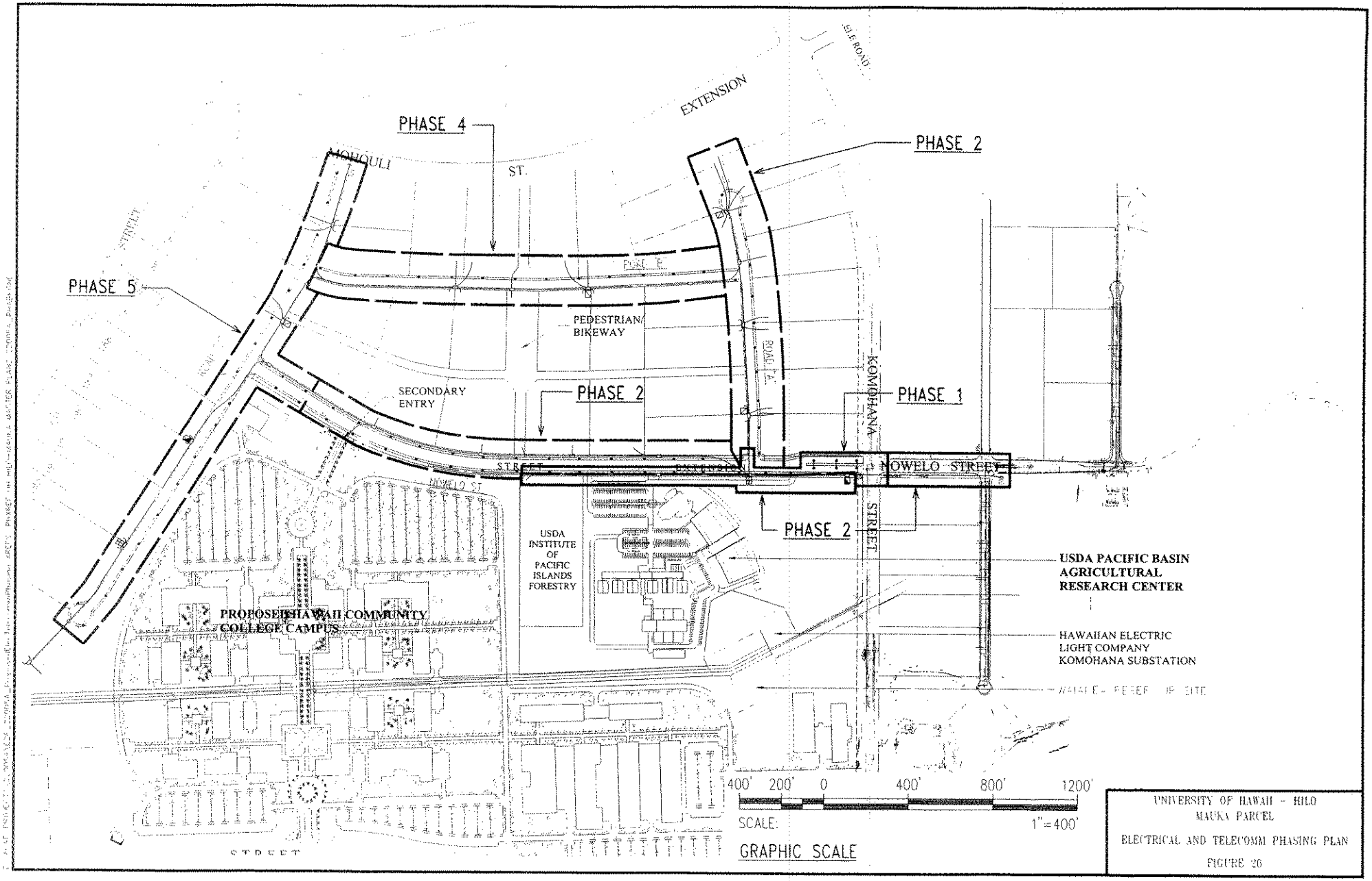
OFFSITE WATER IMPROVEMENTS PHASING PLAN

FIGURE 23


LEGEND:
LOT NUMBER
PROJECT BOUNDARY
PROPOSED WASTEWATER COLLECTION SYSTEM
SEWER FORCE MAIN
SEWAGE PUMP STATION
EXISTING SEWER
PHASE 1
PHASE 2
PHASE 4
PHASE 5
SUNRISE ESTATES SUBDIVISION
MOHOULI ST. EXT.
RD "B"
RD "C"
RD "A"
AOHOKU ST.
NOWELO ST. EXT.
NOWELO ST.
USDA INSTITUTE OF PACIFIC ISLANDS FORESTRY
USDA PACIFIC BASIN AGRICULTURAL RESEARCH CTR. (130.0± Ac.)
PROPOSED HAWAII COMMUNITY COLLEGE CAMPUS (122.0± Ac.)
UNIVERSITY PARK
HELCO SUBSTATION
WAIAKEA RESEVOIR SITE
FUT. UNIVERSITY EXPANSION (27.7± Ac.)
SPS
SFM
PU'AINAKO STREET
KOMAKAHI STREET
EXIST. 1.0 MG RESERVOIR
500' 250' 0 500' 1000'
GRAPHIC SCALE IN FEET
NORTH
UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL
ONSITE WASTEWATER COLLECTION SYSTEM PHASING PLAN
FIGURE 24



LEGEND:
S8 EXIST. SEWER
S12 PROPOSED SEWER
PHASE 2
ISLAND OF HAWAII
NOT TO SCALE
PROJECT LOCATION
HILO BAY
Waiakea Pond
Sunrise Estates Subdivision
University of Hawaii (Hilo Campus)
University Park
Waiakea High School
Hawaii Community College
Wailoa River & Tributaries
CONNECT TO EXIST. 36" S
PROJECT SITE
NORTH
2000' 1000' 0 2000' 4000'
GRAPHIC SCALE IN FEET
UNIVERSITY OF HAWAII-HILO
MAUKA PARCEL
OFFSITE SEWER IMPROVEMENTS
PHASING PLAN
FIGURE 25



UNIVERSITY OF HAWAII - HILO
MAUKA PARCEL

ELECTRICAL AND TELECOMM PHASING PLAN

FIGURE 26

included in Phase 1 to allow water and electrical service to be provided to the USDA site. Electrical, telephone and CATV service to the USDA site will be overhead since providing underground service would exceed the construction budget. Also, electrical, telephone, CATV, communication, and roadway lighting ducts will be provided across Nowelo Street extension to prevent trenching across the roadway in the future. Roadway lighting equipment and light poles will be provided only on the south side of Nowelo Street extension and in the median strip. Provisions will be made for lighting on the north side of the road. An 8-inch sewer line will be constructed from the USDA Site to connect to the existing sewer manhole at the intersection of Nowelo Street and Aohoku Street in the University Park.

Phase 2

Phase 2 will consist of the construction of Nowelo Street to the parking lot entry of HCC, Road "A", 8-inch sewer in the pedestrian/bikeway and offsite sewer improvements. The Nowelo Street construction will consist of the construction of the remaining half of the roadway prism, including roadway, sidewalk and utility improvements (installation of fire hydrants, drainage system, and construction of the major electrical infrastructure). The construction of the electrical, telephone, CATV and communication services will be along the north side of Nowelo Street extension from duct stubouts near Komohana Street to the parking lot entry of Hawaii Community College. Road "A" will consist of the construction of the roadway and utility improvements. Roadway lighting will be provided along the north and south sides of Nowelo Street as well as along the east side of Road "A". The construction of Phase 2 will allow development of Lots 16, 17, 18 and 19 and the lots along Road "A" as well as the construction of the first phase of the HCC Campus.

Phase 3

Phase 3 will consist of the construction of the high service water line, including the offsite water improvements in Kaumana Drive, and the low service water line connecting the existing water lines in Puainako and Nowelo Streets. Also included in the Phase 3 construction is construction of the left-turn lane from Nowelo Street Extension to Komohana Street. A traffic study should be conducted to determine if the left-turn lane is warranted and the length required. Also, the length of the left-turn lane on Komohana Street should be evaluated for the ultimate condition and restriping of the existing left-turn lanes should be done as required. Construction

of the high service water system will allow construction of Phase 2 of the HCC campus since some buildings are located in the high service zone. The construction of the water line through the campus will strengthen the low service water system. The access from HCC to Puainako Street is included in this phase. No electrical work will be provided in this phase.

Phase 4

Phase 4 will consist of the construction of Road "B" which will allow development of the lots along that roadway. Roadway lighting will be provided along the north side of Road "B".

Phase 5

Phase 5 will consist of the construction of Road "C" which will provide the second major access into the UHH Mauka Parcel via Mohouli Street. A median refuge lane in Mohouli Street shall be provided. The remaining portion of Nowelo Street, from the parking lot entry to HCC to Road "C" will also be constructed to complete the roadway improvements for Nowelo Street, including the completion of the ductline on the north side. Included in the construction of Road "C" is the installation of the low service water line to complete the loop between Nowelo Street Extension and Road "B" and the construction of the drain lines in Lots 35 and 39. Roadway lighting will be provided along the north side of Road "C" and along the remainder of Nowelo Street.

The cost for each phase of work is summarized in Table 4.

REFERENCES

1. County of Hawaii, Department of Public Works, Storm Drainage Standard, October 1970.
2. County of Hawaii, Department of Water Supply, Water System Standards, 2002.
3. PBR Hawaii, University of Hawaii at Hilo, University Park Expansion Master Plan (Draft), December 2003.
4. PBR Hawaii, Hawaii Community College, Long Range Development Plan Update (Draft), May 2003.

TABLE 4

COST ESTIMATE BY PHASES

	ROAD	WATER	DRAIN	SEWER	ELECTRICAL	TOTAL
PHASE 1						
Nowelo St. (partial rdway) from Komohana St. to USDA fac. (O/H elect.)	$561,710	$274,855	$28,640	$196,435	$288,250	$1,349,890
Temp. 8" Sewer from Komohana St. to S. Aohoku St.				$104,480		$104,480
Left-turn Lane on Komohana Street	$51,935					$51,935
Phase 1 Total	**$613,645**	**$274,855**	**$28,640**	**$300,915**	**$288,250**	**$1,506,305**
PHASE 2						
Nowelo St. from USDA fac. to HCC Entry (incl. rdway completion)	$1,217,000	$208,000	$809,000		$1,015,000	$3,249,000
Road "A"	$774,000	$359,000	$1,189,000	$295,000	$389,000	$3,006,000
Sewer and Drain in Pedestrian/Bikeway			$333,000	$225,000		$558,000
Offsite Sewer Improvements from UH Mauka Parcel to Manono St.				$2,700,000		$2,700,000
Utility Charge (Nowelo St.)					$150,000	$150,000
Utility Charge (Road "A")					$10,000	$10,000
Phase 2 Total	**$1,991,000**	**$567,000**	**$2,331,000**	**$3,220,000**	**$1,564,000**	**$9,673,000**
PHASE 3						
High Service Water Line (from Mohouli St. to HCC)		$191,000				$191,000
Offsite WL Improvements in Kaumana Drive		$780,000				$780,000
Low Service Water Line through HCC		$511,000				$511,000
Phase 3 Total		**$1,482,000**				**$1,482,000**
PHASE 4						
Road "B"	$1,363,000	$392,000	$968,000	$311,000	$568,000	$3,602,000
Utility Charge (Road "B")					$87,000	$87,000
Phase 4 Total	**$1,363,000**	**$392,000**	**$968,000**	**$311,000**	**$655,000**	**$3,689,000**
PHASE 5						
Road "C"	$1,700,000	$412,000	$1,005,000	$322,000	$761,000	$4,200,000
Nowelo St. (from HCC Entry to Road "C")	$388,000	$81,000	$49,000		$209,000	$727,000
Drain Lines in Lots 35 and 39			$213,000			$213,000
Sewer in Pedestrian/Bikeway				$40,000		$40,000
Utility Charge (Road "C")					$300,000	$300,000
Phase 5 Total	**$2,088,000**	**$493,000**	**$1,267,000**	**$362,000**	**$1,270,000**	**$5,480,000**
TOTAL	**$6,055,645**	**$3,208,855**	**$4,594,640**	**$4,193,915**	**$3,777,250**	**$21,830,305**

PROJECT: UH HILO 300-AC MAUKA PARCEL

LOCATION: HILO, HAWAII

Tm = 10 YEARS 1-HR RAINFALL = 5.1 INCHES COMPUTED BY DY DATE 7/1/04

Tm = 50 YEARS 1-HR RAINFALL = 6.3 INCHES CHECKED BY _____ DATE _____

INLET	OVERLAND FLOW TIME				C.F.	I	C	A (ACRES)	Q (C.F.S.)
	GROUND CHARACTER	LENGTH (FEET)	SLOPE (FT/FT)	Tc (MIN.)					
LOT 1	TALL BRUSH	500	0.03	33.0		6.9	0.25	2.00	3.45
LOT 2	TALL BRUSH	500	0.04	31.0		7.1	0.25	2.30	4.08
LOT 3	TALL BRUSH	500	0.04	31.0		7.1	0.25	2.50	4.44
LOT 4	TALL BRUSH	500	0.03	33.0		6.9	0.25	2.60	4.49
LOT 5	TALL BRUSH	500	0.04	31.0		7.1	0.25	2.50	4.44
LOT 6	TALL BRUSH	500	0.035	32.0		7.0	0.25	2.30	4.03
LOT 7	TALL BRUSH	500	0.04	31.0		7.1	0.25	2.50	4.44
LOT 8	TALL BRUSH	500	0.04	31.0		7.1	0.25	2.70	4.79
LOT 9	TALL BRUSH	490	0.04	31.0		7.1	0.25	2.40	4.26
LOT 10	TALL BRUSH	480	0.035	32.0		7.0	0.25	2.20	3.85
LOT 11	TALL BRUSH	470	0.035	32.0		7.0	0.25	2.40	4.20
LOT 12	TALL BRUSH	500	0.025	34.0		6.8	0.25	2.10	3.57
LOT 13	TALL BRUSH	500	0.022	35.0		6.7	0.25	2.10	3.52
LOT 14	TALL BRUSH	500	0.02	37.0		6.6	0.25	2.10	3.47
LOT 15	TALL BRUSH	500	0.02	37.0		6.6	0.25	2.10	3.47
LOT 16	TALL BRUSH	360	0.043	27.0		7.6	0.25	2.20	4.18
LOT 17	TALL BRUSH	350	0.04	27.0		7.6	0.25	2.50	4.75
LOT 18	TALL BRUSH	450	0.043	28.0		7.5	0.25	2.70	5.06
LOT 19	TALL BRUSH	450	0.043	28.0		7.5	0.25	2.60	4.88

APPENDIX A

RUNOFF CALCULATIONS

PROJECT: UH HILO 300-AC MAUKA PARCEL

LOCATION: HILO, HAWAII

Tm = 10 YEARS 1-HR RAINFALL = 5.1 INCHES COMPUTED BY DY DATE 7/1/04

Tm = 50 YEARS 1-HR RAINFALL = 6.3 INCHES CHECKED BY _____ DATE _____

INLET	OVERLAND FLOW TIME				C.F.	I	C	A	Q
	GROUND CHARACTER	LENGTH (FEET)	SLOPE (FT/FT)	Tc (MIN.)				(ACRES)	(C.F.S.)
CB-1	ROAD	400	0.013	8.0		12.8	0.95	0.37	4.48
CB-2	ROAD	400	0.009	8.0		12.8	0.95	0.37	4.50
CB-3	ROAD	400	0.01	8.0		12.8	0.95	0.37	4.50
NOWELO ST. EXT (HALF RD. PRISM)	ROAD	400	0.01	8.0		12.8	0.95	1.11	13.50
NOWELO ST. EXT	ROAD	400	0.01	8.0		12.8	0.95	2.42	29.43
ROAD "C"	ROAD	400	0.018	8.0		12.8	0.95	3.30	40.13
HAWAII CC	TALL BRUSH	2700	0.026	60.0		5.1	0.25	62.80	80.07
ROAD "B"	ROAD	330	0.02	8.0		12.8	0.95	1.38	16.78
ROAD "B"	ROAD	400	0.026	8.0		12.8	0.95	1.47	17.88
ROAD "A"	ROAD		0.05	8.0		12.8	0.95	0.55	6.69
ROAD "A"	ROAD		0.039	8.0		12.8	0.95	0.62	7.54
ROAD "A"	ROAD		0.007	8.5		12.0	0.95	0.48	5.47
FUT. UNIV. EXP.	TALL BRUSH	1200	0.03	45.0		6.2	0.25	7.58	11.75

PROJECT: UH HILO 300-AC MAUKA PARCEL

LOCATION: HILO, HAWAII

Tm = 10 YEARS 1-HR RAINFALL = 5.1 INCHES COMPUTED BY DY DATE 7/1/04

Tm = 50 YEARS 1-HR RAINFALL = 6.3 INCHES CHECKED BY _____ DATE _____

INLET	OVERLAND FLOW TIME				C.F.	I	C	A	Q
	GROUND CHARACTER	LENGTH (FEET)	SLOPE (FT/FT)	Tc (MIN.)				(ACRES)	(C.F.S.)
LOT 20	TALL BRUSH	500	0.04	31.0		7.1	0.25	2.70	4.79
LOT 21	TALL BRUSH	500	0.031	33.0		6.9	0.25	2.30	3.97
LOT 22	TALL BRUSH	450	0.036	30.0		7.2	0.25	2.50	4.50
LOT 23	TALL BRUSH	450	0.015	36.0		6.6	0.25	2.20	3.63
LOT 24	TALL BRUSH	450	0.015	36.0		6.6	0.25	2.20	3.63
LOT 25	TALL BRUSH	450	0.029	31.0		7.1	0.25	2.30	4.08
LOT 26	TALL BRUSH	550	0.033	33.0		6.9	0.25	2.70	4.66
LOT 27	TALL BRUSH	500	0.03	33.0		6.9	0.25	2.40	4.14
LOT 28	TALL BRUSH	450	0.02	32.5		7.0	0.25	2.40	4.20
LOT 29	TALL BRUSH	500	0.02	37.0		6.6	0.25	2.50	4.13
LOT 30	TALL BRUSH	400	0.02	32.0		7.0	0.25	2.00	3.50
LOT 31	TALL BRUSH	400	0.02	32.0		7.0	0.25	1.90	3.33
LOT 32	TALL BRUSH	400	0.027	31.0		7.1	0.25	2.50	4.44
LOT 33	TALL BRUSH	450	0.027	31.5		7.1	0.25	2.30	4.08
LOT 34	TALL BRUSH	450	0.022	32.5		7.0	0.25	2.40	4.20
LOT 35	TALL BRUSH	600	0.022	34.0		6.8	0.25	5.70	9.69
LOT 36	TALL BRUSH	500	0.04	31.0		7.1	0.25	2.40	4.26
LOT 37	TALL BRUSH	450	0.05	28.0		7.5	0.25	2.50	4.69
LOT 38	TALL BRUSH	400	0.025	34.5		6.8	0.25	2.80	4.76
LOT 39	TALL BRUSH	500	0.02	37.0		6.6	0.25	2.80	4.62

COMPUTATION OF WASTEWATER FLOW

PROJECT: UH HILO 300-AC MAUKA PARCEL
SEWER: SEWER FOR 300-AC PARCEL (HCC & LOTS 16 THRU 20 SWR IN PED. WAY), ASSUMES 80% AREA FOR WET WEATHER I/I
REF. FILE: E:\DORAINE\UH HILO 300-AC PARCEL\ENGINEERING CALCS\SEWER

PAGE: 1
COMPUTED BY: DY
DATE: 11/18/03
rev 7/20/04

SEWER LOCATION		TRIBUTARY AREA		TRIBUTARY EQUIVALENT POPULATION						WASTEWATER FLOW COMPUTATION								SEWER STUDY				
				RESIDENTIAL		OTHER		TOTAL										EXISTING		ULTIMATE		
DISTRICT ZONE OR STREET	SMH NO.	INCR.	TOTAL	INCR.	TOTAL	INCR.	TOTAL	INCR.	TOTAL	AVE. WWF @ 30 GPCD (MGD)*	MAX FLOW FACTOR	MAX. FLOW (MGD)	DRY WEATH. INFIL. (MGD)	DES. AVE. FLOW (MGD)	DES. MAX. FLOW (MGD)	WET WEATH. INFIL. (MGD)	DESIGN PEAK FLOW (MGD)	PIPE DIAM. (IN)	SLOPE (%)	VEL. (FPS)	CAP. (MGD)	O.C. = Over-Capacity or ok
FUT. UNIV. EXP.		27.7	27.7	1,108	1,108	0	0	1,108	1,108	0.033	4.898	0.16	0.006	0.039	0.158	0.028	0.186	8	2.00	4.24	0.96	ok
LOT 39		3.4	31.1	136	1,244	0	0	136	1,244	0.037	4.786	0.18	0.006	0.044	0.185	0.031	0.216	8	1.00	3.00	0.68	ok
LOTS 35 - 36		13.4	44.5	536	1,780	0	0	536	1,780	0.053	4.455	0.24	0.009	0.062	0.247	0.045	0.291	8	1.00	3.00	0.68	ok
LOTS 31 & 32		4.4	4.4	176	176	0	0	176	176	0.005	5.000	0.03	0.001	0.006	0.027	0.004	0.032	8	1.00	3.00	0.68	ok
LOTS 30 & 33		4.3	8.7	172	348	0	0	172	348	0.010	5.000	0.05	0.002	0.012	0.054	0.009	0.063	8	1.00	3.00	0.68	ok
LOT 34		2.4	11.1	96	444	0	0	96	444	0.013	5.000	0.07	0.002	0.016	0.069	0.011	0.080	8	1.00	3.00	0.68	ok
LOTS 30 - 34		0.0	11.1	0	444	0	0	0	444	0.013	5.000	0.07	0.002	0.016	0.069	0.011	0.080	8	1.00	3.00	0.68	ok
LOT 21		2.3	13.4	92	536	0	0	92	536	0.016	5.000	0.08	0.003	0.019	0.083	0.013	0.096	8	1.00	3.00	0.68	ok
LOTS 22 & 29		5.0	18.4	200	736	0	0	200	736	0.022	5.000	0.11	0.004	0.026	0.114	0.018	0.132	8	1.00	3.00	0.68	ok
LOTS 23 & 28		4.6	23.0	184	920	0	0	184	920	0.028	5.000	0.14	0.005	0.032	0.143	0.023	0.166	8	1.00	3.00	0.68	ok
LOTS 24 - 27		9.6	32.6	384	1,304	0	0	384	1,304	0.039	4.741	0.19	0.007	0.046	0.192	0.033	0.225	8	2.50	4.74	1.07	ok
USDA		30.0	30.0	1,200	1,200	0	0	1,200	1,200	0.036	4.821	0.17	0.006	0.042	0.180	0.030	0.210	8	0.80	2.68	0.61	ok
NOWELO ST EXT.		0.0	30.0	0	1,200	0	0	0	1,200	0.036	4.821	0.17	0.006	0.042	0.180	0.030	0.210	8	0.70	2.51	0.57	ok
LOT 18		2.7	2.7	108	108	0	0	108	108	0.003	5.000	0.02	0.001	0.004	0.017	0.003	0.019	8	1.00	3.00	0.68	ok
LOTS 19 & 20		5.3	8.0	212	320	0	0	212	320	0.016	5.000	0.05	0.002	0.011	0.050	0.008	0.058	8	1.00	3.00	0.68	ok
HAWAII CC (PH 1&2)		61.0	69.0		320	1,500	1,500	1,500	1,820	0.047	4.436	0.21	0.009	0.056	0.218	0.069	0.287	8	1.00	3.00	0.68	ok
HAWAII CC (PH 3&4)		61.0	130.0		320	1,500	3,000	1,500	3,320	0.085	3.933	0.33	0.017	0.101	0.349	0.130	0.479	8	1.00	3.00	0.68	ok
LOT 17		2.5	132.5	100	420	0	3,000	100	3,420	0.088	3.910	0.34	0.017	0.105	0.360	0.133	0.492	8	1.00	3.00	0.68	ok
LOT 16		2.2	134.7	88	508	0	3,000	88	3,508	0.090	3.890	0.35	0.018	0.108	0.369	0.135	0.503	8	1.00	3.00	0.68	ok

REMARKS: *ASSUME 40 PERSONS/AC AND AVE. WASTEWATER FLOW OF 30 GAL/CAP/DAY, ASSUME 25 GPCD FOR STUDENT, ASSUME 80% AREA CONTRIBUTES TO WET WEATHER I/I

APPENDIX B

WASTEWATER FLOW CALCULATIONS

APPENDIX C

PRELIMINARY COST ESTIMATE

COMPUTATION OF WASTERWATER FLOW

PROJECT: UH HILO 300-AC MAUKA PARCEL
SEWER: SEWER FOR 300-AC PARCEL (HCC & LOTS 16 THRU 20 SWR IN PED. WAY), ASSUMES 80% AREA FOR WET WEATHER I/I
REF. FILE: E:\DORAINE\UH HILO 300-AC PARCEL\ENGINEERING CALCS\SEWER

PAGE: 2
COMPUTED BY: DY
DATE: 11/10/03
rev. 7/20/04

SEWER LOCATION		TRIBUTARY AREA		TRIBUTARY EQUIVALENT POPULATION						WASTEWATER FLOW COMPUTATION								SEWER STUDY				
				RESIDENTIAL		OTHER		TOTAL										EXISTING		ULTIMATE		
DISTRICT ZONE OR STREET	SMH NO	INCR.	TOTAL	INCR.	TOTAL	INCR.	TOTAL	INCR.	TOTAL	AVE. WWF @ 30 GPCD (MGD)*	MAX FLOW FACTOR	MAX. FLOW (MGD)	DRY WEATH. INFIL. (MGD)	DES. AVE. FLOW (MGD)	DES. MAX. FLOW (MGD)	WET WEATH. INFIL. (MGD)	DESIGN PEAK FLOW (MGD)	PIPE DIAM. (IN)	SLOPE (%)	VEL. (FPS)	CAP. (MGD)	O.C. = Over-Capacity or ok
LOTS 1 & 15		4.1	34.1	164	1,364	0	0	164	1,364	0.041	4.689	0.19	0.007	0.048	0.199	0.034	0.233	8	2.00	4.24	0.96	ok
LOTS 2 & 14		4.4	38.5	176	1,540	0	0	176	1,540	0.046	4.586	0.21	0.008	0.054	0.220	0.039	0.258	8	2.00	4.24	0.96	ok
LOTS 3 & 13		4.6	177.8	184	2,232	0	3,000	184	5,232	0.142	3.591	0.51	0.026	0.168	0.538	0.178	0.714	8	2.00	4.24	0.96	ok
LOTS 4 & 12		4.7	182.5	188	2,420	0	3,000	188	5,420	0.148	3.566	0.53	0.027	0.175	0.553	0.183	0.736	8	2.00	4.24	0.96	ok
LOT 5 & RD B		2.5	217.7	104	3,828	0	3,000	104	6,828	0.190	3.405	0.65	0.034	0.224	0.681	0.218	0.898	12	0.70	3.29	1.67	ok
LOTS 6 & 11		4.7	222.4	188	4,016	0	3,000	188	7,016	0.195	3.387	0.66	0.035	0.231	0.697	0.222	0.919	12	0.70	3.29	1.67	ok
LOTS 7 & 10		4.7	227.1	188	4,204	0	3,000	188	7,204	0.201	3.369	0.68	0.036	0.237	0.714	0.227	0.941	12	0.70	3.29	1.67	ok
LOTS 8 & 9		5.1	232.2	204	4,408	0	3,000	204	7,408	0.207	3.350	0.69	0.037	0.244	0.731	0.232	0.963	12	0.70	3.29	1.67	ok

REMARKS: *ASSUME 40 PERSONS/AC AND AVE. WASTEWATER FLOW OF 30 GAL/CAP/DAY, ASSUME 25 GPCD FOR STUDENT, ASSUME 80% AREA CONTRIBUTES TO WET WEATHER I/I

COST ESTIMATE SUMMARY

	ROAD	WATER	DRAIN	SEWER	ELECTRICAL	TOTAL
Nowelo St. (partial rdway) from Komohana St. to USDA facility	$561,710	$274,855	$28,640	$196,435	$288,250	$1,349,890
Nowelo St. from USDA fac. to HCC Entry (incl. rdway completion)	$1,217,000	$208,000	$809,000		$1,015,000	$3,249,000
Nowelo St. (from HCC Entry to Road "C")	$388,000	$81,000	$49,000		$209,000	$727,000
Road "A"	$774,000	$359,000	$1,189,000	$295,000	$389,000	$3,006,000
Road "B"	$1,363,000	$392,000	$968,000	$311,000	$568,000	$3,602,000
Road "C"	$1,700,000	$412,000	$1,005,000	$322,000	$761,000	$4,200,000
Left-turn Lane on Komohana Street	$51,935					$51,935
High Service Water Line (from Mohouli St. to HCC)		$191,000				$191,000
Offsite WL Improvements in Kaumana Drive		$780,000				$780,000
Low Service Water Line through HCC		$511,000				$511,000
Temp. 8" Sewer from Komohana St. to S. Aohoku St.				$104,480		$104,480
Sewer and Drain in Pedestrian/Bikeway			$333,000	$225,000		$558,000
Offsite Sewer Improvements from UH Mauka Parcel to Manono St.				$2,700,000		$2,700,000
Sewer in Pedestrian/Bikeway				$40,000		$40,000
Drain Lines in Lots 35 and 39			$213,000			$213,000
Utility Charge (Nowelo St. and Roads "A", "B", and "C")					$547,000	$547,000
TOTAL	**$6,055,645**	**$3,208,855**	**$4,594,640**	**$4,193,915**	**$3,777,250**	**$21,830,305**

OFFSITE COSTS = $3,480,000

ONSITE COSTS = $18,350,305

BASIS OF COST ESTIMATE

The preliminary costs are based on the following assumptions:

1. Costs are 2004 construction costs.
2. The cost estimate is contingent on approval of the report by the various County agencies.
3. The cost estimate does not include landscaping or irrigation costs.
4. Development costs (permit fees, design, administration, construction inspection, surveying soil investigation, water development charge, sewer connection charge, etc.) are not included in the estimate.
5. The offsite sewer will be constructed in the roadway shoulders.
6. The cost of lining the south side of the drainage ditch (University Park side) from North Aohoku Street to Waiakea Channel is not included in this cost estimate (refer to Preliminary Engineering Report for the Proposed UH Hilo University Park, November 1993 for the estimated cost).
7. The Department of Water Supply will be able to provide sufficient water to the site.
8. Infrastructure costs within Hawaii Community College are not included in the cost estimate, with the exception of the low service water line that will be used to form a "loop".

Appendix F

Traffic Impact Assessment Report

TRAFFIC IMPACT ASSESSMENT REPORT

UNIVERSITY OF HAWAII AT HILO KOMOHANA-MAUKA

HAWAII COMMUNITY COLLEGE KOMOHANA CAMPUS

HILO, HAWAII

prepared for:

PBR Hawaii
University of Hawaii at Hilo
and Hawaii Community College

prepared by:

Julian Ng, Incorporated
P. O. Box 816
Kaneohe, Hawaii 96744

Octobert 2004

Table of Contents

	Page
Introduction	1
Existing Traffic Conditions	2
Table 1 – State Traffic Count Data	2
Table 2 – Existing Peak Hour Conditions	3
Table 3 – Estimates of Daily Traffic	4
Future Traffic Conditions	4
Table 4 – Baseline Intersection Conditions	5
Project Traffic	5
Table 5 – Trip Generation Factors	5
Table 6 – Project Traffic Generation	6
Table 7 – Project Traffic Distribution	6
Table 8 – With-Project Intersection Conditions – No Mitigation	7
Table 9 – Summary of Future Conditions at Signalized Intersection	7
Table 10 – Unsignalized Intersection Analyses Results	8
Table 11 – Lengths of Storage for Left Turn Lanes	9
Discussion of Findings	10
Conclusions and Recommendations	11
Exhibits ..... following	11

1 Project Location, Hilo, Hawaii
2 Existing (2002) Traffic
3 Baseline Future (2025) Traffic in Area
4 Approach Laneage, Baseline Condition
5 Future (2025) Traffic Assignments with Project
6 Approach Laneage, With Project

Traffic Impact Assessment Report
University of Hawaii Hilo Komohana-Mauka
Hawaii Community College Komohana Campus
Hilo, Hawaii

October 2004

The University of Hawaii (UH) is developing a master plan for their 267-acre property located mauka of the UH Hilo's University Park. Referred to as the Mauka Lands Master Plan, the property is bordered to the south by Puainako Street, to the west by the Sunrise Estates Subdivision, to the north by Mohouli Street, and to the east by Komohana Street (Exhibit 1). Within the master plan, approximately 122 acres in the southern part of the property is designated for the Komohana Campus of the Hawaii Community College. The plan also includes an expansion are of about 119 acres for the UH Hilo's University Park in the northern portion of the property, an area of about 25 acres in the southwestern corner for "university expansion", and an area about 31 acres adjacent to Komohana Street for the Pacific Basin Agricultural Research Center for the United States Department of Agriculture.

This report was prepared to identify the traffic impacts of the proposed project and roadway improvements that will be needed to adequately serve projected peak hour traffic volumes. Traffic estimates for future conditions without the proposed university facilities were based on traffic assignments shown in the *Traffic Impact Assessment Report for U.S. Department of Agriculture Pacific Basin Agricultural Research Center*, prepared by Philip Rowell & Associates, dated March 28, 2002.

This report includes analyses of peak hour conditions on the highway and at intersections. Operating conditions are described by Levels of Service (LOS), which are determined using analyses methods described in the *Highway Capacity Manual*[1]. On highway segments, traffic densities are related to levels of service. At unsignalized intersections, the volumes of the uncontrolled movements affect the capacity available for the other movements that must yield or stop. The analyses of intersections used procedures from the *Highway Capacity Manual* to identify average delays and levels of service for each controlled movement at unsignalized intersections and for each lane group at signalized intersections. These Levels of Service (LOS) are defined as follows:

			Intersection delay (seconds)	
LOS	General Description	Highway density	Unsignalized	Signalized
A	Little or no delay	≤ 11 cars/mile/lane	≤ 10	≤ 10
B	Short traffic delays	≤ 18 cars/mile/lane	> 10 and ≤ 15	> 10 and ≤ 20
C	Average traffic delays	≤ 26 cars/mile/lane	> 15 and ≤ 25	> 20 and ≤ 35
D	Long traffic delays	≤ 35 cars/mile/lane	> 25 and ≤ 35	> 35 and ≤ 55
E	Very long traffic delays	≤ 45 cars/mile/lane	> 35 and ≤ 50	> 55 and ≤ 80
F	Very long traffic delays	> 45 cars/mile/lane	>50	> 80

[1] Transportation Research Board, National Research Council, *Highway Capacity Manual*, Washington, D.C., 2000.

Existing Traffic Conditions

The project site is located west of Komohana Street, a two-lane arterial roadway that serves the upper Hilo area. The site is bounded on the north side by Mohouli Street, which was recently extended from Komohana Street to Kaumana Drive.

Komohana Street is presently a rural roadway with a speed limit of 45 miles per hour. There are few driveways and intersections are spaced far apart. Parking on the roadway is not permitted. Future widening of Komohana Street is planned, but has not yet been programmed and is not expected for at least ten years.

Mohouli Street adjacent to the property is a two-lane collector street with a speed limit of 45 miles per hour. Mohouli Street was recently extended west of Komohana Street to provide a second connection between the Kaumana area of Hilo and the rest of Hilo. Additional improvements (primarily widening) to the older portion of Mohouli Street east of Komohana Street are planned.

Puainako Street adjacent to the property is a two-lane roadway that was opened for traffic in September 2004 and extends 4.5 miles to Kaumana Road; it has a speed limit of 45 miles per hour along most of this segment. East of Komohana Street, Puainako Street is a two-lane collector street. Construction of an new alignment for a portion of Puainako Street east of Komohana Street is expected within five years.

Daily totals from traffic counts taken in 2002 are shown in Table 1.

Table 1
STATE TRAFFIC COUNT DATA

	Approach	Departure	Total
Daily traffic at Komohana and Mohouli Streets, counted July 23-24, 2002			
Komohana Street, north leg	5,486	5,974	11,460
Mohouli Street, east leg	6,577	5,932	12,509
Mohouli Street, west leg	4,719	4,569	9,288
Komohana Street, south leg	8,749	7,706	16,445
Daily traffic at Komohana and Puainako Streets, counted April 15-16, 2002			
Komohana Street, north leg	7,868	8,982	16,850
Puainako Street, east leg	3,656	3,421	7,077
Komohana Street, south leg	6,870	6,015	12,885

Source: State of Hawaii, Department of Transportation, Highways Division

The intersection of Komohana Street and Mohouli Street was counted during the summer when schools are not in full session. Traffic volumes during the summer are therefore lower compared to other months of the year. The intersection of Komohana Street and Puainako Street was counted in April when schools were session. The daily volume on Komohana

Street between Mohouli Street and Puainako Street was 16,445 vehicles per day in the summer (south leg of Mohouli Street intersection) and 2.5 percent higher, or 16,850 vehicles per day, in April (north leg of Puainako Street intersection).

Existing traffic in the area has peak volumes in the morning and afternoon. The peak hours at the intersection of Komohana Street and Mohouli Street occurred between 7:00 AM and 8:00 AM and between 4:15 PM and 5:15 PM. Peak hours at the intersection of Komohana Street and Puainako Street were between 6:45 AM and 7:45 AM and between 4:00 PM and 5:00 PM. Peak hour traffic assignments at the intersections are shown in Exhibit 2.

As described earlier, the counts taken during the spring on Komohana Street north of Puainako Street were only 2.5 percent higher than the counts taken during the summer when schools were not in full session. Similarly, peak hour traffic volumes did not vary substantially much from the counts taken in the summer (–2.7 percent in the AM Peak Hour and –2.1 percent in the PM Peak Hour).

A traffic signal controls use of the intersection of Komohana Street and Mohouli Street, where separate lanes and signal phases are provided for left turns. Based on the layout of the intersection and the observed traffic signal operational characteristics, capacities for each approach were determined. Volume-to-capacity ratios were computed for each approach and for the overall intersection; average delays and levels of service were determined and are shown in Table 2.

Table 2
EXISTING PEAK HOUR CONDITIONS
Komohana Street and Mohouli Street

	AM Peak Hour			PM Peak Hour		
	v/c	ADPV	LOS	v/c	ADPV	LOS
Eastbound approach	0.36	28.1	C	0.62	50.6	D
Westound approach	0.60	49.9	D	0.89	55.4	E
Northbound approach	0.83	53.3	D	0.86	52.9	D
Southbound approach	0.64	52.6	D	0.83	56.4	E
Overall intersection	0.60	46.7	D	0.86	54.3	D

v/c = overall volume-to-capacity ratio
APDV = average delay per vehicle, in seconds
LOS = level of service

The State Department of Transportation has estimated that average daily traffic (ADT) on Puainako Street has not changed significantly in the last ten years. Their estimates are shown in Table 3.

Table 3
ESTIMATES OF DAILY TRAFFIC

Puainako Street, between Komohana Street and Kawili Street	
1992 Average Daily Traffic	7,295
1994 Average Daily Traffic	7,310
1996 Average Daily Traffic	7,543
1998 Average Daily Traffic	7,863
2000 Average Daily Traffic	7,539
2002 Average Daily Traffic	7,523

Source: State of Hawaii, Department of Transportation, Highways Division

Future Traffic Conditions

Traffic assignments were developed for the year 2025. Traffic assignments at the intersections of Komohana Street and Nowelo Street, and Komohana Street and Puainako Street, were based on 2010 estimates for a "Cumulative" condition in year 2010 from the traffic report for the USDA project. These traffic volumes, which represented changes in existing traffic volumes due to growth, other development in the area, and planned roadway improvements, were factored to the year 2025 by applying a multiplier reflecting an estimated growth in traffic volumes of 2.0 percent per year. The traffic volumes due to the USDA project were added to the factored assignments to produce the future "baseline" for traffic assignments. Development of the remainder of the Komohana site was not included in the baseline future traffic volumes. Peak hour traffic assignments for this "baseline" condition are shown in Exhibit 3.

The peak hourly volumes on Komohana Street between Mohouli Street and Puainako Street are 1,700 vehicles per hour in the southbound direction and 1,920 vehicles per hour in the northbound direction; both of these exceed the maximum volume of 1,575 vehicles per lane (based on traffic density for Level of Service D); therefore, two lanes will be needed in each direction.

Left turn and through movements on Komohana Street at each of the intersections are projected to have total volumes greater than 1,800 vehicles per hour. The traffic volumes of the left turn or through movement from either or both side street approaches at each intersection exceed 100 vehicles per hour in at least one peak hour. Traffic signals at each intersection, therefore, will be warranted by peak hour traffic volumes (in Figure 4C-3 of the *Manual on Uniform Traffic Control Devices*). The three intersections were analyzed as signalized intersections operating on an average signal cycle of 135 seconds in the peak periods. Standard width (12 feet wide) lanes were assumed with the number of lanes at each intersection as shown in Exhibit 4. Separate left turn lanes will be provided at each approach, with double left turn lanes for southbound traffic to Puainako Street. Average delays for all

approaches were used to determine an overall intersection level of service, with results summarized in Table 4.

Table 4
BASELINE INTERSECTION CONDITIONS

	AM Peak Hour			PM Peak Hour		
Komohana Street and:	v/c	ADPV	LOS	v/c	ADPV	LOS
Mohouli Street	0.87	46.4	D	0.85	51.8	D
Nowelo Street	0.82	46.8	D	0.71	47.5	D
Puainako Street	0.94	54.9	D	0.80	52.3	D

v/c = overall volume-to-capacity ratio
APDV = average delay per vehicle, in seconds
LOS = level of service

Project Traffic

In order to assess the traffic impact, development of the project site is assumed to be completed by the year 2025. The site is estimated to generate a total of about 15,000 trip ends each weekday at full development. Traffic generated during the morning (AM) and afternoon (PM) peak hours were developed using factors from *Trip Generation, 6th Edition*, a publication of the Institute of Transportation Engineers. These factors are summarized in Table 5.

Table 5
TRIP GENERATION FACTORS

	AM Peak Hour		PM Peak Hour	
	Trip rate	% entering	Trip rate	% entering
University Park Expansion, per employee	0.43	83%	0.41	15%
Community College, per student	0.14	91%	0.17	68%

Source: Institute of Transportation Engineers, *Trip Generation. 6th Edition.*

The peak hour traffic volumes generated by the U.S. Department of Agriculture offices were estimated by Rowell (*Traffic Impact Assessment Report for U.S. Department of Agriculture Pacific Basin Agricultural Research Center*) and have been included in the baseline traffic assignments. The peak hour traffic volumes generated by the 111-acre University Park expansion site and the community college are shown in Table 6. For the community college, the peak hour traffic volumes were based on an enrollment of 4,300 students (from the college's design capacity of 3,000 full-time equivalent students, divided by 0.7, reflecting current enrollment pattern).

Table 6
PROJECT TRAFFIC GENERATION

	AM Peak Hour		PM Peak Hour	
	Entering	Exiting	Entering	Exiting
2,100 Employees, University Park Expansion	749	154	129	731
4,300 Students, Hawaii Community College	548	54	497	234
Total Trip Ends	**1,297**	**208**	**626**	**965**

Traffic Distribution: The project traffic will be distributed onto the roadway system based on the locations of residences and other uses on the island of Hawaii and on the roadway network. The trip distribution used is shown in Table 7.

Table 7
PROJECT TRAFFIC DISTRIBUTION

	AM Peak Hour		PM Peak Hour	
	Entering	Exiting	Entering	Exiting
Komohana Street north	20%	15%	15%	20%
Mohouli Street east	15%	20%	20%	15%
Mohouli Street west	10%	15%	15%	10%
Nowelo Street east	5%	15%	15%	5%
Puainako Street east	15%	20%	20%	15%
Puainako Street west	5%	5%	5%	5%
Komohana Street south	30%	10%	10%	30%

Traffic Assignment: Project traffic was assigned to the roadway system based on the site plan and expected routing within the site. Because the proposed project is not expected to result in a net increase in traffic on Komohana Street to the south, on Mohouli Street to the west, or on Puainako Street to the west, any volumes assigned in those directions were considered to be diverted from the future traffic that will already be on the street system. The future traffic assignments with development of the project are shown on Exhibit 5.

Intersection Analyses: The intersection analyses were redone with the revised traffic assignments for the baseline approach laneage shown previously in Exhibit 4. Results of these analyses are shown in Table 8.

The impact of the project at the intersection of Komohana Street and Mohouli Street will be an increase in average delays in both peak hours; overall intersection condition, however, remains at an acceptable Level of Service D. Similar impacts occur in the AM Peak Hour at the Nowelo Street intersection and in the PM Peak Hour at the Puainako Street intersection.

Table 8
WITH PROJECT INTERSECTION CONDITIONS – NO MITIGATION

	AM Peak Hour			PM Peak Hour		
Komohana Street and:	v/c	ADPV	LOS	v/c	ADPV	LOS
Mohouli Street	0.71	46.6	D	0.82	54.3	D
Nowelo Street	0.79	48.6	D	1.11	94.4	F
Puainako Street	1.05	71.1	E	0.83	54.6	D

v/c = Overall volume-to-capacity ratio
APDV = average delay per vehicle, in seconds
LOS = level of service

At the intersection of Komohana Street and Nowelo Street, with-project volumes in the PM Peak Hour will exceed capacity and conditions would be poor, at Level of Service F. The addition of a third lane on the eastbound approach of Nowelo Street to provide separate lanes for right turns and for through traffic remaining on Nowelo Street would mitigate the over-capacity situation and the poor level of service.

The high volume of westbound right turns result in over-capacity conditions at the intersection of Komohana Street and Puaninako Street in the AM Peak Hour. The addition of a second right turn lane will mitigate these conditions. The lane configurations with these changes at each approach are shown in Exhibit 5. The results of the analyses are summarized in Table 9.

Table 9
SUMMARY OF FUTURE (2025) CONDITIONS AT SIGNALIZED INTERSECTIONS

	AM Peak Hour		PM Peak Hour	
	ADPV	LOS	ADPV	LOS
Komohana Street and Mohouli Street				
Baseline	46.4	D	51.8	D
With project, unmitigated	46.6	D	54.3	D
Komohana Street and Nowelo Street				
Baseline	46.8	D	47.5	D
With project, unmitigated	48.6	D	94.4	F
With project, mitigated	47.7	D	54.3	D
Komohana Street and Puainako Street				
Baseline	54.9	D	52.3	D
With project, unmitigated	71.1	E	54.6	D
With project, mitigated	50.2	D	52.1	D

APDV = average delay per vehicle, in seconds
LOS = level of service

Exhibit 5 also shows traffic assignments for the proposed connections to Mohouli Street and to Puainako Street. At each of these intersections, traffic on the major street (Mohouli Street or Puainako Street) will proceed uninterrupted, with stop signs controlling entry from the minor streets (the project roadway or driveway). A separate left turn lane on the major road was assumed to be created in a third lane located between the travel lanes of the major street in each case. The third lane was also assumed to be extended beyond the intersection to serve as a refuge lane for left turns from the minor street, which then can be made in two steps, first crossing the traffic from the left into the median refuge lane, and subsequently merging with the traffic from the right. The roadway connecting to Mohouli Street will be 40 feet wide, and half of that roadway will allow for separate lanes for left turn and right turn movements. The driveway to Puainako Street was assumed to be a single lane shared by all traffic exiting the parking lot. The intersections were analyzed using the procedure for unsignalized intersections described in the *Highway Capacity Manual* and results are shown in Table 10.

Table 10
UNSIGNALIZED INTERSECTION ANALYSES RESULTS

	AM Peak Hour			PM Peak Hour		
	v/c	ADPV	LOS	v/c	ADPV	LOS
Mohouli Street and project road						
Mohouli Street westbound left turn	0.32	11.8	B	0.34	8.6	A
Project road right turn	0.13	15.7	C	0.40	15.1	C
Project road left turn (with median)	0.19	27.9	D	0.41	27.8	D
Puainako Street and HCC parking lot						
Puainako Street eastbound left turn	0.07	8.4	A	0.03	8.8	A
Driveway shared lane (with median)	0.07	13.1	B	0.37	17.1	C

v/c = overall volume-to-capacity ratio
APDV = average delay per vehicle, in seconds
LOS = level of service

The results of the analyses indicate that left turns onto Puainako Street would not have excessive delays. Left turns to Mohouli Street, however, could have very long delays if a single movement is made. A median refuge lane on Mohouli Street would mitigate this situation, allowing drivers the opportunity to first cross the eastbound traffic, then merge with westbound traffic.

Length of Left Turn Lanes: Left turn lanes at signalized intersections should have sufficient storage to store one-and-a-half times the average number of vehicles that would arrive during one cycle in the peak hour. The capacity analyses indicate that a cycle length of 150 seconds would be needed for the signalized intersections evaluated. Therefore, there would be 24 cycles per hour, the average cycle would have 1/24th of the peak hourly turn

volume, and the lane should store 1/16th of the peak hourly turn volume. In the case of double left turn lanes, the length of each lane should be 55 percent of the length required if only a single lane were provided. The length of the storage lane is based on 25 feet per vehicle, with one of the vehicles being a truck (50 feet) with a minimum length for one car and one truck, or 75 feet.

At unsignalized intersections, the length of storage for left turn lanes would be the average number of vehicles arriving in a two-minute period during the peak hour, or 1/30th of the peak hourly turn volume. As in the case with signalized intersections, the length of the storage lane is based on 25 feet per vehicle, with one of the vehicles being a truck (50 feet). The minimum length required is two vehicles, or 75 feet. Table 11 shows the lengths of left turn lanes for the traffic volumes projected for full development in the year 2025.

Table 11
LENGTHS OF STORAGE FOR LEFT TURN LANES

	AM volume	PM volume	Storage length
Komohana Street			
southbound to Mohouli Street	215	205	375 feet
southbound to Nowelo Street	320	115	525 feet
southbound to Puainako Street	355	1,070	950 feet
northbound to Mohouli Street	305	380	625 feet
northbound to Nowelo Street	515	120	850 feet
northbound to Puainako Street	115	45	225 feet
Mohouli Street			
westbound at Komohana Street	195	400	650 feet
eastbound at Komohana Street	70	95	175 feet
westbound to site access road *	235	40	225 feet
Nowelo Street			
westbound at Komohana Street	90	305	525 feet
eastbound at Komohana Street	45	210	375 feet
Puainako Street			
westbound at Komohana Street	40	225	400 feet
eastbound at Komohana Street	210	130	375 feet
eastbound to college parking lot *	70	30	100 feet

* unsignalized intersection

Timing of Roadway Improvements: The additional roadway improvements needed to accommodate project traffic should be implemented as follows:

a) A third lane on eastbound Nowelo Street approaching the Komohana Street intersection would provide a separate lane for left turns, for through movements, and for right turns. This third lane should be incorporated into the design (a two-lane approach with a median should be constructed initially, since the full build-out volumes are not expected for many years) and implemented when needed. Estimated timetable for the need for the third lane is after the University Park Expansion is 50 percent occupied or after 2010, whichever is later.

b) A second right turn lane from westbound Puainako Street to northbound Komohana Street should be available for use after 2006 or when the University Park Expansion is 15 percent occupied, whichever is later.

Discussion of Findings

With or without the proposed project, future traffic volumes will require that Komohana Street be four lanes wide with separate left turn lanes at major intersections. Additional intersection improvements have been identified to support traffic at full development. At the intersection of Komohana Street and Nowelo Street, a third eastbound lane would be needed. At the intersection of Komohana Street and Puainako Street, a second westbound right turn lane would be needed.

The proposed vehicular access to and from the site to Mohouli Street at an unsignalized intersection would be adequate if a median lane is provided to separate westbound left turns from through traffic and to provide a refuge area for traffic turning left onto Mohouli Street from the site roadway.

The peak hourly traffic generated by the community college will be a smaller portion of the total traffic. An unsignalized intersection from the college parking lot would operate satisfactorily. The master plan also shows a direct access into the parking lot from Komohana Street. The traffic analyses did not account for this access due to closeness of this accessway to the intersection of Komohana Street and Puaninako Street. Due to the projected high volumes of left turn movements at this nearby intersection, left turns in and out of the proposed accessway should not be permitted. While right turns in from and out onto the southbound lanes of Komohana Street may ease traffic conditions elsewhere, the analyses do not indicate that it will serve to mitigate any poor conditions.

The traffic impacts and the additional turning lanes identified as mitigation measures are based on a trip distribution that includes many trips from and to the residential upper Panaewa area (designated as "Komohana Street south" in Table 7). The analyses were done assuming full development by year 2025, and the existing roadway system. Actual use of the University Park may evolve over several years and completion of the future Kupulau Street extension and connection to Ponahawai Street (see Exhibit 1) will provide alternative paths between the project site and the upper Panaewa area.

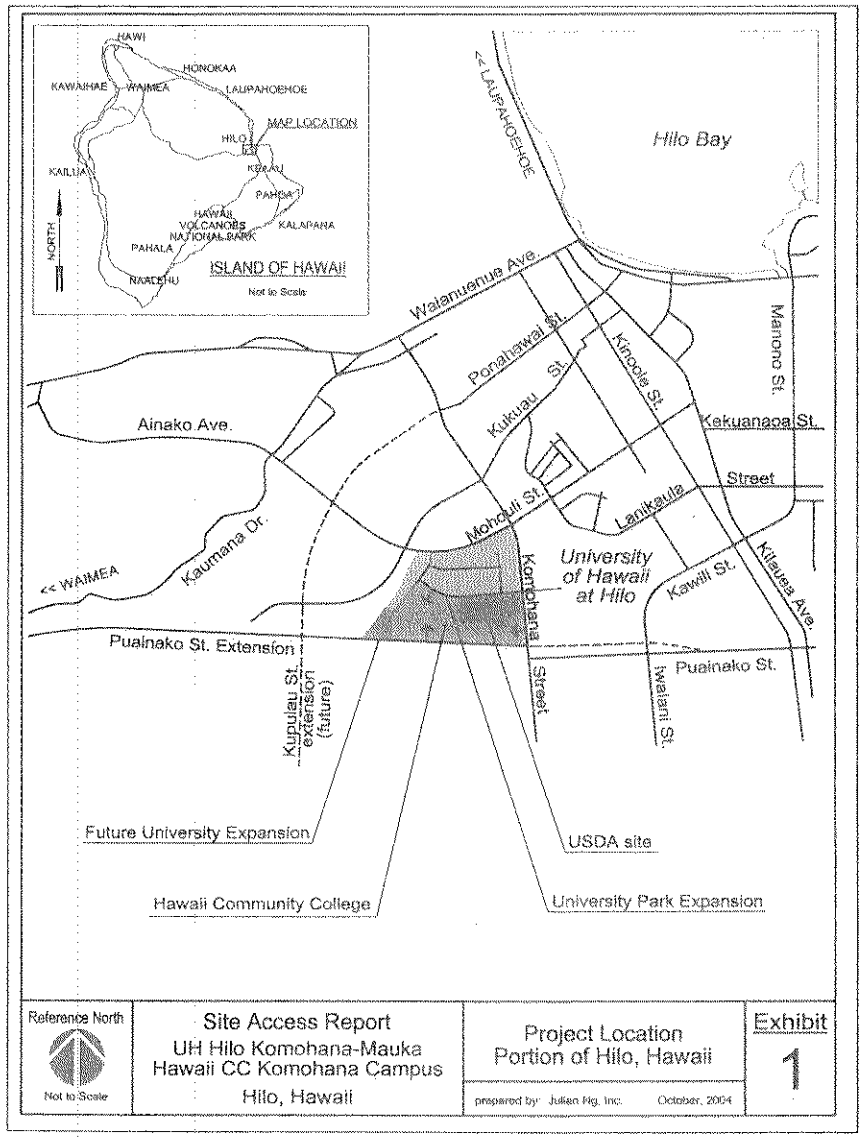
Therefore, improvements identified as mitigation measures should be implemented only when needed. Reservation of rights-of-ways and the provision of adequate setbacks to allow for the future implementation of needed roadway improvements should be included in the master plan.

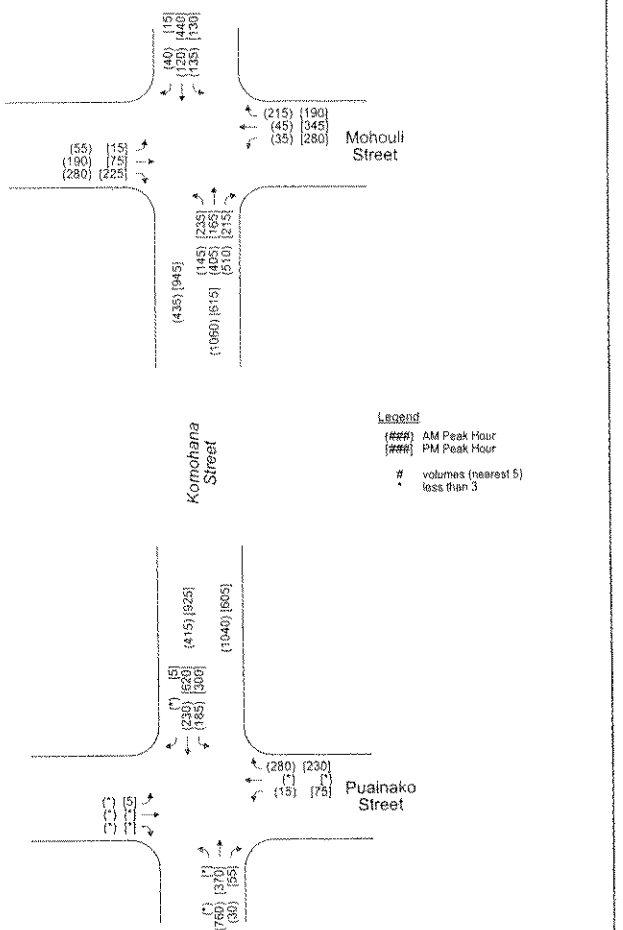
Conclusions and Recommendations

The proposed project's traffic impact will occur as the site is developed. Adequate setbacks and other reservation of land for future roadway widening should be provided for the following minimum street widths adjacent to the site:

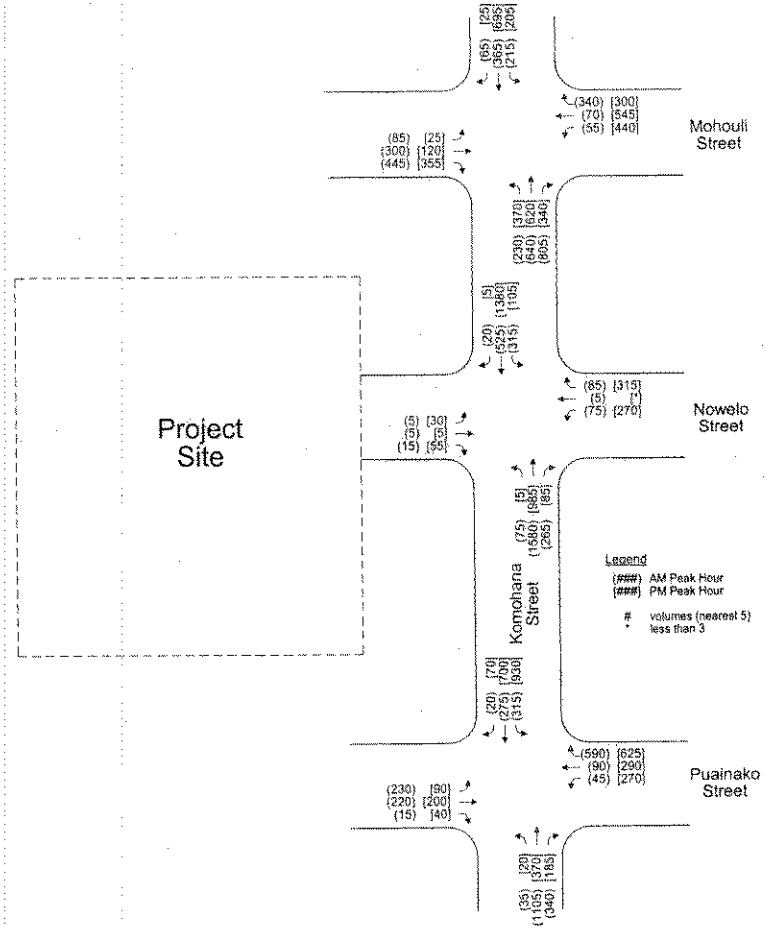
Mohouli Street:	four-lane roadway with additional width at intersections for a separate left turn lane
Komohana Street:	four-lane roadway with additional width at intersections for left turn lanes and separate right turn lanes
Puainako Street:	two-lane roadway with a median left turn lane.

Left turn lanes should be provided to facilitate access to the site. Other improvements should be implemented as warranted by development and traffic conditions.

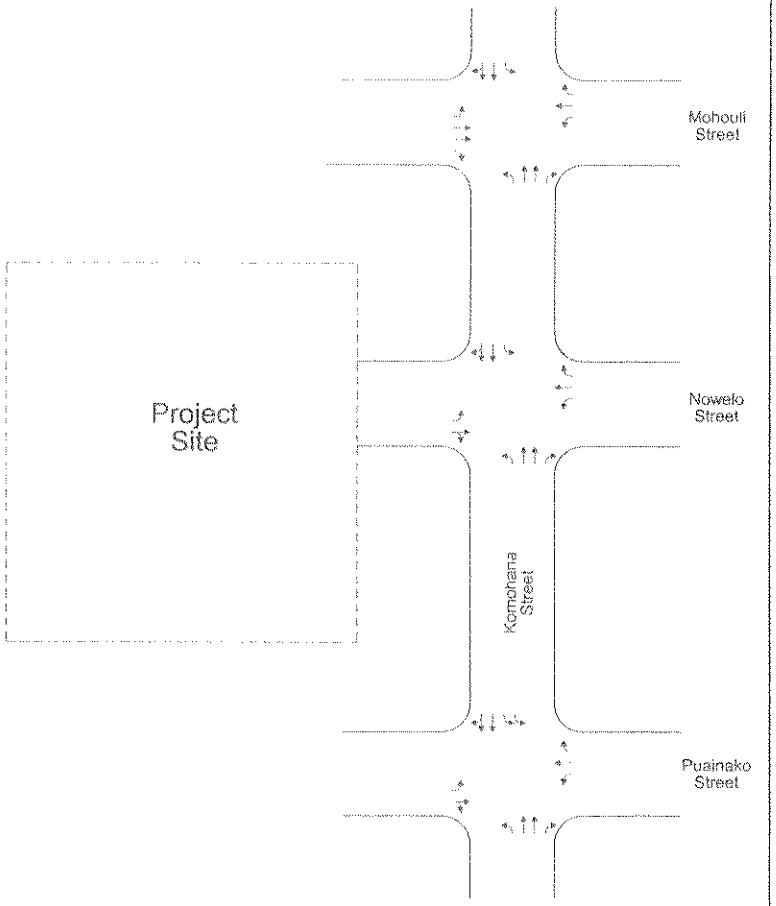




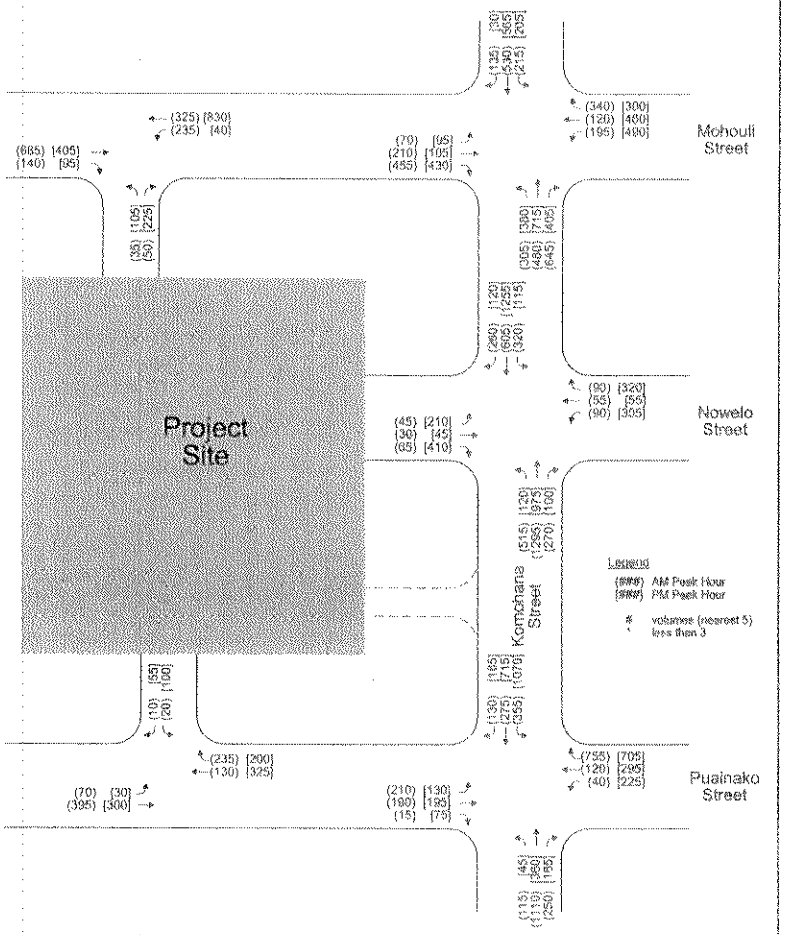
Reference North	Site Access Report	Existing (2002) Traffic	Exhibit
Not to Scale	UH Hilo Komohana-Mauka Hawaii CC Komohana Campus Hilo, Hawaii	prepared by: Julian Ng, Inc. October, 2004	2



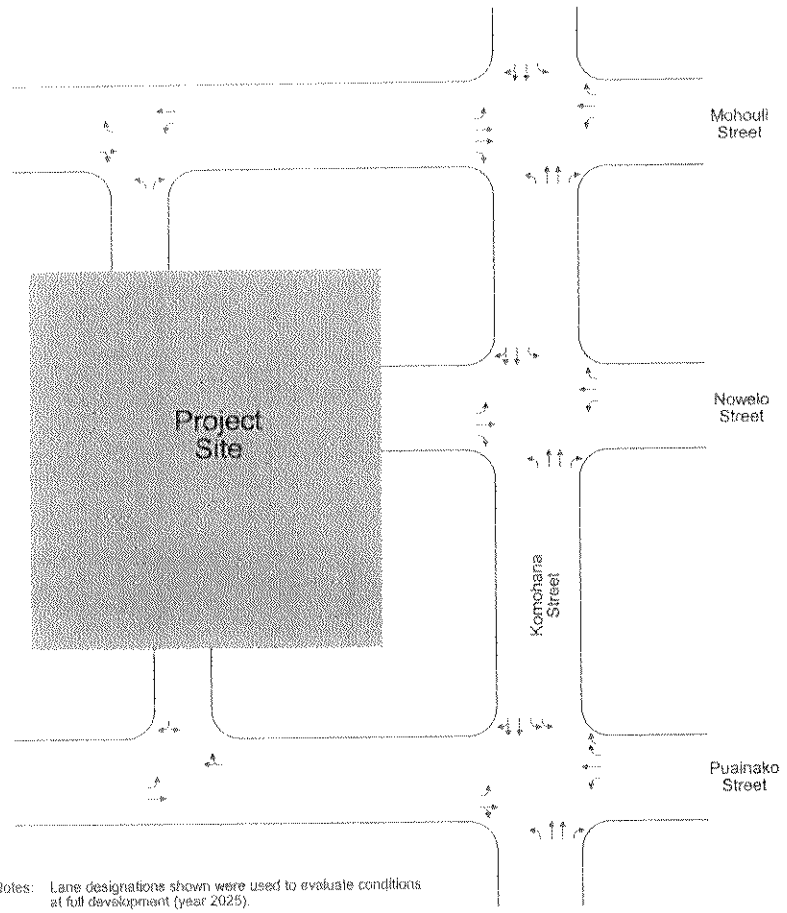
Reference North	Site Access Report	Baseline Future (2025) Traffic in Area	Exhibit
Not to Scale	UH Hilo Komohana-Mauka Hawaii CC Komohana Campus Hilo, Hawaii	prepared by: Julian Ng, Inc. October, 2004	3



Reference North (Not to Scale)	Site Access Report UH Hilo Komohana-Mauka Hawaii CC Komohana Campus Hilo, Hawaii	Approach Lanes Baseline Condition prepared by: Julian Ng, Inc. October, 2004	Exhibit 4



Reference North (Not to Scale)	Site Access Report UH Hilo Komohana-Mauka Hawaii CC Komohana Campus Hilo, Hawaii	Future (2025) Traffic Assignments with Project prepared by: Julian Ng, Inc. October, 2004	Exhibit 5

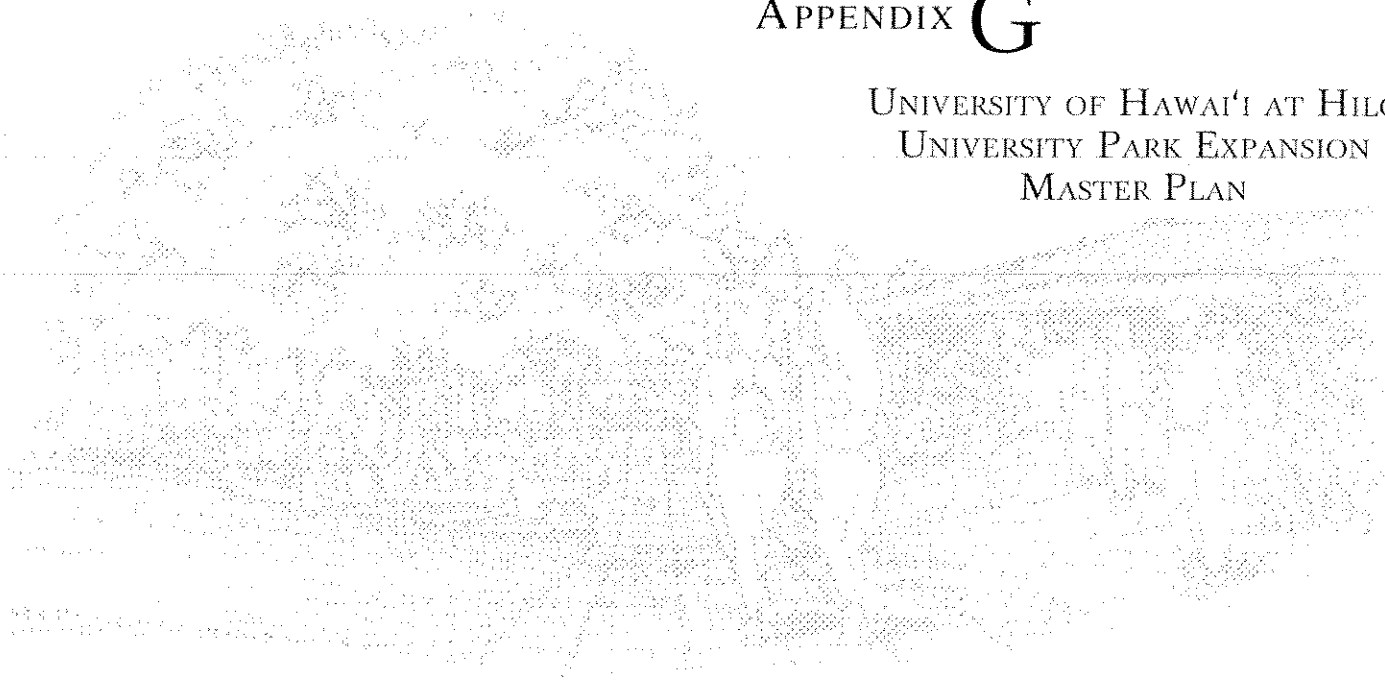


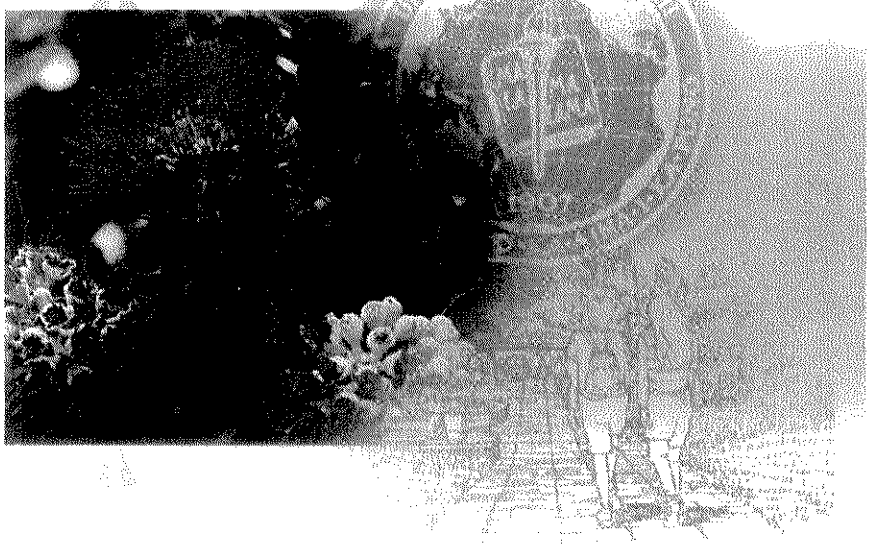
Notes: Lane designations shown were used to evaluate conditions at full development (year 2025).
Interim lane designations may differ and should be evaluated separately.

Reference North Not to Scale	Site Access Report UH Hilo Komohana-Mauka Hawaii CC Komohana Campus Hilo, Hawaii	Approach Laneage With Project prepared by: Julian Ng, Inc. October, 2004	Exhibit 6

Appendix G

University of Hawai'i at Hilo
University Park Expansion
Master Plan





DRAFT

University of Hawai'i at Hilo

University Park Expansion Master Plan

PBR HAWAII

January 2005

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 BACKGROUND 1
1.2 PURPOSE 1

2.0 SITE ANALYSIS 3
2.1 DESCRIPTION OF THE 267-ACRE STATE-OWNED PARCEL 3
2.1.1 Location and Description of Property 3
2.1.2 Surrounding Land Uses 3
2.1.3 Climate 4
2.1.4 Topography and Slopes 4
2.1.5 Flooding and Drainage 5
2.1.6 Wetlands 6
2.1.7 Soils 7
2.1.8 Earthquakes and Volcanic Hazards 7
2.1.9 Botanical Resources 8
2.1.10 Mammalian and Avian Species 9
2.1.11 Archaeological and Historical Sites 10
2.1.12 Cultural Sites and Practices 10
2.1.13 Visual Resources 13
2.1.14 Easements 14
2.1.15 Roadways and Circulation 15
2.1.15.1 Existing and Proposed Roadways 15
2.1.15.2 Vehicular Traffic 16
2.2.1 State of Hawai'i 17
2.2.1.1 Chapter 343, Hawaii Revised Statutes 17
2.2.1.2 Chapter 205, Hawaii Revised Statutes 17
2.2.2 County of Hawai'i 17
2.2.2.1 General Plan 17
2.2.2.2 County Zoning 18
2.2.3 Federal 18
2.2.3.1 Americans with Disabilities Act (ADA) 18

3.0 MASTER PLAN 20
3.1 MASTER PLAN CONCEPT AND SUBDIVISION 20
3.2 OPEN SPACE AND PEDESTRIAN MALL 20
3.3 ACCESS AND CIRCULATION 21
3.3.1 Vehicular Access and Circulation 21
3.3.2 Pedestrian, Bicycle, and Barrier-free Access and Circulation 22
3.4 CIVIL IMPROVEMENTS 23
3.4.1 Drainage Plan 23

3.4.1.1 Existing Conditions 23
3.4.1.2 Basis of Design 24
3.4.1.3 Proposed Plan 24
3.4.2 Water Plan 24
3.4.2.1 Existing Conditions 24
3.4.2.2 Basis of Design 25
3.4.2.3 Proposed Plan 25
3.4.3 Wastewater Plan 27
3.4.3.1 Existing Wastewater Facilities 27
3.4.3.2 Basis of Design 27
3.4.3.3 Proposed Plan 28
3.5 ELECTRICAL AND COMMUNICATION PLAN 29
3.5.1 Electrical Facilities 29
3.5.1.1 Existing Electrical Facilities 29
3.5.1.2 Proposed Electrical System 29
3.5.1.3 Existing Roadway Lighting System 31
3.5.1.4 Roadway Lighting System 31
3.5.2 Communication Facilities 31
3.5.2.1 Existing Telephone System 31
3.5.2.2 Proposed Telephone System 31
3.5.2.3 Existing Cable Television System 32
3.5.2.4 Proposed Cable Television System 32
3.5.2.5 Existing Communication System 32
3.5.2.6 Proposed Communication Facilities 32
3.6 LANDSCAPE MASTER PLAN 32

4.0 DESIGN GUIDELINES 39

5.0 PHASING PLAN AND COST ESTIMATES 40
5.1 PHASING PLAN 40

6.0 REFERENCES 41

LIST OF FIGURES AND TABLES

Figure		Follows Page
2.1	Site Analysis	3
3.1	Mauka Lands Master Plan	20
3.2	Nowelo Street Entry Roadway Section	21
3.3	Nowelo Street Extension Roadway Section	21
3.4	Typical Internal Roadway Section	21
3.5	Bicycle and Pedestrian Circulation Plan	22

Table		Page
3.1	Plant List	34

1.0 INTRODUCTION

1.1 BACKGROUND

The University of Hawai'i at Hilo (UH Hilo) is a comprehensive four-year State University offering a residential campus on the eastern side of the island of Hawai'i. Just minutes from Downtown Hilo, Hilo International Airport, and Hilo Bay, UH Hilo consists of a 115-acre main campus, an adjoining 116-acre University Park of Science and Technology (University Park), and a 110-acre University Agricultural Farm Laboratory located in Pana'ewa Agricultural Park.

In order to build upon the economic and educational synergy created between the University, the research facilities at University Park, and the community, UH Hilo is planning to expand University Park on currently undeveloped State lands mauka of the existing University Park. The proposed University Park Expansion will encompass approximately 118 acres of a 267-acre State-owned parcel, also referred to as the UHH Mauka Lands parcel. This parcel is bordered by Komohana Street to the east, Pū'ainakō Street Extension (opened to traffic in September 2004) to the south, the Sunrise Estates Subdivision to the west, and Mohouli Street Extension to the north. The Tax Map Key (TMK) number for this parcel is (3) 2-4-01:122.

In April of 1998, the State of Hawai'i Board of Land and Natural Resources (BLNR) designated approximately 326 acres of land in Hilo for general University and Community College purposes. In 1999, the BLNR approved the University's request for a management right-of-entry for this parcel for planning and design purposes including necessary environmental studies, topographical fieldwork, and surveying by the United States Department of Agriculture (USDA) for a proposed Pacific Basin Agricultural Research Center (PBARC). In November of 1998, the UH Board of Regents authorized the UH Administration to enter into a lease agreement with the USDA on approximately 30 acres of land. Of the remaining land, approximately 118 acres were allocated for the University Park Expansion, 27.7 acres for Future University Expansion, 122 acres for the Hawai'i Community College (Hawai'i CC) Komohana Campus, and 1.4 acres for an archaeological site.

1.2 PURPOSE

This master plan serves as a guide for the physical development of the 118-acre University Park Expansion. The objective of this master plan is to develop a physical plan that achieves the University's goals for expanding University Park, guides the efficient and cost-effective development of University Park Expansion, and complies with government, utility, and historical/aesthetic/environmental requirements. While

this document reflects current plans, policies, and thinking by the University, some assumptions related to policies, priorities, resources, and technology in the future have been made. As such, this master plan may require periodic review and revision. However, it is hoped that the vision, guidelines, and recommendations established by this master plan will provide a lasting framework for the development of the University Park Expansion.

This master plan is comprised of five sections. The first two sections (*1.0 Introduction* and *2.0 Site Analysis*) provide background information and a technical foundation. The third section (*3.0 Master Plan*) describes the overall vision and concept. The remaining two sections (*4.0 Design Guidelines* and *5.0 Phasing Plan and Cost Estimates*) provide more specific information on the design and development of University Park Expansion.

2.0 SITE ANALYSIS

This section describes the existing conditions of the 267-acre State-owned parcel, also known as the UH Hilo Mauka Lands. The parcel consists of approximately 118 acres for the University Park Expansion, 122 acres for the Hawai'i CC Komohana Campus, and 28 acres for other University-related functions. Site analyses were conducted in preparation for the *University of Hawai'i at Hilo Mauka Lands Master Plan Environmental Impact Statement (EIS)*. Government regulations and procedural requirements for development of the parcel are also discussed in this section.

2.1 DESCRIPTION OF THE 267-ACRE STATE-OWNED PARCEL

To establish a context for development of the 118-acre University Park Expansion, a description of the site constraints and opportunities related to the entire 267-acre State-owned parcel follows. Where applicable, information specific to the 118-acre parcel is provided.

2.1.1 LOCATION AND DESCRIPTION OF PROPERTY

The 267-acre parcel is located in the city of Hilo, mauka of the UH Hilo University Park. The parcel is bordered by Komohana Street to the east, Pū'ainakō Street Extension (recently opened to traffic) to the south, Mohouli Street Extension to the north, and the Sunrise Estates Subdivision to the west (see Figure 2.1). University Park Expansion comprises approximately 118 acres in the northern portion of the parcel, between Mohouli Street Extension and the proposed Nowelo Street Extension. Hawai'i CC will be located on approximately 122 acres south of University Park Expansion, between the proposed Nowelo Street Extension and Pū'ainakō Street Extension. At the southwest corner of the parcel, an additional 27.7 acres is allocated for Future University Expansion.

The 267-acre parcel is classified as ceded land by the State of Hawai'i Department of Land and Natural Resources (DLNR). The parcel is currently vacant and covered with thick vegetation.

2.1.2 SURROUNDING LAND USES

Vacant State land and Mohouli Street Extension border the northern portion of the 267-acre parcel. Komohana Street separates the eastern portion of the parcel from the existing University Park, which is currently being developed by the UHH and has a

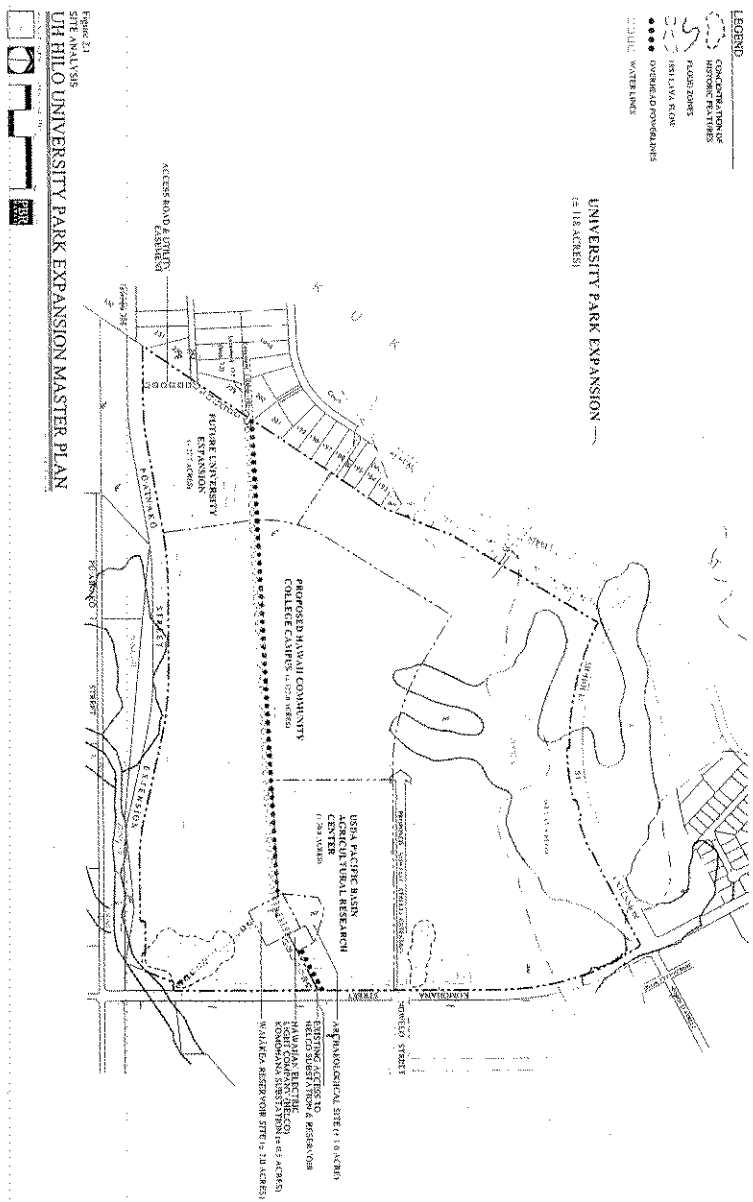


Figure 2.1
SITE ANALYSIS
UH HILO UNIVERSITY PARK EXPANSION MASTER PLAN

number of tenants (primarily research and astronomy-related facilities). Vacant State land and Pū'ainakō Street Extension border the southern portion of the parcel. Residential developments in the vicinity of the parcel include the Komohana Gardens Subdivision to the south and the Sunrise Estates Subdivision to the west (mauka).

On the eastern portion of the 267-acre parcel, four outparcels border Komohana Street. Hawaii Electric Light Company (HELCO) Komohana Substation (TMK: 2-4-01:166) is located on an approximately half-acre piece of land. Adjacent to the substation is the 0.5-million gallon (MG) Waiākea Reservoir (TMK: 2-4-01:40), located on a 2.066-acre parcel. Adjacent to these utilities are the 1.4-acre archaeological preservation area (TMK: 2-4-01:170) and the proposed USDA PBARC (TMK: 2-4-01:169) on a 30-acre parcel of land.

Within the 30-acre property leased by the USDA, the PBARC will occupy about 25 acres of land and will grant the Forest Service the right to construct, occupy, and maintain its Institute of Pacific Islands Forestry (IPIF) complex on the remaining 5 acres west of the PBARC. The PBARC is planned to have a total floor area of approximately 122,575 square feet, with access from Nowelo Street Extension, once it is constructed. Until Nowelo Street is extended, a temporary driveway entrance may be provided from an existing private access road from Komohana Street serving the adjacent Waiākea Reservoir and HELCO Komohana Substation. The IPIF facility is planned to have a total floor area of approximately 30,200 square feet.

2.1.3 CLIMATE

Temperatures in the Hilo area are very moderate, with average daily minimum and maximum temperatures ranging from 66 to 82 degrees Fahrenheit. At Hilo International Airport, about one mile east of the parcel, average monthly temperatures were recorded to be about 73 degrees Fahrenheit, with a range between 70 and 76 degrees Fahrenheit. Rainfall in Hilo is substantial, with an average of 129 inches per year. Northeast trade winds typically occur during the day, while winds from the southwest typically occur during the night due to cold air drainage from the mountains. The mean annual wind speed at the airport is about 8 miles per hour (mph), and usually varies between about 4 and 12 mph during the day.

2.1.4 TOPOGRAPHY AND SLOPES

The island of Hawai'i is the largest island in the Hawaiian Archipelago, covering an area of approximately 4,000 square miles. The island is larger than all the other Hawaiian Islands combined and was formed by the activity of five shield volcanoes: 1) Kohala (long extinct); 2) Mauna Kea (some activity during recent geologic times); 3) Hualālai (last erupted in 1801 and considered dormant); 4) Mauna Loa (active); and 5) Kilauea (active). The 267-acre Mauka Lands parcel is located at the eastern end of the island on the lower, northeastern flank of the Mauna Loa Volcano.

UNIVERSITY PARK EXPANSION MASTER PLAN
UNIVERSITY OF HAWAI'I AT HILO

The parcel slopes from the west to the east. The slope generally ranges from 5 to 10 percent, with isolated areas having slopes greater than 15 percent. Topographic features in the immediate vicinity of the parcel consist of gradually increasing slopes traveling in a northeast to southwest direction.

Within the 118-acre University Park Expansion site, elevations range from approximately 400 feet above mean sea level (msl) near the Future University Expansion area (southwest corner bordering the Sunrise Estates Subdivision) and approximately 280 feet msl at the intersection of Mohouli Street Extension and Komohana Street (northeast corner). The average slope of the site is 4 percent, with flatter slopes located within the western/central portion and steeper slope gradients along the eastern edge. The steep slopes are generally limited and should not pose a constraint to development.

2.1.5 FLOODING AND DRAINAGE

Flooding. According to the Flood Insurance Rate Map (FIRM), Community Panel Number 155166 0880 C (revised September 16, 1988), the majority of the 267-acre parcel is designated Zone X, which includes areas determined to be outside the 500-year floodplain. Portions of the 118-acre University Park Expansion site are located within Zone A, which are areas inside the 100-year floodplain (no base flood elevations determined) (see Figure 2.1).

Designated floodways in the northern portion of the 267-acre parcel are associated with an unnamed tributary, and floodways south of the parcel are associated with Waiākea Stream. The floodways run in a west to east-northeast direction. The 267-acre parcel is not located within a tsunami inundation area, and at the lowest point (northeast corner of the University Park Expansion), the elevation is about 280 feet msl.

The areas contributing to the Zone A floodplain appear to be greatly reduced with construction of the Sunrise Estates Subdivision and related drainage improvements. Therefore, when lots within the current Zone A designation are developed, a detailed flood study should be performed to determine the 100-year floodplain. If the floodplain differs from what is shown on the FIRM, an application should be made for a Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR). Appropriate drainage improvements for the 267-acre parcel will be provided in compliance with County building codes and design standards to address surface runoff from increased impervious surfaces.

Drainage. Two major drainageways are located east (makai) of the 267-acre parcel, in the University Park area. One major drainageway is Waiākea Stream, which traverses

along the southern and eastern boundaries of University Park. The other drainageway is a drainage ditch along the northern boundary of University Park. This drainage ditch separates University Park from the University Heights Subdivision and discharges into Waiākea Stream near the Lanikaula Street Bridge.

Four drainage crossings exist along Komohana Street: 1) a lined channel under the bridge over Waiākea Stream; 2) an arch culvert (9'-6" x 6'-5") that outlets into an unlined channel diverted along the western boundary of the Komohana Agricultural Complex (east of the parcel across Komohana Street) and discharges into Waiākea Stream; 3) an arch culvert (11'-5" x 7'-3") approximately 250 feet south of the Waiākea Reservoir Access Road discharging into University Park; and 4) an arch culvert (16'-5" x 10'-3") near the Mohouli Street and Komohana Street intersection discharging into the drainage ditch along the northern boundary of University Park.

Surface runoff follows natural slope conditions since the parcel is undeveloped. However, past observations of the drainage crossings at Komohana Street have shown that very little runoff from the parcel appears to discharge into the University Park area. Two lined, trapezoidal drainage ditches located in Kipuni and Makana'a Streets of the Sunrise Estates Subdivision discharge into the parcel during times of heavy rainfall. The drainage ditches are downstream of existing drywell inlets.

Facilities constructed within the 267-acre parcel will not be allowed to discharge more than pre-development runoff quantities onto roadways. The overflow would go to drainage systems in the roadways. As such, storm runoff generated from areas mauka of the parcel could be intercepted and conveyed through or around it to the two existing drainage structures running under Komohana Street. The runoff generated on-site would be handled by a network of drainpipes and drywell inlets. Overflow from drywell inlets during large storms could be accommodated by unlined or lined swales/ditches and directed to existing drainageways. The drywell drainage facilities for storm runoff must meet State Department of Health (DOH) requirements, particularly those stated in *Hawaii Administrative Rules*, Section 11-23. The 267-acre parcel is located mauka of the Underground Injection Control (UIC) line, which regulates the use of injection wells for disposal of domestic and non-domestic wastewater. However, a UIC permit would be obtained for the drywells. No State wells are located in or near the parcel.

2.1.6 WETLANDS

According to the State digitized GIS (geographic information system) maps showing the 1978 National Wetlands Inventory Maps, there is a palustrine (marshy), scrub/shrub, broadleaf evergreen, seasonal wetland (PSS3C) along Waiākea Stream, to the south of the 267-acre parcel. Additional information related to wetlands is limited due to the existing vegetation, which makes penetration of this area difficult.

2.1.7 SOILS

According to the U.S. Department of Agriculture (*1973 Soil Survey of Island of Hawaii, State of Hawaii*), soils within the 267-acre parcel (including the 118-acre University Park Expansion site) consist of Pāhoehoe Lava Flows (rLW) and Keaukaha Extremely Rocky Muck (rKFD).

Within the University Park Expansion site, pāhoehoe lava flows comprise a small portion in the northeast and a large part of the central and southern areas. This land type has a billowy, glassy, and relatively smooth surface; however, some surface areas are rough and broken, with hummocks and pressure domes. Pāhoehoe lava usually has no soil covering and is typically bare of vegetation, with the exception of mosses and lichens. Pāhoehoe lava is very slowly permeable, but water moves rapidly through its cracks.

Northern and central portions of the University Park Expansion site are dominated by Keaukaha Extremely Rocky Muck, which consists of well-drained, thin organic soils overlaying pāhoehoe lava bedrock. Runoff potential on this soil type is medium, and the erosion hazard is slight.

2.1.8 EARTHQUAKES AND VOLCANIC HAZARDS

The island of Hawai'i is subject to earthquakes, lava flows, hurricanes, tsunami, and flooding hazards. Hawai'i experiences thousands of earthquakes each year; however, most are only detectable by instruments. Since 1868, most of the larger, damaging earthquakes (magnitude 6 or greater) have occurred in the southeastern region of the island. The largest earthquake near Hilo had a magnitude of 6.2 and occurred in Honomū in 1973. The entire island is designated Zone 4 for seismic hazard, and as such, facilities and other accessory structures would be structurally designed and constructed in accordance with applicable County design standards for Zone 4 areas.

The current U.S. Geological Survey volcanic hazard zone map for the island of Hawai'i divides the island into zones ranked from 1 through 9 (with 1 being the area of greatest hazard and 9 being the area of least hazard) based on probability of coverage by lava flows. According to this map, the entire Hilo area is within Zone 3. This hazard rating indicates that the zone is gradationally less hazardous than Zones 1 and 2 because it is a greater distance from active vents and the topography makes it less likely to be covered by lava flows. Zone 3 has had one to five percent covered by lava since 1800, and 15 to 75 percent covered in the last 750 years. Northern and western portions of the 118-acre University Park Expansion site were covered by lava flows from Mauna Loa as recently as 1881.

2.1.9 BOTANICAL RESOURCES

A botanical survey of the 267-acre parcel was prepared by Char & Associates in October 2003 for the *University of Hawai'i at Hilo Mauka Lands Master Plan EIS*. The objectives of this survey were to prepare a description of the vegetation on the parcel, inventory the flora, search for threatened and endangered species, and identify areas of potential environmental problems or concerns. The survey identified three vegetation types within the 267-acre parcel.

'Ōhi'a/Uluhe Forest. 'Ōhi'a/uluhe forest covers the majority of the 267-acre parcel. This vegetation type, which is found on geologically young lava flows and shallow soils, is fairly common on the lower windward slopes of the Puna and Hilo regions. It is a lowland, wet forest primarily composed of uluhe fern (*Dicranopteris linearis*) and native 'ōhi'a trees (*Metrosideros polymorpha*). The 'ōhi'a/uluhe forest represents a fairly early stage in plant succession on wet lava flows and does not support a rich diversity of native plant species. Two introduced species, melastoma (*Melastoma candidum*) and strawberry guava (*Psidium cattleianum*), are commonly encountered within this vegetation type.

Strawberry Guava Thicket. Strawberry guava thicket with scattered 'ōhi'a trees are found within the 267-acre parcel in places where soil is somewhat deeper, including along the western boundary near the Sunrise Estates Subdivision, around the northeastern corner of the parcel, and at the southeastern corner adjacent to Pū'ainakō Street Extension. These areas appear to have been disturbed in the past, perhaps by cattle grazing. The strawberry guava thicket at the southeastern corner of the parcel appears recently disturbed, as it supports a number of ornamental/landscape plants.

Ruderal Vegetation. Ruderal vegetation consists of a varied assemblage of mostly introduced grasses, herbs, and shrubs, and occupies a small portion of the 267-acre parcel. It is found in areas infrequently maintained, such as the utility easement bordering the PBARC and along the periphery of the parcel.

A total of 126 species were inventoried on the property, 99 (79 percent) of which are introduced or alien species. Most of these introduced species are associated with ruderal vegetation, although a few represent ornamental/landscape material that has escaped cultivation and established populations. The inventory included 23 native species, 17 of which are indigenous (native to the Hawaiian Islands and elsewhere) and six of which are endemic (native only to the Hawaiian Islands). Endemic plants found on the project site include 'ōhi'a, 'ama'u (*Sadleria cyatheoides*), hāpu'u (*Cibotium glaucum*), ni'ani'au (*Neprolepis exaltata* ssp. *hawaiiensis*), neneleau (*Rhus sandwicensis*), and 'ahanui or 'uki (*Machaerina mariscoides* ssp. *meyenii*).

None of the plants inventoried are threatened, endangered plants, or species of concern. The native plants observed on the parcel can be found elsewhere in 'ōhi'a/uluhe forests

throughout the Puna and Hilo regions. The botanical study concluded that the proposed development of the parcel is not expected to have a significant impact on botanical resources.

Act 73 of the *Hawaii Revised Statutes* mandates that any new or renovated landscapes for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants wherever and whenever feasible. The botanical study recommended that, wherever possible, the existing larger 'ōhi'a trees be incorporated into the landscaping plan, and that some of the smaller trees be transplanted within the parcel. Other native species that are suitable for landscaping include: hāpu'u, loulu palm (*Prictchardia beccariana*), 'ohe (*Tetraplasandra*), 'ama'u, ni'ani'au, neneleau, 'akiohala (*Hibiscus furcellatus*), and 'ahanui. Some of these plants already exist within the parcel.

The UH Hilo Botany and Horticulture departments, as well as native plant societies, could be consulted for additional information and suggestions of native plants suitable for landscape use. The UH Hilo Center for Conservation Research and Training (CCRT) grows native plants at its facilities and should be contacted for plant material.

2.1.10 MAMMALIAN AND AVIAN SPECIES

A wildlife survey of the 267-acre parcel was conducted by Tim J. Ohashi in October 2003 for the *UH Hilo Mauka Lands Master Plan EIS*. The objectives of the wildlife survey were to describe the avian and mammalian species found on the parcel and determine whether any threatened, endangered, or sensitive species were present and how they would be impacted by development.

Mammalian Species. Mammals encountered or expected to be found on the parcel include feral pigs (*Sus scrofa*), Small Indian Mongoose (*Herpestes auropunctatus*), cats (*Felis cattus*), feral dogs, (*Canis familaris*), rats (*Rattus spp.*), and house mice (*Mus musculus*). A Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), listed as an endangered species by both State and Federal governments, was observed just outside the parcel flying over a residential subdivision near the southwest corner. The study noted that bats are normally not present in closed canopy forests, which are present on much of the parcel, but they are frequently seen along edges of these forests among exotic trees and in orchards. Bats have a wide distribution throughout the island of Hawai'i, and it could not be determined whether the species is dependent on this particular parcel or if the individual was merely passing over it, as observed.

Avian Species. Birds seen or heard on the parcel include the Melodius Laughing Thrush (*Garrulax canorus*), Japanese White-eye (*Zosterops japonica*), Spottend Dove (*Streptopelia chinensis*), Zebra Dove (*Geopelia striata*), Northern Cardinal (*Cardinalis cardinalis*), House Finch (*Carpodacus mexicanus*), Common Myna (Acridotheres tristis), Nutmeg Mannikin (*Lonhura punctulata*), and Pacific Golden Plover (*Pluvialis dominica*). Although the parcel supports a native 'ōhi'a forest, no native birds were observed on

the parcel. No threatened or endangered birds were observed either, although the parcel is within current known distribution of the Pueo (*Asio flammeus*) and the endangered Hawaiian Hawk (*Buteo solitarius* or io) and the habitat on the site and in adjacent properties could support the species. No Newell's Shearwaters (*Puffinus auricularis newelli*) or Hawaiian Petrels (*Pterodroma sandwichensis*) were observed during the survey, but they have been recorded in Hilo transiting to and from locations further mauka on Mauna Kea.

2.1.11 ARCHAEOLOGICAL AND HISTORICAL SITES

An archaeological inventory survey of the 267-acre parcel was completed by Scientific Consultant Services, Inc. (SCS) in November 2003 for the *UH Hilo Mauka Lands Master Plan EIS*. Archaeological field studies of the area were conducted in May and June 2003, and the State Historic Preservation Division (SHPD) reviewed the report in September 2004. The survey identified no pre-Contact sites in the parcel.

Sixteen sites, comprising 80 features, were recorded in this survey and three previously documented sites were reassessed. Most of these sites were interpreted as being related to historic sugar cane cultivation, ranching, or military activities. Of the 19 sites, 17 required no further work and two were recommended for data recovery. Sites 24243 and 24244 were recorded because of their importance in documenting military defense and training activities in the upland Hilo area. No sites were recommended for preservation.

Concentrations of historical sites on the parcel are shown in Figure 2.1. Sites in the southeast corner of the parcel are associated with sugar cane agriculture (field-clearing mounds) and are likely remnant portions of Waiākea Mill. The concentration of historical sites at the intersection of Komohana Street and Nowelo Street Extension are associated with military activities.

Just outside of the 267-acre parcel, an approximately 1-acre archaeological site is surrounded by the PBARC, the HELCO Komohana Substation, and the Waiākea Reservoir (see Figure 2.1). A single human femur was found in an overhang of a lava tube within a shallow skylight. This site is a State Burial Preserve (Site 50-10-35-22,080).

2.1.12 CULTURAL SITES AND PRACTICES

A cultural impact assessment was performed by PBR Hawaii in September 2003 for the 267-acre parcel. The study assessed the potential impacts of the proposed developments on traditional cultural practices, including native Hawaiian gathering rights. A review of existing archaeological information, as well as oral interviews with cultural practitioners familiar with the area, were part of this study. The assessment is included below in its entirety.

History. Waiākea and Hilo have been known as rich, sustainable areas associated with a number of Hawai'i's most prominent ali'i (chiefs) and often mentioned in Hawaiian folklore and history because of their resources. Both Hilo and Waiākea are mentioned as a residence or favorite visiting place in famous stories such as Hi'iaka and Pele, 'Umi-a-Liloa, 'Ulu, Kawelo, Keaomelemele, and Kūapāka'a. In narratives recorded as Kepā Maly, the lands of Waiākea were actually named after a high chief:

> *...the lands of Waiākea were named for the high chief Waiākea-nui-kumuhonua. The brother of Pi'ihonua-a-ka-lani and Pana'ewa-nui-moku-lehua. After departing from Pana'ewa, Ka-Miki mā met Haili-kula-manu, who was a guardian of Waiākea. Haili led Ka-Miki and his companions to his chief's compound at Kalepolepo [February 17,1916]. Arrangements were made for Ka-Miki to compete with the 'ōlohe – experts of Waiākea, with the events to be held at the kahua [contest site] at Kalepolepo...*

Waiākea was the home of 'Ulu, a legendary man living in a time of famine. 'Ulu eventually died of starvation and was buried next to a fresh water spring. The next day, an 'ulu (breadfruit) tree filled with fruit stood where he was buried, ending the famine in Waiākea. In *Native Planters in Old Hawai'i*, Handy and Handy recorded the agricultural development of Waiākea and Hilo:

> *In lava-strewn South Hilo there were no streams whose valleys or banks were capable of being developed in terraces, but [taro] cuttings were stuck into the ground on the shores and islets for many miles along the course of the Wailuku River far up into the forest zone. In the marshes surrounding Waiākea Bay, east of Hilo, taro was planted in a unique way known as kanu kipi...On the lava-strewn plain of Waiākea and the slopes between Waiākea and the Wailuku River, dry taro was formerly planted wherever there was enough soil. There were forest plantation in Pana'ewa and in the lower fern-forest zone above Hilo Town and along the course of the Wailuku River (Handy & Handy, 1972).*

While Waiākea was, in ancient times, very rich in agriculture, it became a home for sugar plantations from the mid-1800s through the mid-1900s. Waiākea and Hilo's lands were filled with crops of sugar, as commercial sugar became the top industry and Waiākea Mill the largest in the district. After statehood and with the closing of Waiākea Mill, Hilo relied on tourism as its economic mainstay. Waiākea eventually included in an airport, hotels along Hilo Bay, residential subdivisions, and an accredited University.

Existing Conditions. According to Van James in his book *Ancient Sites of Hawai'i*, Hilo was known to support ancient settlements. Although it is certain that there were many heiau, Hawaiian temples of worship, the only evidence of ancient temples in the area include Naha and Pinao Pōhaku. Recorded accounts of destroyed heiau include Kaipalaoa, Kānoa, Kīnailoa, and 'Ōhele heiau.

> *The sources of Hilo's rich water supply include two major rivers, a number of streams, Waiākea Fishpond, and an annual rainfall of about 140 inches. Famous natural landmarks in the district include the 'Akaka Falls and Waiānuenue (Rainbow Falls). Other natural features include Ka Wa'a o Māui, Mo'o Kuna, and the Boiling Pots, all on the Wailuku River.*

The following individuals were asked if they were aware of any cultural practices or archaeologically significant sites within the property: Mr. Jeno Enoncencio (Cultural Specialist), Mrs. Pua Kanehele (Professor/Kumu Hula), Mr. Larry Kimura (Professor of Hawaiian Studies - UH Hilo), Mr. Kepā Maly, Ms. Kealoha Piscotta (Cultural Specialist), Ms. 'Ululani Sherlock (Cultural Specialist), and Mr. Kalani Flores (Instructor at Hawai'i Community College).

Mr. Flores deferred comment and suggested that Hawaiian organizations such as the Edith Kanaka'ole Foundation and Hawaiian Civic Clubs might have more information. Hawaiian Studies professor and co-founder of the Edith Kanaka'ole Foundation, Ms. Pua Kanahele said she was not familiar with Waiākea but offered some oral history of the Waiākea area.

Mr. Larry Kimura, a professor of Hawaiian Studies and Language at the University of Hawai'i at Hilo, was not aware of any obvious cultural practices or archaeological evidence in the area. Mr. Kimura noted that the Lava Flow of 1881 flowed through the area and may have covered any culturally significant sites. He also mentioned that the proposed development is near the campsite where Princess Ruth Ke'elikōlani was summoned to help the people of Hilo and try to stop the lava flow from destroying more of Hilo town.

Ke'elikōlani was often referred to as "the Last of the Kamehamehas". The high Chiefess was an ali'i who held true to Hawaiian beliefs, refusing instruction and influences from the protestant missionaries. Although fully capable, Ruth refused to speak any English. Many Hawaiians loved her, while many hated or were terrified of her. In 1881, lava flowed to the edge of Hilo town. After months of prayer, many Hawaiians approached the Kamehameha descendent and requested her help. Kristin Zambuka, author of *The High Chiefess Ke'elikōlani* writes:

> *She sent for her bookkeeper to fetch her required offerings for Pele: red silk handkerchiefs and brandy...Ruth tied one of the red handkerchiefs around her throat, bandanna style, then announced that she was ready to go the edge of lava...They were awed as the mighty Chiefess moved boldly and fearlessly towards the fiery edge as if she were going to greet an old friend...Chanting loudly to Pele at time, then softening her voice to a conversational tone, Ruth spoke to the goddess, defying the intense heat and moving so near that some of retainers swore later that the Chiefess actually stepped on to the hot molten lava as she began her eerie ritual...By the first light of morning, their unbelieving eyes saw the lava had stopped, some said within a yard of Princess Ruth's sleeping body.*

Mr. Kimura stated that any development in the Waiākea area should be culturally sensitive and respectful to its history:

> *I would like to propose that due respect be given especially to the 1881 lava flow because of the significance of its being stopped by Princess Ruth (Zambuka). I am of course backing my concern that every effort be made to be mindful of the destruction of the natural landscape and native plants and their importance to Hawaiian cultural lore and values. A committee to initiate acts of respect for the natural native landscape and plants and their importance to Hawaiian cultural lore and values should be initiated so that the relevance of the Hawaiian cultural connections can survive in spite of future development being planned for the project.*

Kepā Maly performed studies in the immediate vicinity of the proposed site:

> *I have done some extensive documentary research and limited oral history interviews in the area you described, and know that there are a number of storied places from traditional accounts and historical testimonies in the vicinity.*

Mr. Maly agreed with Mr. Kimura and stated:

> *Larry Kimura's comments on the 1881 lava are most likely accurate for a portion of the property; and I concur with his thoughts about care for the 'ōhi'a, as well as the neneleau and other patches of native plants left in the area. Anything natural and native, or of cultural-historical archaeological interest (regardless of its period in history – i.e., traditional or historic plantation) is becoming almost impossible to locate in the Hilo Town/UH vicinity. Thus, careful planning and development could help retain some of the unique environment and qualities of Hilo's past.*

Potential Impacts. Hilo/Waiākea is rich in water and is a very desirable area for chiefs and commoners alike. Hilo is famous for its rain and the abundance of 'ōhi'a lehua. Although no negative cultural impacts were identified through consultation, special care should be taken to preserve as much of the natural landscape consisting of 'ōhi'a lehua and neneleau (also known as neleau), which takes many years to mature. Kanilehua is the name for Hilo's misty rain that lehua blossoms drink. It is often referenced in chants and songs. An alternate interpretation is "rain that make the lehua blossoms rustle" (Pūku'i, Elbert 1986).

Individuals consulted were unaware of any cultural practices or significant archaeological sites associated with the 267-acre parcel. It was suggested that the Lava Flow of 1881, which extended to portions of the University Park Expansion site, covered any culturally-significant sites. Participating individuals voiced their concerns for the preservation of natural landscape. Existing landscape would be incorporated throughout the parcel in compliance with Act 73 of the *Hawaii Revised Statutes*, which mandates that any new or renovated landscapes for any building, housing, or other facility developed with State funds incorporate native Hawaiian plants wherever and whenever feasible.

2.1.13 VISUAL RESOURCES

The 267-acre parcel is currently undeveloped and dominated by a native 'ōhi'a and uluhe forest. No significant or important visual resources or landforms are present within the parcel. Views of the parcel from Komohana Street and Mohouli Street Extension are limited to the tall and dense 'ōhi'a and uluhe forest vegetation. Views from the shoreline area toward the parcel are also very limited due to the area's relatively flat slope and obstructions from nearby structures. The parcel may lie within the coastal view plane from house lots within the Sunrise Estates Subdivision and other

residential subdivisions mauka of the parcel. However, the tall 'ōhi'a and uluhe forest along the parcel boundaries generally limits and obstructs any views toward the parcel and shoreline. New views of Mauna Kea, Mauna Loa, and the coastline would be created from within the parcel, which is currently inaccessible to the public.

A 50-foot landscape setback buffer is recommended along the western edge of the University Park Expansion site to screen views of the developments within the parcel from the Sunrise Estates Subdivision. The buffer should continue along Mohouli Street Extension and widen to 100 feet along Komohana Street (providing 50 feet for road-widening considerations). Design plans would incorporate existing trees and native plants into the landscaping concept.

The University Park Expansion gateways, entries, access driveways, parking areas, walkways, building entries and exteriors, and signs would require outdoor lighting, which could affect the astronomical observatories on Mauna Kea. Permissible light fixtures will include only those that limit the direction of light rays downward by completely shielding the lighting source (lamp). Smooth surfaces that reflect light from ground or wall surfaces will be avoided where lighting fixtures are used.

2.1.14 EASEMENTS

There are no existing utility easements within the University Park Expansion site. However, within the 267-acre Mauka Lands parcel, a 50-foot-wide easement runs through the Hawai'i CC and Future University Expansion area (see Figure 2.1).

A 69-kilovolt (kV) overhead electrical line extends west from the HELCO Komohana Substation through the 50-foot-wide utility easement running through the Hawai'i CC and Future University Expansion area. Overhead lines within this easement will need to be relocated outside of the 267-acre parcel for development of these areas. The easement extends east from the substation to University Park and other lands.

Two waterlines (12-inch and 6-inch) extend west from Waiākea Reservoir through a 15-foot-wide easement that runs through the Hawai'i CC and Future University Expansion area. This easement will need to be widened to 30 feet when the lines are relocated underground. Two 8-inch waterlines also extend from the reservoir in a southeasterly direction through the proposed Hawai'i CC and connect to 8-inch waterlines located under Komohana Street. As the Hawai'i CC is developed, these two lines will require relocation underground within a 30-foot-wide easement to be located during later phases. An 8-inch waterline also extends east from Waiākea Reservoir to University Park along the 50-foot-wide utility easement.

A 1.0-million gallon (MG) concrete reservoir has recently been constructed along the southwestern edge of the parcel, near the Sunrise Estates Subdivision. An influent line from the reservoir connects to the existing 12-inch waterline within the 15-foot-wide

easement, traverses the site, and connects with Waiākea Reservoir (see Figure 2.1). Access to the reservoir will be from Pū'ainakō Street Extension, through a roadway in the Future University Expansion area. A utility easement will follow the alignment of this access road.

Utility easements are proposed within Nowelo Street Extension and internal roadways of University Park Expansion. A 15-foot-wide easement is proposed on one side of Nowelo Street Extension (entry and roadway), and a 10-foot-wide utility easement is proposed on both sides of internal roadways.

2.1.15 ROADWAYS AND CIRCULATION

2.1.15.1 EXISTING AND PROPOSED ROADWAYS

From a regional perspective, the 267-acre Mauka Lands parcel is accessible via Kanoelehua Avenue/Volcano Highway/State Highway 11 (a segment of the round-the-island "Belt Highway," which carries traffic beginning at the mauka end of Kaūmana Drive/Waianuenue Avenue, crossing the island, and connecting the Kona and Kohala Districts with East Hawai'i) and the Hilo Bayfront Highway/State Highway 19 (road carrying traffic to Hilo from the northern parts of the island). The recently constructed Pū'ainakō Street Extension also serves as a link in the arterial flow between Highway 11 (Volcano Highway) and Saddle Road (Highway 20), bypassing Hilo Town.

There are no existing roadways within the 267-acre parcel; however, roadways that directly influence circulation patterns in and around the area are described below. Roadway improvements were proposed in the *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel*, prepared by Engineering Concepts, Inc.

Komohana Street. Komohana Street is a two-lane roadway with an 80-foot-wide right-of-way and speed limit of 45 miles per hour. This street borders the eastern edge of the 267-acre parcel and provides direct cross-town access between north and south Hilo. It also serves as a north-south bypass of commercial areas in Hilo. Komohana Street has few driveways, and intersections are spaced far apart. Parking on the roadway is not permitted. The Komohana Street and Nowelo Street intersection will be signalized, and a 100-foot-long left turn storage lane will be added to Komohana Street to provide left turn movements into the 267-acre parcel. Depending on future traffic volumes, the storage lane may need to be extended later. The County of Hawai'i has long planned for Komohana Street as a 4-lane roadway with two through lanes in each direction (given its 80-foot-wide right-of-way), but future widening has not been programmed and will not take place for at least 10 years.

Mohouli Street/Mohouli Street Extension. Mohouli Street is a two-lane roadway with a varying right-of-way (from 60 to 135 feet). Mohouli Street extends from Kīlauea Avenue in the east to 'Ainakō Avenue in the lower Kaūmana community (west of

Komohana Street) and provides a second connection between the Kaūmana area of Hilo and the rest of Hilo. Mohouli Street Extension borders University Park Expansion on the north and will provide access to University Park Expansion.

Nowelo Street/Nowelo Street Extension (University Park Expansion Entry Road). Nowelo Street is the main roadway within the existing University Park. At its intersection with Komohana Street, Nowelo Street has an 85-foot-wide right-of-way (9-foot-wide median and 28-foot-wide pavement, 4-foot-wide planter strips and 6-foot-wide walkways on either side). Nowelo Street will extend west of Komohana Street and serve as the main access to the University Park Expansion and the secondary access to the Hawai'i CC.

Pū'ainakō Street/Pū'ainakō Street Extension. Pū'ainakō Street is south of the parcel and was recently extended 4.5 miles west as a two-lane collector street with a 120-foot-wide right-of-way between Komohana Street and Saddle Road (State Highway 200, also designated Kaūmana Drive). Pū'ainakō Street Extension opened to traffic in September 2004 and will serve as the main access to Hawai'i CC.

2.1.15.2 VEHICULAR TRAFFIC

A Traffic Impact Assessment Report (TIAR) was prepared by Julian Ng, Inc. to identify traffic impacts resulting from the developments within the 267-acre parcel and to identify roadway improvements to adequately serve projected peak hour traffic volumes. The TIAR determined that the proposed developments on the 267-acre parcel (including the University Park Expansion) are not expected to result in a net increase in traffic on Komohana Street to the south, Mohouli Street to the west, or on Pū'ainakō Street to the west.

The TIAR estimated peak hour traffic volumes that would be generated by the University Park Expansion, assuming it is completed by the year 2025. The estimates shown on the following table were based on 2,100 employees at University Park Expansion.

Project Traffic Generation

	AM Peak Hour		PM Peak Hour	
	Entering	Exiting	Entering	Exiting
2,100 Employees, University Park Expansion	749	154	129	731

Traffic on Mohouli Street will proceed uninterrupted, as stop signs will control entry to Mohouli Street Extension from minor streets (i.e., driveways and internal roadways) within University Park Expansion. However, the TIAR determined that left turns onto Mohouli Street could have long delays if a single movement is made. Therefore, a

median refuge lane on Mohouli Street is recommended to allow drivers to cross eastbound traffic and then merge with westbound traffic.

The TIAR found that with or without the developments on the 267-acre parcel, future traffic volumes would require that Komohana Street be four-lanes-wide with separate left turn lanes at major intersections. It also suggested constructing a third lane on eastbound Nowelo Street Extension (approaching the Komohana Street intersection) to provide a separate lane for left turns, through movements, and right turns, after University Park Expansion is at 50 percent occupancy or after 2010, whichever is later. The TIAR also recommended a second right turn lane from westbound Pū'ainakō Street to northbound Komohana Street, when the University Park Expansion reaches 15 percent occupancy, or after 2006, whichever is later.

2.2 PROCEDURAL REQUIREMENTS OF GOVERNMENT REGULATIONS

2.2.1 STATE OF HAWAI'I

2.2.1.1 CHAPTER 343, HAWAII REVISED STATUTES

Development of the proposed facilities will require an environmental impact statement (EIS) due to the use of State lands and funds. The *University of Hawai'i at Hilo Mauka Lands Master Plan Environmental Impact Statement* for the entire 267-acre State-owned parcel, is currently being prepared.

2.2.1.2 CHAPTER 205, HAWAII REVISED STATUTES

The entire 267-acre parcel (including the University Park Expansion) is within the State Land Use Agricultural District. A State Land Use District Boundary Amendment (SLUDBA) will be required to amend the land use designation from Agricultural to Urban.

2.2.2 COUNTY OF HAWAI'I

Relevant land use regulatory policy documents and guidance plans of the County of Hawai'i that pertain to the parcel include the *General Plan* and Land Use Pattern Allocation Guide (LUPAG) map, and the *Hawaii County Code* (Comprehensive Zoning Ordinance). The 267-acre parcel is located well outside of the Special Management Area (SMA).

2.2.2.1 GENERAL PLAN

The Hawai'i County *General Plan*, adopted by ordinance in 1989, is the policy document for the long-range development of the island of Hawai'i. The *General Plan* provides direction for the future growth of the County. The plan contains a series of land use maps referred to as the Land Use Pattern Allocation Guide (LUPAG) maps. The LUPAG map designates the entire 267-acre parcel (including the University Park Expansion) for University Use and Urban Expansion.

2.2.2.2 COUNTY ZONING

The Hawai'i County *General Plan* is also the basis for Ordinance No. 63, the County Comprehensive Zoning Ordinance. The entire 267-acre parcel (including the University Park Expansion) is zoned Agriculture (A-1a). Under the current County Zoning Ordinance, a Use Permit would be required. However, the County Planning Development may request an amendment to the Zoning Ordinance to create a new zoning designation for colleges and universities. The maximum building height within the Agricultural zoned district is 45 feet. Under the current zoning, a variance would be required for taller structures, although no buildings taller than 45 feet are currently planned or anticipated.

2.2.3 FEDERAL

2.2.3.1 AMERICANS WITH DISABILITIES ACT (ADA)

The Americans with Disabilities Act (ADA) of 1990 sets guidelines for accessibility to buildings and facilities by individuals with disabilities. These guidelines are to be applied during the design, construction, and alteration of buildings and facilities covered by Titles II and III of the ADA to the extent required by regulations issued by Federal agencies, including the Department of Justice and the Department of Transportation, under the ADA.

Site Considerations. Primary site accessibility shall be provided from public right-of-ways to all entrance points on the site and to all individual facilities that require access. Parking for individuals with disabilities and accessible routes in accordance with the ADA must be provided to link all facilities.

Building Considerations. All facilities must be accessible to individuals with disabilities, as governed by the ADA:

- At least one entrance, preferably the principal entrance, must interface with an accessible route on the site;
- Access must be provided to all floors of all buildings except in unusual circumstances;
- All toilet facilities must be accessible; and

- Emergency egress must be provided for the disabled equal to that provided for able-bodied occupants.

Barrier-free access and circulation is discussed in *Section 3.3.2 Pedestrian, Bicycles, and Barrier-free Access and Circulation.*

The requirement to provide access to all floors almost ensures that every new building two stories or higher must include an elevator(s). All facilities will be designed to meet the ADA guidelines and the requirements of Section 103-50, *Hawaii Revised Statues*, except where compliance would: 1) cause substantial harm to cultural, historical, religious, or significant natural features and characteristics; 2) substantially alter the nature of the setting or the purpose of the facility, or portion of the facility; 3) require construction methods or materials that are prohibited by Federal, State, or local regulations or statutes; or 4) be unfeasible due to terrain or prevailing construction practices.

3.0 MASTER PLAN

To accomplish the objectives of the *University of Hawai'i at Hilo Strategic Plan 2002-2010* and to continue the success of University Park, UH Hilo plans to expand the University Park research facilities mauka (west) of Komohana Street. This location is ideal because of its proximity to the existing University Park, the UH Hilo Upper Campus, and the proposed Hawai'i CC Komohana Campus.

This master plan establishes the overall framework for development of University Park Expansion. This framework, as well as the on- and off-site improvements required to support this master plan, are described in this section.

3.1 MASTER PLAN CONCEPT AND SUBDIVISION

The University Park Expansion master plan is based on the land use program developed for the existing University Park and is intended to be compatible with the proposed Hawai'i CC Komohana Campus and PBARC/IFIP complex.

To create a "campus-like" atmosphere and encourage pedestrian and bicycle use within University Park Expansion and adjacent properties in the 267-acre parcel, a central open space linked via a pedestrian/bikeway corridor is proposed (see Figure 3.1).

The proposed master plan for University Park Expansion includes 39 lots ranging in size from about 2 acres to 5.5 acres, with most lots averaging 2.5 acres. To allow for market flexibility in development of University Park Expansion, these lots can be combined should future tenants need larger areas for development. A 50-foot-wide landscape setback buffer is proposed along the western edge of University Park Expansion to screen the Sunrise Estates Subdivision. The landscape buffer would continue along Mohouli Street Extension to Komohana Street, where it would widen to 100 feet (providing 50 feet for possible road-widening). As recommended by the cultural impact assessment for the 267-acre parcel, existing vegetation, particularly native or rare plants, should be maintained within this buffer and where appropriate.

3.2 OPEN SPACE AND PEDESTRIAN MALL

An approximately four-acre Central Courtyard is proposed for University Park Expansion. The Central Courtyard runs in a north-south direction through the middle of the subdivision with pedestrian and bicycle links to nearby streets, the PBARC/IPIF complex, and the Hawai'i CC. The typical width of the Central Courtyard is 150 feet and the access corridors are 40 feet wide. The Central Courtyard is envisioned as a

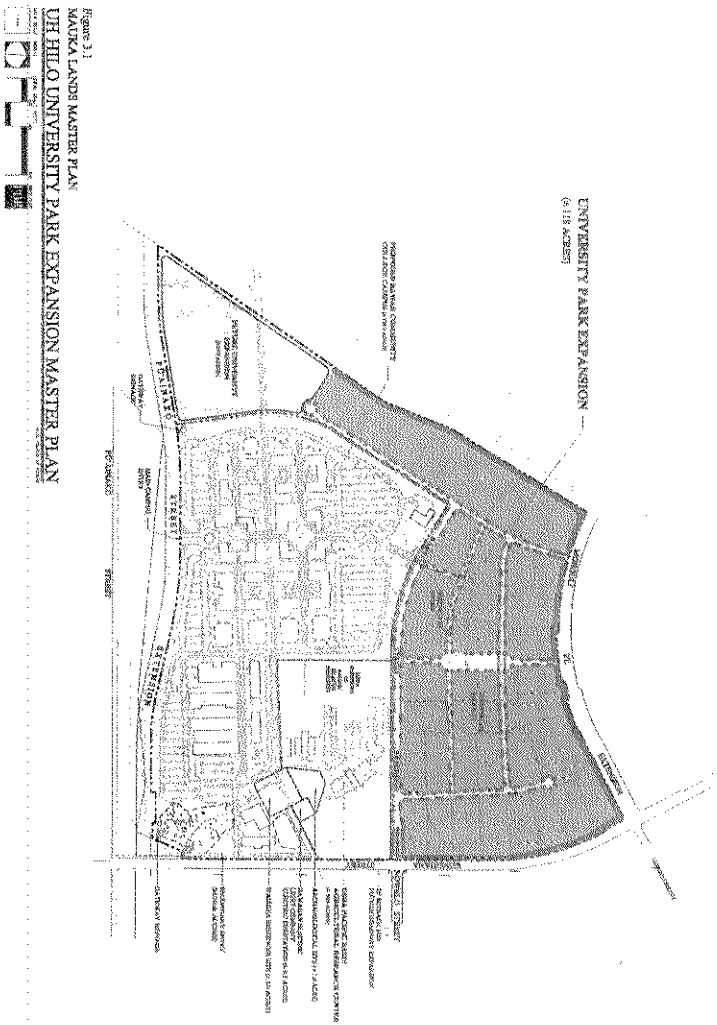


Figure 3.1
MAUKA LANDS MASTER PLAN
UH HILO UNIVERSITY PARK EXPANSION MASTER PLAN

beautifully landscaped area where researchers and employees can exercise, eat outdoors, or gather and interact with colleagues.

3.3 ACCESS AND CIRCULATION

3.3.1 VEHICULAR ACCESS AND CIRCULATION

Main entry to University Park Expansion is proposed off Komohana Street, where it intersects with Nowelo Street/Nowelo Street Extension. Access to each lot will be from internal roadways or Nowelo Street Extension, which will terminate at a T-intersection with an internal road. A secondary entry will be off Mohouli Street Extension.

Nowelo Street Extension (University Park Expansion Entry Road). The Nowelo Street entry to the 267-acre parcel will extend west of Komohana Street (between University Park Expansion and Hawai'i CC). Nowelo Street Extension will serve as the main access to University Park Expansion and the secondary access to Hawai'i CC. Nowelo Street Extension will have an 89-foot-wide right-of-way, with four 12-foot-wide travel lanes (two in each direction), a 9-foot-wide median, two 6-foot-wide bicycle lanes (one in each direction), 10-foot-wide sidewalks (one in each direction), and a 15-foot-wide utility easement on one side (see Figure 3.2). Four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting. From the entry, Nowelo Street Extension will taper down to an 80-foot-wide right-of-way, with four 12-foot-wide travel lanes (two in each direction), two 6-foot-wide bicycle lanes (one in each direction), 10-foot-wide sidewalks (one in each direction), and a 15-foot-wide utility easement on one side (see Figure 3.3). Four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting. Nowelo Street Extension will terminate at a T-intersection with an internal roadway. When University Park Expansion is approximately 50 percent occupied, a separate left turn lane from Nowelo Street Extension to Komohana Street should be constructed, and current traffic volumes should be evaluated to determine if a left-turn storage lane is warranted.

Mohouli Street Extension. Mohouli Street Extension borders and provides secondary access to University Park Expansion.

Internal Roadways. Three internal roadways (Roads A, B, and C) are proposed within the 118-acre University Park Expansion. Each roadway will have a 60-foot-wide right-of-way, with 40-foot-wide pavement (one 12-foot-wide travel lane and one 8-foot-wide parking lane in each direction), and 10-foot-wide walkways on either side (see Figure 3.4). A 10-foot-wide utility easement is proposed on both sides of the roadway, and four-foot-wide tree wells on each side of the roadway could be included along the sidewalk at regular intervals to accommodate street tree planting. Road A will connect

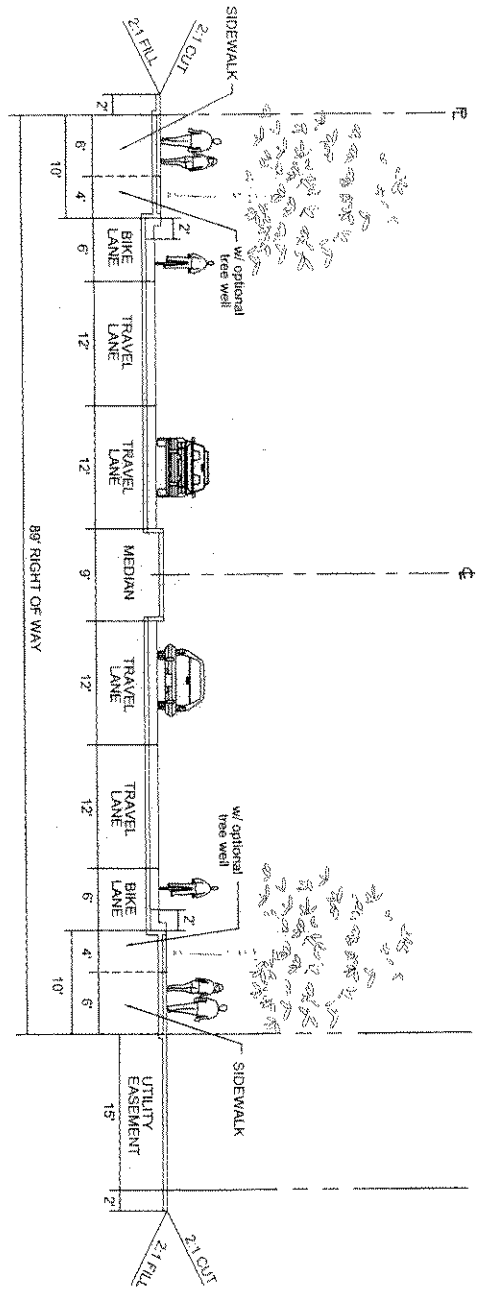
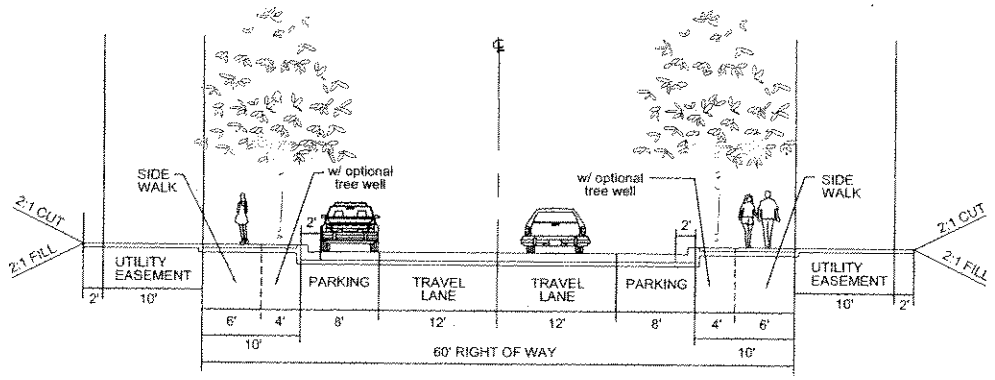


Figure 3.2
NOWELO STREET ENTRY ROADWAY SECTION

University of Hawai'i at Hilo
Mauka Lands Master Plan
HILO, HAWAII

NORTH
LINEAR SCALE (FEET)
0 6 12

PBR HAWAII
February 2008

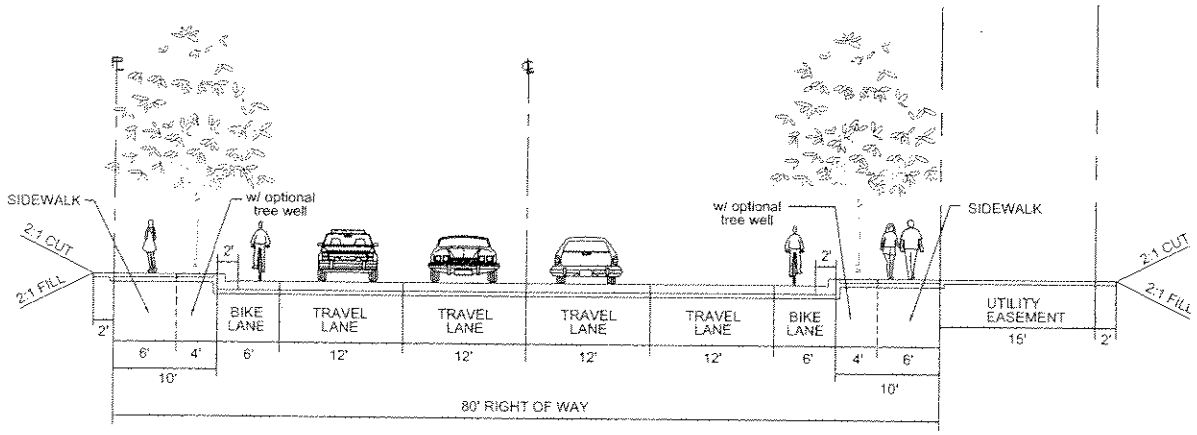


TYPICAL INTERNAL ROADWAY

Figure 3.4
TYPICAL INTERNAL ROADWAY SECTION
University of Hawai'i at Hilo
Mauka Lands Master Plan
HILO, HAWAI'I

NORTH
LINEAR SCALE (FEET)
3 0 3 6 12

PBR HAWAII
February 2005



NOWELO STREET

Figure 3.3
NOWELO STREET ROADWAY SECTION
University of Hawai'i at Hilo
Mauka Lands Master Plan
HILO, HAWAI'I

NORTH
LINEAR SCALE (FEET)
3 0 3 6 12

PBR HAWAII

to Nowelo Street Extension and provide access to Lots 1 through 15. Road B will connect Roads A and C and provide access to Lots 21 through 30. Road C, located at the southwestern end of Nowelo Street Extension, will connect to Mohouli Street Extension and provide a secondary access to University Park Expansion. Road C could be extended to connect with Pū'ainakō Street Extension, if additional lots are developed on the remaining 27.7 acres of Future University Expansion.

Service Vehicle Access. Service vehicles will access lots within University Park Expansion through the roadways described above. Within each lot, service access will be ultimately sized and located during the project planning phase to conform to Hawai'i County requirements. To the extent possible, service areas should be located away from major pedestrian paths and building entries, and should be hidden from view from roadways. Walls, fencing, and/or landscaping should be used for visual screening of these areas.

Emergency and Fire Vehicle Access. Emergency and fire vehicle access will be provided to all lots from roadways within University Park Expansion.

3.3.2 PEDESTRIAN, BICYCLE, AND BARRIER-FREE ACCESS AND CIRCULATION

The Central Courtyard is proposed within University Park Expansion to create a "campus-like" atmosphere and encourage pedestrian and bicycle transportation. The Central Courtyard will provide pedestrian and bicycle links to nearby streets, the Hawai'i CC, and the PBARC/IPIF complex, and will be separated from vehicular traffic, except where crossing Nowelo Street Extension. Figure 3.5 shows the pedestrian and bicycle circulation plan for University Park Expansion.

Pedestrian Access and Circulation. An interconnected pedestrian network, including sidewalks along all roadways, is provided throughout University Park Expansion. This network provides access to all lots within University Park Expansion, as well as to the Hawai'i CC and PBARC/IPIF complex.

Bicycle Access and Circulation. Bike lanes will be provided along Nowelo Street Extension. A separated bikeway system will provide access within the University Park Expansion, as well as to the Hawai'i CC and the PBARC/IPIF complex.

2003 Bike Plan Hawaii. As part of the State Department of Transportation *2003 Bike Plan Hawaii*, several bicycle facilities have been provided or are proposed. Mohouli Street Extension has a 1.2-mile signed shared road, and there are plans to provide a 1-mile bike lane on Mohouli Street between Komohana Street and Kilauea Avenue (northeast of University Park Expansion). Bike lanes are proposed on Nowelo Street Extension and Komohana Street, which border University Park Expansion. Plans for a

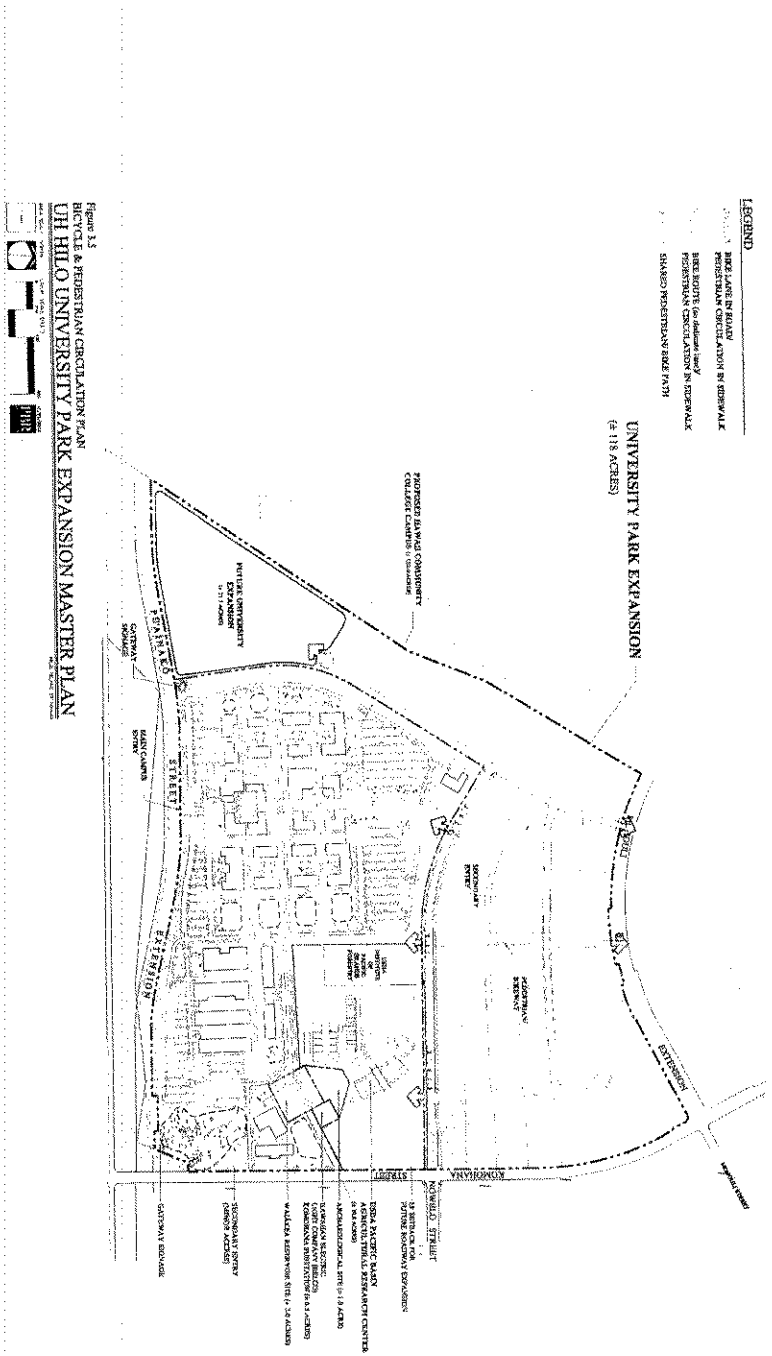


Figure 3.5
BICYCLE & PEDESTRIAN CIRCULATION PLAN
UH HILO UNIVERSITY PARK EXPANSION MASTER PLAN

6-mile signed shared road on Pū'ainakō Street Extension are currently underway, and a 1.4-mile bike lane is planned to extend east of the 267-acre parcel on West Pū'ainakō Street.

Barrier-free Access and Circulation. Sidewalks and the pedestrian network connecting to all lots within the 267-acre parcel will be sized and planned to provide barrier-free access to individuals with disabilities. Development within the entire parcel must comply with requirements of the ADA.

3.4 CIVIL IMPROVEMENTS

3.4.1 DRAINAGE PLAN

3.4.1.1 EXISTING CONDITIONS

Two major drainageways are located makai (east) of the 267-acre parcel. One major drainageway is Waiākea Stream, which traverses along the southern and eastern boundaries of University Park. The other drainageway is a drainage ditch along the northern boundary of University Park. This drainage ditch separates University Park from the University Heights Subdivision and discharges into Waiākea Stream near the Lanikaula Street Bridge.

Four drainage crossings exist along Komohana Street: 1) a lined channel under the bridge over Waiākea Stream; 2) an arch culvert (9'-6" x 6'-5") that outlets into an unlined channel diverted along the western boundary of the Komohana Agricultural Complex and discharges into Waiākea Stream; 3) an arch culvert (11'-5" x 7'-3") approximately 250 feet south of the Waiākea Reservoir access road discharging into University Park; and 4) an arch culvert (16'-5" x 10'-3") near the Mohouli Street and Komohana Street intersection discharging into the drainage ditch along the northern boundary of University Park.

Surface runoff follows natural slope conditions since the parcel is undeveloped; however, past observations of the drainage crossings at Komohana Street have shown that very little runoff from the parcel appears to discharge into the University Park area. Two lined, trapezoidal drainage ditches located in Kipuni and Makana'a Streets of the Sunrise Estates Subdivision discharge into the parcel during times of heavy rainfall. The drainage ditches are downstream of existing drywell inlets.

The majority of the 267-acre parcel is designated Zone X by the Flood Insurance Rate Map (FIRM), indicating areas outside of the 500-year floodplain (see Figure 2.1). A portion of the University Park Expansion site is designated Zone A, indicating areas inside the 100-year floodplain (no base flood elevations determined).

3.4.1.2 BASIS OF DESIGN

The hydrologic criteria used in this report are based on the *Storm Drainage Standards* of the Department of Public Works, County of Hawai'i, October 1970.

3.4.1.3 PROPOSED PLAN

Runoff will be collected by drainage systems consisting of catchbasins and pipe drains within roadways. Runoff will ultimately discharge directly into the two existing drainageways located makai of the parcel. Drywell catchbasins/manholes will be constructed on the main drain to mitigate increases in storm runoff resulting from the impervious surfaces created by roadways. A drainage system will also be constructed in the pedestrian/bikeway to accommodate the overflow from Lots 16 to 20 of University Park Expansion. A pipe connection will be provided to each lot to convey overflow from the drywells. A headwall, drywell inlet, and drain will be constructed in Lots 35 and 39 to connect to the drainage system in Road C. Drywell catchbasins will also be constructed in Road C to mitigate the impact of the off-site runoff.

The drainage system for the University Park Expansion and a portion of the Hawai'i CC will discharge into the drainage ditch located along the northern boundary of University Park via the existing arch culvert near the Mohouli Street and Komohana Street intersection. The drainage ditch was evaluated to determine the 100-year flood boundary, which is usually located within the banks of a ditch. The slope of the ditch is fairly steep for a major portion of its length, resulting in channel flow velocities that exceed five feet per second. The *Preliminary Engineering Report for the Proposed UH Hilo Mauka Parcel* suggested lining the banks of the ditch since velocities exceeding 5 feet per second are considered erosive. As part of Phase III improvements for the proposed University Park, the bank along the University Park can be lined with 12-inch-thick grouted riprap, east of the drain outlet for South Aohoku Street. As the drainage ditch approaches Waiākea Stream, it enters the floodplain of Waiākea Stream. The drainage system for the remainder of Hawai'i CC will discharge into Waiākea Stream via the arch culvert near the Komohana Agricultural Complex.

3.4.2 WATER PLAN

3.4.2.1 EXISTING CONDITIONS

The existing UH Hilo campus and University Park are served by the 1.0-million gallon (MG) reservoir located along Pū'ainakō Street, near the Sunrise Estates Subdivision. This reservoir has a spillway elevation of 479 feet and is the primary reservoir. The Waiākea Reservoir (0.5-MG reservoir with a spillway elevation of 354 feet), located adjacent to the HELCO Komohana Substation, provides a secondary source for the UH Hilo campus through the loop formed between the 8-inch line from the Waiākea Reservoir (located under Waiākea Stream and Lanikaula Street) and the 12-inch line

(along Campus Road) from the 1.0-MG reservoir. A pressure reducing valve (PRV) with a setting of 65 psi exists at an approximate elevation of 204 feet on the 12-inch line from the 1.0-MG reservoir at Nowelo Street, just before the UH Hilo campus.

Wells at Pi'ihonua pump water into Pi'ihonua Reservoir No. 3 (a 1.0-MG reservoir with a spillway elevation of 300 feet). A booster pump station at Pi'ihonua Reservoir No. 3 then pumps water up to Pi'ihonua Reservoir No. 2 (a 0.8-MG reservoir with a spillway elevation of 646 feet). From there, water flows to Waiākea Reservoir via a PRV located downstream of Pi'ihonua Reservoir No. 2, at an elevation of 279 feet. The PRV is set at 70 psi, which is comparable to a reservoir with a spillway elevation of 441 feet at the PRV location. From this PRV, the transmission main runs along Komohana Street toward Waiākea Reservoir.

The 1.0-MG reservoir located along Pū'ainakō Street is fed by the connection to an existing 12-inch waterline coming from the Kaumana Reservoir (a 50,000-gallon reservoir with a spillway elevation of 724 feet). From the 1.0-MG reservoir, a 16-inch transmission main runs along Pū'ainakō Street Extension and Komohana Street, then connects to the 12-inch waterline in Nowelo Street from the University Park.

The 267-acre parcel is located mauka of the Underground Injection Control (UIC) line, which regulates the use of injection wells for disposal of domestic and non-domestic wastewater. No State wells are located in or near the parcel.

3.4.2.2 BASIS OF DESIGN

The water system shall be designed in conformance with the Water System Standards of the Department of Water Supply, County of Hawai'i.

3.4.2.3 PROPOSED PLAN

Due to elevation differences within the 267-acre parcel, the projected water demand for the developments is divided into two water service zones: a high service zone at an elevation above 379 feet and a low service zone at an elevation below 379 feet. The total average daily domestic water demand for all of the developments within the parcel is estimated to be approximately 575,900 gallons per day (GPD) at full occupancy. Two separate water distribution systems are proposed to serve the two water service zones.

Low Service System. The low service system will include areas located below the 379-foot elevation, which will be served by a new 12-inch water main from the 1.0-MG reservoir along Pū'ainakō Street. This reservoir will be the source of water for the University Park Expansion Lots 1 through 35, the Hawai'i CC, and the PBARC/IPIF complex. The estimated maximum daily demand for these facilities is 564,150 GPD. This reservoir will also provide water for the proposed China-U.S. Center located across the existing UH Hilo Campus on Kawili Street. The projected maximum daily demand

for this facility is 201,153 GPD, making the total projected maximum daily demand for the reservoir 1,371,603 GPD. The 1.0-MG reservoir may not be large enough to serve the total distribution area, including the lower half of the 267-acre parcel. The Waiākea Reservoir also provides service to the UH Hilo Campus; however, its storage is primarily allocated to other areas. As the parcel is developed, further evaluation will be required to determine whether a new reservoir is required or if the proposed 2.0-MG Pi'ihonua Reservoir No. 2 can be used as a secondary source to service this system during emergencies, using the PRV located within the parcel. At the end of Phase III, the actual water demand should be evaluated to determine if additional storage is required.

The new 12-inch water main will be located in Nowelo Street Extension and will connect to the existing 16-inch line at the intersection of Nowelo Street and Komohana Street. Water mains of 12 inches will also be constructed in Roads A and B. A 12-inch main within Hawai'i CC will connect the existing 16-inch main in Pū'ainakō Street Extension to the 12-inch main in Nowelo Street Extension. Service stubouts will be provided to each lot, including the PBARC/IPIF complex, with individual meters proposed for each lot. Waterlines are proposed to be dedicated to the Department of Water Supply (DWS).

High Service System. Areas located above the 379 elevation will be served by the high service system. The Pi'ihonua Reservoir No. 2, with a current capacity of 0.8 MG, will be increased to a 2.0-MG reservoir with a spillway elevation of 646 feet. The DWS has indicated that this reservoir should serve the high service system including the University Park Expansion Lots 36 through 39, the Hawai'i CC, and the Future University Expansion area. The estimated maximum daily demand for these facilities is 299,700 GPD. The proposed 1.0-MG Haleloke Reservoir (with a spillway elevation of 838 feet), located approximately halfway between the existing Pi'ihonua Reservoir No. 1 and the Kaūmana Reservoir, could also help to meet the storage requirement. The water system should be re-evaluated to determine which reservoir should provide the storage requirement when lots within the high service zone are developed.

Two proposed distribution systems include the Pi'ihonua Reservoir No. 2 and the Haleloke Reservoir. From Pi'ihonua Reservoir No. 2, there is an existing 16-inch water main in Waiānuenue Avenue until Kaūmana Drive, where there are 6-inch and 8-inch lines. Waterline improvements in Kaūmana Drive are required to increase the size of the line from Waiānuenue Avenue to Mohouli Street Extension. This distribution system would extend along Road C from the existing 12-inch main in Mohouli Street Extension to service the mauka portion of the University Park Expansion and Hawai'i CC. The other proposed distribution system begins at the future Haleloke Reservoir, where a proposed 16-inch transmission main will extend to existing 8-inch waterlines in the Sunrise Estates Subdivision. A proposed 12-inch waterline will feed the 1.0-MG reservoir located along Pū'ainakō Street via a PRV set to establish a pressure head of 724 feet (similar to the elevation of the existing Kaūmana Reservoir). If the Haleloke

Reservoir is used for storage in the high service system, the influent line of the 1.0-MG reservoir along Pū'ainakō Street can be connected.

Water System Connection and Availability. On-site water system improvements would consist of 8- and 12-inch water lines within driveways to serve the various facilities within the 267-acre parcel. The DWS anticipates the ability to provide water service to all of the developments within the parcel. A calculated water usage for the parcel will be submitted to DWS for its final determination of water service availability. During periods of high water demand, some areas of the parcel (primarily those at higher elevations) may remain outside of the DWS service zone and experience diminished water pressure. An Elevation Agreement with DWS will be required to acknowledge this condition. The proposed 1.0-MG Haleloke Reservoir will eventually extend the service zone to areas below an elevation of 738 feet and strengthen the water system within the parcel.

3.4.3 WASTEWATER PLAN

3.4.3.1 EXISTING WASTEWATER FACILITIES

The 267-acre parcel, including the proposed University Park Expansion, is vacant and has no on-site wastewater facilities.

Hilo Wastewater Treatment Plant. The Hawai'i County Hilo Wastewater Treatment Plant, located near the Hilo International Airport fronting Puhi Bay, services the Hilo area. The County wastewater system presently consists of a 5.0-million gallon per day (MGD) secondary sewage treatment plant with an ocean outfall effluent disposal, and a collection system of sewage pump stations, force mains, and gravity lines. Many areas outside of central Hilo rely on cesspools and septic tanks for wastewater treatment.

University Park Sewer System. The existing University Park sanitary sewer system is comprised of 8- and 10-inch sewers that are owned and maintained by UH Hilo. This system discharges into the County sewer system through a connection with the 8-inch County sewer in Lanikaula Street, east of Waiākea Stream. Each lot within the University Park is provided with a sewer service connection.

3.4.3.2 BASIS OF DESIGN

Design populations for the University Park Expansion, Hawai'i CC, PBARC/IPIF complex, and Future University Expansion area were used to project the wastewater flow from the 267-acre parcel. The estimated total capita is 9,632 and the maximum design flow is estimated to be 731,000 gallons per day (GPD).

3.4.3.3 PROPOSED PLAN

On-site Improvements. The existing 8-inch sewer line in Nowelo Street will provide temporary service connection for the PBARC, for which construction is anticipated to be completed in June 2006. Since the existing University Park is not fully developed, the PBARC will temporarily borrow some capacity from the existing sewer. An additional 8-inch sewer line will be constructed in Nowelo Street and will serve only the PBARC. As lots in the existing University Park are developed, the sewer flows will be monitored to determine if the PBARC site can continue to be served by the existing 8-inch line in Nowelo Street. When the existing sewer in University Park is approaching its capacity, the new 8-inch sewer will be connected to the sewer in Road A. To serve Lots 16 to 20 and 35 to 39 within University Park Expansion, as well as the Hawai'i CC, a proposed 8-inch sewer line will be constructed in the pedestrian/bikeway. Another 8-inch sewer in Road B is proposed to serve Lots 21 to 34.

The majority of the 267-acre parcel slopes toward Mohouli Street in the northeastern corner. The planned sewage system within the 267-acre parcel will also slope toward the northern end of Road A, where it will connect to the off-site sewer system.

Off-site Improvements. The existing University Park sewer system was not sized to accommodate flows outside of the University Park area. Therefore, a separate off-site sewer along Lanikaula Street is proposed to transport the wastewater flows generated by the 267-acre parcel to a point in the County sewer system with the capacity to convey the wastewater to the Hilo Wastewater Treatment Plant.

From Road A, a proposed 12-inch off-site sewer will be located in the southern shoulder of the roadway in Mohouli Street, until it intersects with Kumukoa Street. The 12-inch sewer will continue in the shoulder area of Kumukoa Street and will cross under Waiākea Stream to Lanikaula Street. The sewer will then parallel the existing Lanikaula Trunk Sewer along Lanikaula Street and Iolani Street until it intersects with Leilani Street. At this intersection, the proposed sewer will turn onto Leilani Street and finally connect to the existing 36-inch sewer at Manono Street. The proposed 12-inch sewer would be a relief sewer that will mitigate the limitations of the existing Lanikaula Trunk Sewer.

The UH Hilo will conduct appropriate coordination with the County Department of Environmental Management (DEM) to address the proposed off-site sewer improvements. Wastewater plans will be prepared and will discuss the connection of developments within the parcel to the Hilo Wastewater Treatment Plant. These plans will conform to the appropriate State Department of Health (DOH) Administrative Rules and shall be subject to review by the DOH. The availability of a sewer line connection would be coordinated between the County DEM, the UH Hilo, and the Hawai'i CC.

3.5 ELECTRICAL AND COMMUNICATION PLAN

3.5.1 ELECTRICAL FACILITIES

3.5.1.1 EXISTING ELECTRICAL FACILITIES

The Hawaii Electric Light Company, Inc. (HELCO) provides electrical power to the island of Hawai'i. HELCO is a privately-owned utility company regulated by the State Public Utilities Commission. Peak electrical demand is currently 186,700 kilowatts (KW) and total generation system capability is 255,100 KW. HELCO's reserve margin is currently 27 percent for the entire island, and its Komohana Substation has adequate generation to serve the first phase of development (construction of a portion of Nowelo Street Extension).

HELCO's power generation system is produced by its steam units, diesel units, and gas turbines located in various areas of the island. Remaining capacity is purchased from three privately-owned companies. HELCO's network of power plants serving Hilo includes the Kanoelehua Power Plant, Puna Power Plant, Wailuku Hydro Power Plant, Hilo Coast Power Plant, and Shipman Power Plant.

There are three levels of transmission voltages to transfer power between areas on Hawai'i. These voltages are 69 kilo-volt (KV), 34.5 KV, and 138 KV. Four cross-island transmission lines are energized at 69 KV; however, one of the Kaumana to Keamuku transmission lines was constructed for 138 KV. This distribution system basically consists of overhead pole lines and underground systems.

The HELCO Komohana Substation is adjacent to the 267-acre parcel, the PBARC, and Waiākea Reservoir. It is located on about a half-acre of land approximately 400 feet from Komohana Street. There are both 69- and 12.47-KV overhead electrical lines associated with the substation. These lines are located in the 50-foot-wide utility easement, which extends eastward to University Park and westward through the proposed Hawai'i CC and Future University Expansion area. In 1996, HELCO added a 10-megavolt-ampere (MVA) substation transformer at the Komohana Substation to increase its capacity from 7.5 MVA to 17.5 MVA. The 10- and 7.5-MVA transformers at Komohana Substation are currently close to their rated capacity.

3.5.1.2 PROPOSED ELECTRICAL SYSTEM

Demand for electrical power will increase with proposed facilities within the 267-acre parcel. HELCO currently has adequate generation capacity to serve the subject loads in Phase I (construction of a portion of Nowelo Street Extension); however, the Komohana Substation transformation capacity must be increased to accommodate future loads. An additional 69- to 12.47-KV substation transformer and associated equipment must be added at Komohana Substation. Additional 12.47-KV distribution lines will also be

required to connect the new substation transformer to the developments via Komohana Street. The existing overhead 69- and 12.47-KV lines will need to be relocated, and distribution line easements will be arranged from Komohana Substation to and within the parcel. During Phase II of the UHH Mauka Parcel development, HELCO will determine if an additional transformer will be required.

The proposed route to serve the 267-acre parcel is from Komohana Substation via Komohana Street. The new duct system will consist of concrete-encased ducts and reinforced concrete manholes and handholes per HELCO requirements. HELCO requires that the duct system connect to an existing HELCO manhole on Nowelo Street, on the east side of Komohana Street. This manhole will connect to a new vacuum switch and switchgear on Nowelo Street Extension, on the west side of Komohana Street, to serve Phases I through IV of the UHH Mauka Parcel development. If required by HELCO, during Phase V, another vacuum switch and switchgear may be added along Road C to feed existing and future lots along this road. Two 4-inch and four 5-inch ducts will cross Komohana Street and continue to the end of Nowelo Street Extension. These ducts will provide service to the lots north of Nowelo Street Extension, the PBARC/IPIF complex, and Hawai'i CC. Two 4-inch and two 5-inch ducts will be extended from Nowelo Street Extension to feed Road C, which will connect with Road A. Service stubouts will be provided to each lot.

Suitable conservation and energy-efficient features to reduce peak electrical demand will be incorporated into development plans. HELCO recommends that developments within the 267-acre parcel take advantage of waste heat recovery equipment to recycle and reuse the waste heat rejected by air conditioning and refrigeration equipment to substantially reduce the amount of energy required.

Various developments shall comply with applicable provisions of *Hawaii Revised Statutes*, Chapters 344 and 226, "State Environmental Policy" and "Hawaii State Planning Act". Buildings, activities, and site grounds will be designed with energy-saving considerations, and developments will also be consistent with the State objective to promote cost-effective energy conservation through the adoption of energy-efficient practices and technologies. The Hawai'i County Energy Code will be consulted. Energy-saving design practices and technologies could include the following.

- Use of natural ventilation to increase comfort of occupants;
- Maximum use of natural lighting without heat gain;
- Use of high efficiency compact fluorescent lighting;
- Use of insulation/radiant barrier for an equivalent R-19 value in ceiling;
- Use of ceiling fans; and
- Use of landscaping for dust control and to minimize area heat gain.

Developments within the parcel will also meet the requirements of Administrative Directive Number 98-03, "Policy Governing the Use of Solar Water Heating Systems for State Facilities".

All plans and designs for new or renovated facilities using State funds or located on State land and incorporating the use of hot water shall include a comparative analysis to determine the cost-benefit of using a conventional water heating system or a solar water heating system. The analysis shall be based on the projected life-cycle analysis is positive, the facility shall incorporate solar water heating. If water heating entirely by solar is not cost-effective, the analysis shall also evaluate the life-cycle, cost-benefit of solar water heating for preheating water. Each Department shall be responsible for conducting an analysis for every facility that provides hot water.

3.5.1.3 EXISTING ROADWAY LIGHTING SYSTEM

There is currently no roadway lighting system within the 267-acre parcel.

3.5.1.4 ROADWAY LIGHTING SYSTEM

The roadway lighting system will consist of steel roadway lighting standards (30 feet high), low-pressure sodium luminaire, and underground secondary feeders. Each roadway luminaire will be equipped with a photocontrol switch and cut-off distribution. HELCO pad-mounted transformers and service equipment will be provided for the roadway lighting system and other lighting and power systems along the roadway right-of-way.

Roadway, walkway, and landscape lighting will be provided and designed in conformance with Hawai'i County Outdoor Lighting Ordinance No. 88-122 to prevent lighting impacts on the Mauna Kea Observatory and astronomical research. The roadway lighting system will also be designed in accordance with the standards and recommendations of the *Illuminating Engineering Society Handbook*.

3.5.2 COMMUNICATION FACILITIES

3.5.2.1 EXISTING TELEPHONE SYSTEM

There is no existing telephone system within the 267-acre parcel. Verizon Hawaii provides telephone service to the area near the parcel from its switching station at the corner of Nowelo Street and South Aohoku Street. Telephone lines are located on HELCO's overhead distribution line along Komohana Street.

3.5.2.2 PROPOSED TELEPHONE SYSTEM

Connection to the existing telephone system would be required. According to Verizon Hawaii, existing facilities are adequate to serve the developments on the 267-acre parcel. As required by Verizon Hawaii, the proposed duct system will be connected to the existing switching station through an existing manhole in Nowelo Street (on the east side of Komohana Street) and will consist of concrete-encased ducts and reinforced

concrete manholes and handholes. The specific communication and telecommunication systems required would be developed as part of each facility's design and would be coordinated with Verizon Hawaii.

3.5.2.3 EXISTING CABLE TELEVISION SYSTEM

There is no existing cable television system within the 267-acre parcel. Hawaiian Cablevision provides cable television service to the area near the parcel from Komohana Street.

3.5.2.4 PROPOSED CABLE TELEVISION SYSTEM

Cable television service currently provided by Hawaiian Cablevision may be adequate to serve the developments on the parcel; however, the signal strength may need to be upgraded within the site. As required, amplifiers will be located in cable television handholes to boost the signal strength.

The proposed duct system will be connected to existing cable television wiring through a cable television handhole in Nowelo Street, east of Komohana Street. The new system will consist of concrete-encased ducts and reinforced concrete handholes.

3.5.2.5 EXISTING COMMUNICATION SYSTEM

There is no existing communications system within the 267-acre parcel. A centralized communications system exists at University Park.

3.5.2.6 PROPOSED COMMUNICATION FACILITIES

As part of an overall UHH master communications system, connection to the communications system at University Park is proposed through an existing cable television handhole on the west corner of the Nowelo Street and South Aohoku Street intersection. The system will consist of concrete-encased ducts and reinforced concrete handholes.

3.6 LANDSCAPE MASTER PLAN

The landscape design for the University Park Expansion will help to provide cultural ties to the history of the site, define and create spaces, define circulation patterns, and reinforce the "campus-like" atmosphere. Native plants as well as introduced plants with cultural significance will be incorporated into the landscape design of the campus to follow the "Hawaiian Garden" concept, as recommended and discussed in the *Hawai'i Community College Long Range Development Plan* (LRDP) *Update* (2003). In accordance with Act 73 of the *Hawaii Revised Statutes*, the landscapes for the buildings

and facilities of the State-funded development will incorporate native Hawaiian plants wherever and whenever feasible. Nearby natural and on-site landscaped areas will provide similar habitat for the existing mammalian and avian species that will be displaced by construction of proposed facilities.

A list of plant material is included in Table 3.1. As much as possible, native and culturally-significant plant material will be used throughout the University Park Expansion. Within the Central Courtyard, smaller gathering areas will be created and site furnishings installed where colleagues from University Park can gather and interact. A plant palette similar to that on the UH Hilo campus will also help to give a "campus-like" atmosphere for the research and technology park.

Historic features located at the Nowelo Street entry to the parcel should be highlighted, but should not encourage people to walk through the area to avoid any damage to the site. 'Ōhi'a lehua and hāpu'u fern is encouraged to re-establish native plants in this area, similar to the plant palette of the historic area on the UH Hilo main campus. Any other existing native or rare plants should also be maintained within this area.

In buffer areas, large canopy shade trees and shrubs will be added to provide screening or to frame views where appropriate. These screening trees will be used to define the boundaries and reinforce a sense of identity for the University Park Expansion.

Water conservation will be a major consideration in the selection of plant materials and in the design of the irrigation system. Low-maintenance landscape design principles should be utilized as much as possible.

TABLE 3.1
PLANT LIST

Common Name	*Botanical Name*	*Ultimate Size + (height, spread)*	*Gateways*	*Reeals*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Park's Edge*	*Edges (Perimeter Plantings)*	*Accent Plantings*
TREES									
KOA	Acacia koa	60ft, 80ft		X	X	X	X		
KUKUI TREE*	Aleurites moluccana	40ft, 30ft		X	X	X	X		
QUEEN PALM	Arecastrum romanzoffianum	50 ft		X		X			X
HONG KONG ORCHID	Bauhinia blakeana	30ft, 30ft			X	X			X
TRUE KAMANI*	Calophyllum inophyllum	35ft, 35ft				X			
HAWAIIAN TREE FERN (HAPU'U)	Cibotium splendens	10ft, 6ft				X		X	X
AUTOGRAPH TREE	Clusia rosea	30ft, 30ft		X		X	X		
TRUE KOU*	Cordia subcordata	30ft, 35ft		X			X	X	
WILIWILI*	Erythrina sandwicensis	30ft, 30ft				X			X
MOUNTAIN APPLE*	Eugenia malaccensis	60ft, 20ft						X	
WEEPING BANYAN	Ficus benjamina	60ft, 80ft				X			
CHINESE BANYAN	'Ficus retusa	75ft, 75ft				X			
JACARANDA	Jacaranda acutifolia	50ft, 40ft		X		X			X
GIANT CRAPE MYRTLE	Largerstroemia speciosa	30ft, 30ft		X	X	X			X
MAGNOLIA	Magnolia grandiflora	30ft, 20ft			X				X
OHIA LEHUA*	Metrosideros collina subsp. Polymorpha	100ft, 20ft			X	X		X	X

Common Name	*Botanical Name*	*Ultimate Size + (height, spread)*	*Gateways*	*Roads*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Park'g Lots*	*Edges (Perimeter Planting)*	*Accent Planting*
JOANNIS PALM	Veitchia joannis	50ft	X	X		X			X
MANILA PALM	Veitchia merrillii	15ft	X	X		X			X
SHRUBS									
RED GINGER	Alpinia purpurata		X			X			X
SHELL GINGER	Alpinia speciosa		X			X			X
AZALEA	Azalea spp. and hybrids					X			X
DWARF CARISSA	Carissa grandiflora "Boxwood Beauty"		X			X			
NATAL PLUM	Carissa grandiflora					X		X	
HAPU'U PULU*	Cibotium glaucum		X			X			X
CROTON	Codiaeum variegatum		X			X			X
HYBRID TI	Cordyline sp.		X		X	X		X	X
TI*	Cordyline terminalis		X		X	X		X	X
SPIDER LILY	Crinum asiaticum		X			X			X
QUEEN EMMA LILY	Crinum augustum		X			X			X
GARDENIA	Gardenia jasminoides		X		X	X			X
TIARE	Gardenia taitensis		X		X	X			X
WHITE GINGER	Hedychium coronarium					X			X
YELLOW GINGER	Hedychium flavescens		X			X			X
HELICONIA	Heliconia sp.		X			X			X

Common Name	*Botanical Name*	*Ultimate Size + (height, spread)*	*Gateways*	*Roads*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Park'g Lots*	*Edges (Perimeter Planting)*	*Accent Planting*
HALA*	Pandanus odoratissimus	30ft, 30ft				X			X
ALL SPICE	Pimenta dioica	40ft, 25ft		X	X	X	X		X
PLUMERIA	Plumeria sp.	30ft, 30ft				X			X
MONKEYPOD TREE	Samanea saman	35ft, 70ft				X			
AFRICAN TULIP	Spathodea campanulata	50ft, 25ft			X	X			X
GOLD TREE	Tabebuia donnell-smithii	75ft, 25ft		X	X	X			X
PINK TECOMA	Tabebuia pentaphylla	40ft, 30ft			X	X			X
MILO*	Thespesia populnea	25ft, 30ft							X
PALMS									
ALEXANDRA PALM	Archontophoenix alexandrae	60ft			X				X
FISHTAIL PALM	Caryota mitis	25ft				X			X
ARECA PALM	Chrysalidocarpus lutescens	30ft		X		X			X
COCONUT PALM*	Cocos nucifera	50ft				X			X
SAGO PALM	Cycas revoluta	10ft	X			X			X
CYCAD PALM	Cycas circinalis	20ft	X			X			X
FIJI FAN PALM	Pritchardia pacifica	30ft	X	X		X			X
LOULU PALM*	Pritchardia beccariana	30ft	X	X		X			
MACARTHUR PALM	Ptychosperma macarthurii	30ft				X			X
RHAPIS PALM	Rhapis excelsa	10ft				X			X
ROYAL PALM	Roystonea regia	75ft	X	X	X	X			X

Common Name	*Botanical Name*	*Ultimate Size + (height, spread)*	*Gateways*	*Roads*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Park'g Lots*	*Edges (Perimeter Planting)*	*Accent Planting*
MONDO GRASS	Ophiopogon japonicus		X			X	X		
STAGHORN FERN	Platycerium grande				X				X
POTHOS	Pothos aureus		X			X			
SPATHIPHYLLUM	Spathiphyllum sp.		X			X			X
GOLDEN GLORY	Arachis pintoi					X	X	X	
GRASS									
AUSTRALIAN CARPET GRASS	Eremochloa ophiuroides		X	X	X	X	X	X	
KIKUYU GRASS 'AZ-1'	Pennisitum clandestinum		X	X	X	X	X	X	
VINES									
YELLOW ALLAMANDA	Allamanda cathartica var. hendersonii					X			X
BLEEDING HEART VINE	Clerodendron thomsonae					X			X
CONGEA, PINK SANDPAPER VINE	Congea tomentosa					X			X
RED JADE VINE	Mucuna bennettii					X			X
JADE VINE	Strongylodon macrobotrys					X			X

Common Name	*Botanical Name*	*Ultimate Size + (height, spread)*	*Gateways*	*Roads*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Park'g Lots*	*Edges (Perimeter Planting)*	*Accent Planting*
SALMON HIBISCUS	Hibiscus spp.		X		X	X		X	X
RED IXORA	Ixora macrothyrsa		X			X			X
LEEA	Leea coccinea					X			
MONSTERA	Monstera deliciosa		X			X			X
YELLOW AFRICAN IRIS	Morea bicolor		X			X			X
MOCK ORANGE	Murraya paniculata					X		X	
PHILODENDRON	Philodendron selloum		X			X			X
TRAVELLER'S TREE	Ravenala madagascariensis					X			X
GIANT BIRD OF PARADISE	Strelitzia nicolai					X			X
GROUNDCOVER									
MAIDENHAIR FERN	Adiantum sp.					X			X
ASPARAGUS FERN	Asparagus sprengeri					X			
BIRDS-NEST FERN	Asplenium nidus								X
TUTTLE CARISSA	Carissa grandiflora "Tuttle"					X			
FALSE HEATHER	Cuphea hyssopifolia		X			X			X
DAYLILY	Hemerocallis sp.		X			X			X
LIRIOPE	Liriope spp.		X			X			X
LAUA'E FERN	Microsorium scolopendria		X			X	X		
WALKING IRIS	Neomarica caerulea		X			X			X

4.0 DESIGN GUIDELINES

(being prepared)

5.0 PHASING PLAN AND COST ESTIMATES

5.1 PHASING PLAN

The University Park Expansion will be developed over five phases. The first phase of development includes the construction of a portion of Nowelo Street Extension that will provide access to the University Park Expansion and the PBARC/IPIF complex. Construction of this portion of the roadway is anticipated to be completed by the year 2005. The lease and development of lots within the University Park Expansion is expected to commence shortly thereafter.

Based on the anticipated 20-year absorption rate for lots within the 267-acre parcel, approximately two lots will be leased for development per year. All lots are expected to be leased by the year 2025. Construction of the remainder of Nowelo Street Extension, internal roadways, and associated infrastructure will be phased to correspond with development of the University Park Expansion.

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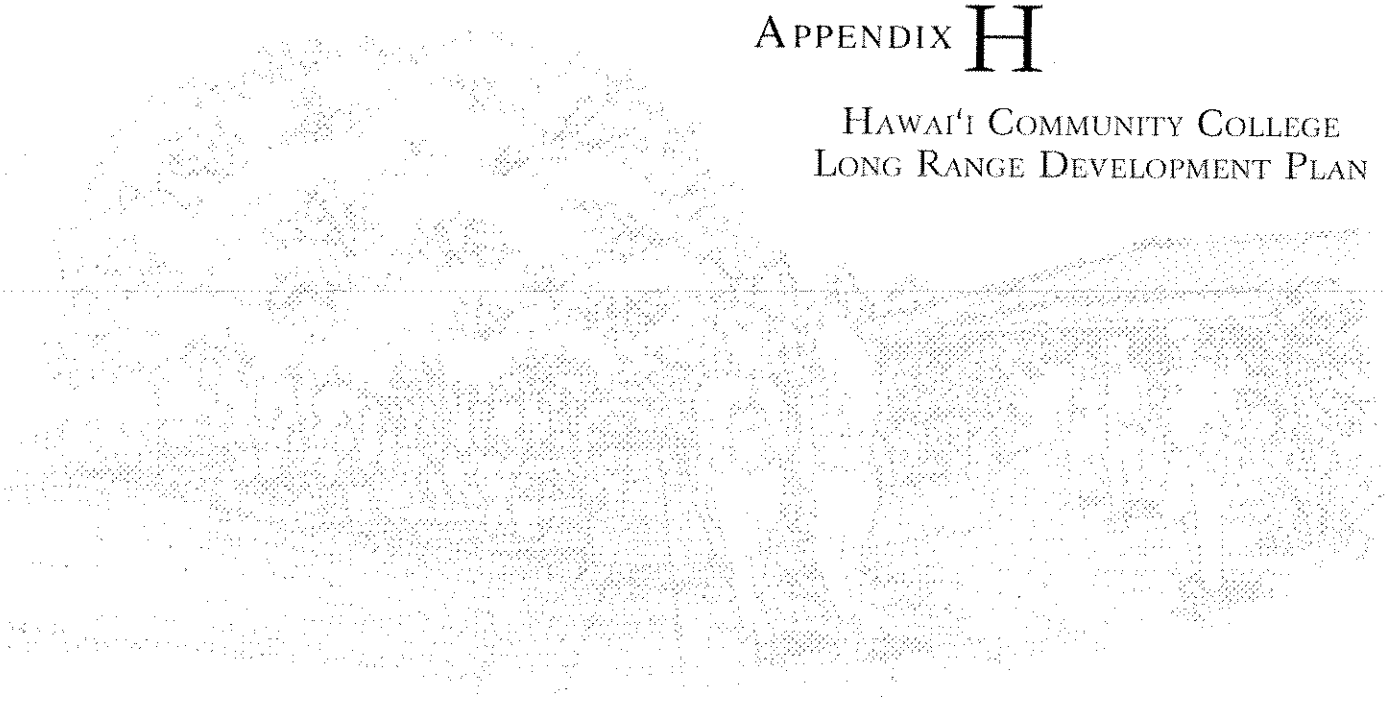
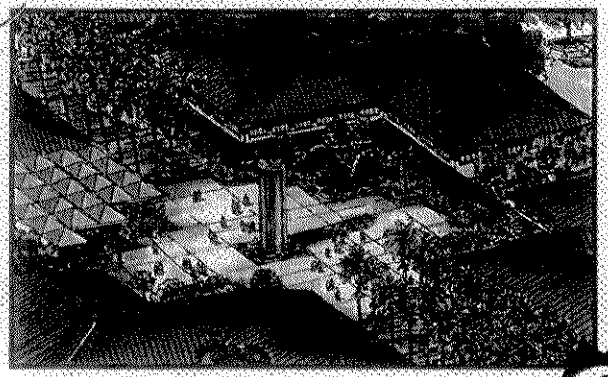
Appendix H

Hawai'i Community College
Long Range Development Plan



Hawai'i Community College



LONG RANGE DEVELOPMENT PLAN UPDATE

May 2003

Prepared for:

Hawai'i Community College
The University of Hawai'i
State of Hawai'i
Project Number CC-99-9014

Prepared by:

PBR HAWAII
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Honolulu, Hawai'i 96813-3484

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Urban Works, Inc.
Ronald N.S. Ho & Associates, Inc.

Hawai'i Community College

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Approved

Chancellor
Hawai'i Community College

6/25/03
Date

TABLE OF CONTENTS

1.0 INTRODUCTION 1-1

1.1 Background 1-1
1.1.1 1996 Hawai'i CC LRDP 1-1
1.1.2 UH Hilo University Park Expansion and the US Department of Agriculture Pacific Basin Agricultural Research Center 1-2
1.1.3 Hawai'i CC's Island-Wide Plan 1-2
1.2 Methodology 1-3

2.0 PROGRAM PLANNING FOR THE ULTIMATE 3,000 FTE KOMOHANA CAMPUS 2-1

2.1 Introduction 2-1
2.2 Program Requirements for a 3,000 FTE Campus 2-1
2.2.1 Assignable Square Footages 2-1
2.2.2 Planning Assumptions 2-2
2.2.3 Projected Gross Square Footages 2-2
2.3 Space Allocation Program (Building Footprint Requirements) 2-2
2.4 Functional Relationships 2-2

3.0 SITE ANALYSIS AND RECOMMENDED SITE FOR THE 3,000 FTE KOMOHANA CAMPUS 3-1

3.1 Objective 3-1
3.2 Description of the 267-acre State-owned Parcel 3-2
3.2.1 Location and Site Conditions 3-2
3.3 Recommended Site, Site Characteristics and Factors Affecting the Development of the Site 3-6
3.3.1 Site Area and Existing Conditions 3-7
3.3.2 Topography 3-8
3.3.3 Climatic Conditions 3-8
3.3.4 Flora 3-8
3.3.5 Archaeological Resources 3-8
3.3.6 Flooding and Drainage 3-8
3.3.7 Visual Resources 3-9
3.3.8 Surrounding Land Uses 3-9
3.3.9 Easements 3-9
3.3.10 Electrical and Communication Requirements 3-10
3.3.11 Water and Sewer System Requirements 3-10
3.3.12 Traffic Access and Circulation 3-10

3.4 Procedural Requirements of Government Regulations 3-11
3.4.1 Land Use Regulations 3-11
3.4.2 Chapter 343, HRS Environmental Impact Statement Process 3-11
3.4.3 ADA (American Disability Act) 3-11

4.0 REVISED ULTIMATE SITE PLAN 4-1

4.1 Objective 4-1
4.2 Revised Ultimate Site Plan 4-1
4.2.1 Plazas, Open Spaces and Pedestrian Circulation 4-3
4.2.2 Buildings / Functional Siting 4-3
4.2.3 Landscaping 4-5
4.2.4 Gateways and Entries 4-5
4.2.5 Edges 4-5
4.2.6 Vehicular Circulation and Parking Areas 4-6
4.2.7 Solid Waste Handling 4-7
4.3 Architectural Barrier-Free Access Plan 4-7
4.4 Grading and Drainage Plan 4-7
4.4.1 Existing 4-7
4.4.2 Off-site Improvements 4-7
4.4.3 On-site Improvements 4-8
4.5 Water System 4-8
4.5.1 Existing 4-8
4.5.2 Off-Site Improvements 4-8
4.5.3 On-Site Improvements 4-9
4.6 Sewer System 4-9
4.6.1 Existing 4-9
4.6.2 Off-Site Improvements 4-9
4.6.3 On-Site Improvements 4-9
4.7 Electrical System 4-10
4.7.1 Existing 4-10
4.7.2 Off-Site Improvements 4-10
4.7.3 On-Site Improvements 4-11

5.0 FACILITIES TRANSITION AND PHASING PLAN 5-1

5.1 Objective 5-1
5.2 The Manono Campus 5-2
5.3 Projected Timeline, Campus Growth, and Program Requirements for Interim Student Population at Manono Campus 5-2
5.3.1 Projected Timeline 5-2
5.3.2 Interim Student Population 5-2
5.3.3 Interim Program Requirements 5-3
5.4 Alternatives and Order-of-Magnitude Cost Analysis for the Interim Manono Campus 5-4
5.4.1 Renovation Alternative 5-4
5.4.2 Second Story Additions Alternative 5-4

5.4.3 Site-constructed Portables Alternative 5-4
5.4.4 Modular (Prefabricated) Portables - Preferred Alternative 5-5
5.5 Interim Transition Plan for Manono Campus 5-6
5.5.1 Portable Building Design 5-6
5.5.2 Parking 5-7
5.6 Proposed Phasing Plan for Komohana Campus 5-7
5.6.1 Phase 1 5-8
5.6.2 Phase 2 5-9
5.6.3 Phase 3 5-9
5.6.4 Phase 4 5-10
5.7 Order-of-Magnitude Cost Estimates 5-10

APPENDICES

APPENDIX A: Various Letters to and from County and State Agencies and the Hawaiian Electric Light Company Regarding Civil Improvements for the Hawai'i CC LRDP Update A-1

APPENDIX B: Additional Space Requirements for Interim Manono Campus B-1

APPENDIX C: Typical Portable Building Quotation and Specifications C-1

APPENDIX D: Detailed Order-of-Magnitude Cost Estimates for Hawai'i CC LRDP Update D-1

LIST OF FIGURES

Figure 1.1: Location Map 1-1
Figure 2.1: Idealized Functional Relationships 2-11
Figure 2.2: Detailed Functional Relationship Diagram 2-12
Figure 3.1: Komohana Site 3-1
Figure 3.2: Selected Komohana Campus Site 3-7
Figure 4.1: Komohana Campus Revised Ultimate Site Plan 4-2
Figure 5.1: Manono Campus 5-1
Figure 5.2: Proposed Portable Buildings and Parking Lot Layout at Manono Campus 5-5
Figure 5.3: Typical Floor Plan for Portable Buildings at Manono Campus 5-6
Figure 5.4: Komohana Campus Proposed Phasing Plan 5-11

LIST OF TABLES

Table 2.1: Planning Assumptions 2-3
Table 2.2: Program Requirements 3,000 FTE 2-4
Table 2.3: Building Footprints for 3,000 FTE Campus 2-8
Table 4.1: Revised Plant List 4-12
Table 4.2: Updated Potential Building Loads for the Komohana Campus 4-17
Table 5.1: Additional Program Space Requirements for Interim Manono Campus 5-3
Table 5.2: Order-of-Magnitude Cost Estimates for the Interim Manono Campus and the KomohanaCampus 5-10

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Mr. Alan Subica, Director of Administrative Services, Hawai'i Community College
Mr. Harry Kawamura, Dean of Instruction, Hawai'i Community College
Mr. Wilton Watanabe, Coordinator of Apprenticeship and Non Credit programs and CIP Coordinator, Hawai'i Community College
Mr. Michael Unebasami, Vice Chancellor for Administrative Affairs, Chancellor's Office for Community Colleges
Mr. Maynard Young, Director, Facilities Planning Office for Community Colleges
Mr. Lo-li Chih, Registered Architect, Facilities Planning and Construction, University of Hawai'i at Hilo

1.0

Introduction

1.0 INTRODUCTION

1.1 Background

1.1.1 1996 Hawai'i CC LRDP

In the fall of 1990, the Board of Regents approved the separation of Hawai'i Community College (Hawai'i CC) and UH-Hilo into two distinct entities. Although Hawai'i CC continues to share facilities and services with the UH-Hilo, plans were announced to relocate Hawai'i CC to a "new" campus on State owned lands across from the University Park on Komohana Street. The entire parcel on which the new Hawai'i CC campus is to be located is comprised of 326 acres. (See Figure 1.1.) The new Hawai'i CC campus (Komohana Campus) campus would be located within a portion of this property. In 1991, the legislature appropriated funds to prepare Long Range Development Plans (LRDPs) for UH-Hilo and for Hawai'i CC. Each of the plans were to be developed to reflect the academic program plans and enrollment projections of the two individual institutions. The planning efforts for the two schools were initiated concurrently so that issues regarding the transition from a shared campus at UH-Hilo to separated campuses, could be addressed in the context of the

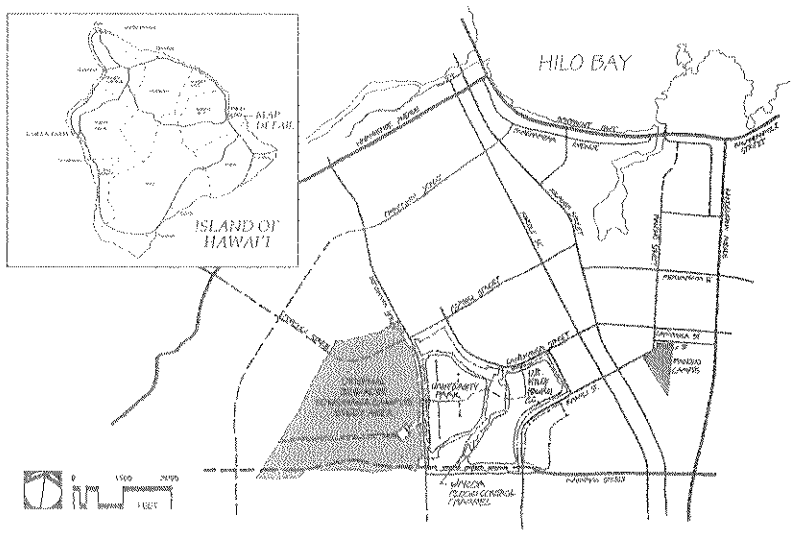


Figure 1.1: Location Map

respective LRDP for each campus. This process was intended to be delineated within a Transition and Implementation Plan which had been deferred, because of outstanding policy issues. The LRDP's for the two campuses were completed and adopted by the University of Hawai'i Board of Regents in 1996.

1.1.2 UH Hilo University Park Expansion and the US Department of Agriculture Pacific Basin Agricultural Research Center

In April of 1998, the State's Board of Land and Natural Resources (BLNR) approved the set-aside of approximately 326 acres of land in Hilo for general University and Community College purposes. The following year, the BLNR approved the University's request for a management right-of-entry for this parcel for planning and design purposes, including necessary environmental studies, topographical field work, and surveying by the United States Department of Agriculture (USDA) for a proposed Pacific Basin Agricultural Research Center (PBARC). In November of 1999, the UH Board of Regents authorized the UH Administration to enter into a lease agreement with the USDA on approximately 30 acres of land within the 326-acre property. In addition, a 1.4-acre parcel was delineated for an archaeological site. The proposed PBARC site occupies a portion of land which was previously earmarked as the site for the new Hawai'i CC campus. This has resulted in a need to delineate a new site within the 326-acre parcel for Hawai'i CC. In addition, plans for UH Hilo's University Park expansion needed to be considered in the new site selection.

1.1.3 Hawai'i CC's Island-Wide Plan

Hawai'i CC has recently established a new policy direction for the campus that has a direct bearing on the transition and implementation component of the Hawai'i CC LRDP. While the Hawai'i CC LRDP was based on the development of a master-planned campus at the Komohana site to serve as a centralized "home" campus, the new "Island-Wide Concept" for Hawai'i CC envisions servicing the entire island of Hawai'i through distributed campus sites in Hilo, Kona, Waimea, Kā'ū and possibly smaller sites located in Laumāhoehoe and Pāhoa. Under this new policy direction, academic and training programs are distributed by means of distance education, with selected programs rotated to various sites depending on program needs and employment opportunities. The concept envisions that certain support functions, such as counseling and library services, would be decentralized and available at each site, while other functions, such as admissions and records, and business and accounting, would be centrally located and connected electronically between the various sites. The changes to Hawai'i CC's educational program due to this change in policy direction has resulted in a reduced ultimate student population size of 3,000 Full-Time Equivalent (FTE) for the new Hawai'i CC campus which is planned to be located on the 100-acre Komohana Campus parcel.

A key component of the Island-Wide Concept is the use of recent advances in computer and communications technologies to extend Hawai'i CC programs to the more remote areas of the Big Island through the development of distance learning programs. The distance learning component, structured on a network of distribution and receiver sites, seeks to provide a cost effective approach to extending the availability of Hawai'i CC programs to a broader geographical area.

Coupled with the use of these technologies, Hawai'i CC also recognizes the need to remain flexible in its program planning in order to respond to the economic development opportunities and the unique educational and training resources that emerge in various areas of the Island. The Island-Wide Concept, by shifting Hawai'i CC's emphasis away from a centralized "home" campus to a network of distributed sites, promises to provide for a more responsive and cost effective approach to meeting the growing and dynamic educational needs of the Island.

Space and infrastructure limitation at the current Hawai'i CC Manono Campus restrict the extent of further development on the Manono property. Nevertheless, the Manono Campus must serve as the interim campus for Hawai'i CC until construction of the initial phase of the Komohana Campus is completed. A phased transition plan which satisfies the interim growth and infrastructure requirements is essential to accommodate the growth and development of Hawai'i CC during this interim period.

1.2 Methodology

The Hawai'i CC LRDP Update and Technology Plan has been prepared to identify a new site for the permanent Komohana campus for Hawai'i CC based on the new Island-Wide Concept for the campus. In addition, the LRDP Update and Technology Plan provides a phased plan for the transition of Hawai'i CC's campus facilities from the existing Manono and UH-Hilo campuses to the new Komohana Campus. Finally, the plan serves to identify technology needs and issues for the college and potential locations for new satellite campuses to implement the Island-Wide Concept. To achieve these objectives, the LRDP Update and Technology Plan will be prepared in a six step process as follows:

1. Summarize the program requirements (provided by Hawai'i CC) to accommodate Hawai'i CC facilities which are temporarily housed at the Manono and University of Hawai'i at Hilo (UH Hilo) campuses, as well as to reflect the ultimate 3,000 FTE student campus at Komohana and the satellite campus locations.

2. Identify a new 100-acre site for the new Komohana campus. Provide an update to the existing LRDP for the campus.

3. Prepare an incremental facilities transition plan that will satisfy the short and long range requirements for phasing the relocation of Hawai'i CC from the existing Manono and UH Hilo campuses to the Komohana campus.

4. Prepare order-of-magnitude cost estimates for the building renovations and infrastructure requirements needed at the Manono campus to accommodate the interim use of the site, prior to relocation to the new campus. Provide revised order-of-magnitude cost estimates, by phase, for the 3,000 FTE Hawai'i CC Komohana campus based on the cost estimates prepared for the Hawai'i CC Long Range Development Plan.

5. Document the planning process and study findings into a Transition/Implementation Plan and Cost Estimate Report.

6. Prepare a Technology Plan to assess the technology infrastructure on the Island and develop a plan to link the campus with its island-wide satellite campus sites.

The LRDP Update and Technology Plan are bound as separate reports. This report describes the changes to the LRDP. The Technology Plan was prepared by Secure Technology Hawai'i and was completed in February 2002.

2.0

Program Planning for the Ultimate
3,000 FTE Komohana Campus

2.0 PROGRAM PLANNING FOR THE ULTIMATE 3,000 FTE KOMOHANA CAMPUS

2.1 Introduction

This section of the Hawai'i CC LRDP Update revises the program requirements for the Hawai'i CC Komohana Campus, as described in the 1996 Hawai'i CC LRDP, based on a reduced ultimate student population size of 3,000 FTE and changes to the school's educational program requirements. These revisions included changes to the projected assignable square footage and resultant gross square footage requirements for the campus. Functional relationship diagrams which were prepared in the 1996 Hawai'i CC LRDP were modified to meet the new program requirements and changes are also included in this phase.

2.2 Program Requirements for a 3,000 FTE Campus

2.2.1 Assignable Square Footages

The assignable square footages described in the Educational Specifications (December 1994) were modified to reflect the updated Hawai'i CC campus program for a 3,000 FTE campus. Specific changes to the program requirements include the removal of the Machine Technology from the program and the name change from "Community Services" to the "Office of Continuing Education and Training." In addition, Hawai'i CC added two new programs: Agroforestry (T&I Division) and Hawaiian Culture (Humanities). The major components taken into account during preparation of the Educational Specifications and Program Planning phase for the 3,000 FTE campus are as follows[1]:

1. Instructional facilities to include the following divisions:
   - Social Science/Humanities
   - Public Service
   - Communications & Language Arts
   - Math/Science
   - Business Education
   - Nursing
   - Trade & Industry programs
2. Support facilities to include:
   - Academic Support
   - Student Services
   - Institutional Support
   - Community Services
3. Parking facilities to accommodate 1,500 cars.

This results in a total projected assignable square footage requirement of 564,053 square feet.

[1] Housing and athletic facilities were not considered as part of the new campus.

2.2.2 Planning Assumptions

A number of planning assumptions were utilized in developing projected gross square footage and building footprint requirements. These assumptions, listed in Table 2.1, include a grossing factor of 50 percent to determine building gross square footages, the provision of educational and support services primarily within two-story structures, and a parking ratio of 1 stall for every 2 FTE with a land area of 350 square feet per parking stall.

2.2.3 Projected Gross Square Footages

The projected assigned square footages (shown in column "b" of Table 2.2) where translated into projected gross square footages based on a grossing factor of 50 percent which accommodates for non-assigned spaces (such as custodial space, mechanical rooms, electrical rooms, signal closets, etc.) and internal circulation. The projected total gross square footage requirement (shown in column "c" of Table 2.2) for a 3,000 FTE campus is 846,080 square feet.

2.3 Space Allocation Program (Building Footprint Requirements)

Building heights (ranging from 1 to 2-stories) were then applied to the gross square footage requirements (column "c" of Table 2.2) to yield a building footprint for the campus (See Table 2.3). For the 3,000 FTE Komohana Campus, there will be a total of 30 1 to 2-story buildings.

2.4 Functional Relationships

The functional relationship diagrams depicted in the Hawai'i CC LRDP (March 1996) were updated and modified for the 3,000 FTE campus. Except for the name change from "Community Services" to "Office of Continuing Education and Training," the Idealized Functional Relationship Diagram remains the same as in the earlier LRDP. In this diagram, parking is located at the main entrance to the campus, with Institutional Support, Student Services, and Continuing Education and Training located in close proximity to the parking area (See Figure 2.1). At the core of the campus would be the Academic Support facilities which would includes the Learning Center. Surrounding the core area would be the primary Instructional areas. Shops and technical training facilities are located at the rear of the campus or away from classroom and office buildings to mitigate noise and odor emissions that may be disruptive. Institutional Support facilities in the form of Auxiliary Services would also be located away from the main entry to the campus. A secondary entrance, with adjacent parking, would be provided in the rear portion of the campus.

The Detailed Functional Relationship Diagram, which depicts relationships among the program groupings of Instructional, Academic Support, Student Services, Institutional Support, and Continuing Education and Training, was modified to reflect the elimination of the Machine Technology Program, the addition of Agroforestry (Hawaiian Culture falls under the Humanities Department and therefore does not have a separate bubble), and the name change from "Community Services" to "Office of Continuing Education and Training" (See Figure 2.2). In addition, Hawai'i CC requested that provisions for "Campus Security" be indicated near the Student Services/Campus Center and that the "Maintenance and Operations" uses be relocated to the area near the Welding Technology in the rear of the campus.

TABLE 2.1
PLANNING ASSUMPTIONS

A. Full-Time Equivalent (FTE) Headcount[2]:	3,000 FTE
B. Non-Assigned Space & Internal Circulation Factor[3]:	50%
C. Height of Buildings:	See Table 2.3
D. Parking Ratio (Number of Parking Stalls Per Every FTE Count)[4]:	1 to 2
E. Percent of Parking Stalls:	
At-Grade	100%
In Parking Structure	0%
F. Number of Floors In The Parking Structure (if applicable):	0 Floors
G. Area Per Parking Stall:	350 Sq. Ft.

[2]The FTE Headcount is based on the program requirement as stated in the scope of services for the Master Plan of the Hawai`i Community College. It should be noted that the Actual Headcount, or the total number of students enrolled in classes at Hawai`i CC regardless of part- or full-time status, may vary from the FTE Headcount. The average FTE Headcount over the past ten years at Hawai`i CC has varied between 65 - 70 percent of the Actual Headcount.

[3]The Factor for Non-Assigned Space is based on a recommendation by the Physical Facilities Planning & Construction Office for the Community Colleges. This factor takes into account Non-Assigned Space such as custodial space, mechanical rooms, and Public Circulation such as corridors and stairways.

[4]The parking ratio is based on a recommendation by the Hawai`i CC Facilities Planning Office.

TABLE 2.2
PROGRAM REQUIREMENTS
3,000 FTE

a. Instructional Spaces	b. Projected Assigned Sq. Ft.[1]	c. Projected Gross Sq. Ft.[2]
Social Science/Humanities Division		
Divisional Spaces	18,334	27,501
Hawaiian Culture	6,115	9,173
Public Service Division		
Divisional Spaces	8,532	12,798
Early Childhood Education	12,314	18,471
Language Arts Division		
Divisional Spaces	11,022	16,533
Fine Arts	16,076	24,114
Foreign Language	2,160	3,240
Journalism	2,120	3,180
Speech/Communication	2,500	3,750
Math/Science Division		
Divisional Spaces	20,580	30,870
Mathematics	3,100	4,650
Natural Sciences	15,236	22,854
Business Education Division		
Divisional Spaces	7,748	11,622
Accounting	2,500	3,750
Business Education Learning Center	3,040	4,560
Hotel Operations	300	450
Information & Computer Science	7,175	10,763
LAN/Computer Maint. Room	400	600
Office Admin. & Technology	4,320	6,480
Sales & Mktg/Gen Business	500	750

TABLE 2.2 PROGRAM REQUIREMENTS 3,000 FTE (CONT.)

a. Instructional Spaces	b. Projected Assigned Sq. Ft. [1]	c. Projected Gross Sq. Ft. [2]
Nursing Division		
Divisional Spaces	11,784	17,676
Trade and Industry Division		
Divisional Spaces	5,366	8,049
Agriculture Program	14,500	21,750
Agroforestry	18,750	28,125
Auto Body Repair & Painting	27,663	41,495
Automotive Technology	30,182	45,273
Carpentry	32,460	48,690
Drafting & Engr'g Aide Program	8,695	13,043
Diesel Mechanics Program	25,488	38,232
Electrical Maint. & Install. Tech.	16,328	24,492
Electronics	6,518	9,777
Food Service	27,126	40,689
Welding Technology	12,448	18,672
Instructional Space Subtotal	**381,380**	**572,070**

TABLE 2.2 PROGRAM REQUIREMENTS 3,000 FTE (CONT.)

a. Support Spaces	b. Projected Assigned Sq. Ft. [1]	c. Projected Gross Sq. Ft. [2]
Academic Support		
Dean of Instruction	1,900	2,850
Learning Resources	19,930	29,895
Learning Skills	19,572	29,358
Telecom./Media Center	24,968	37,452
Cooperative Vocational Educ.	708	1,062
Student Services		
Administration	3,748	5,622
Admissions & Records	3,780	5,670
Bridge Programs	4,530	6,795
Counseling & Guidelines/		
Human Development	8,950	13,425
Financial Aid	2,720	4,080
Special Programs	1,340	2,010
Student Activities	12,512	18,768
Student/Faculty Health Center	1,194	1,791
Contract Food Service	15,084	22,626
Multi-Purpose Room	2,500	3,750
Bookstore	4,744	7,116
Main Utility Services	400	600
Institutional Support		
Provost	3,590	5,385
Administrative Services	880	1,320
Business Operations	2,740	4,110
Personnel Services	920	1,380
Computing Services	2,132	3,198

TABLE 2.2 PROGRAM REQUIREMENTS 3,000 FTE (CONT.)

a. Support Spaces	b. Projected Assigned Sq. Ft. [1]	c. Projected Gross Sq. Ft. [2]
Institutional Support (continued)		
Operations & Maintenance	9,882	14,823
Security Command Center	667	1,000
Office of Continuing Education and Training		
Office of Continuing Education and Training	33,282	49,923
Support Space Subtotal	**182,673**	**274,010**
Instructional & Support Space Total	**564,053**	**846,080**

Notes:

1 The Projected Assigned Sq. Ft. requirement is based on the Educational Specifications for the Hawai'i CC LRDP (December 1994) and subsequently updated per Hawai'i CC Administration.

2 The Projected Gross Sq. Ft. is the result of increasing the Projected Assigned Square Feet of the program spaces by 50% (the Non-Assigned Space and Internal Circulation Factor as noted in Item B, Table 2.1).

TABLE 2.3
BUILDING FOOTPRINTS FOR 3,000 FTE CAMPUS

Building #	Department		GSF	# of Stories	Building Footprint
INSTRUCTIONAL BUILDINGS					
Social Science/Humanities Division					
1 & 2	Social Sciences/Humanities Bldg. (2 Buildings)		27,501	1	27,501
3	Hawaiian Culture		9,173	1	9,173
Public Service Division					
4	Public Services Bldg.		12,798	1	12,798
5	Early Childhood Ed. Div./Children's Center		18,471	1	18,471
Language Arts Division					
6 & 7	Language Arts Bldg. (2 Buildings)		50,817	2	25,409
	Divisional Spaces	16,533			
	Fine Arts	24,114			
	Foreign Language	3,240			
	Journalism	4,180			
	Speech/Communication	3,750			
Math/Science Division					
8	Math/Science Bldg.		58,374	1.5	38,916
9	Business Education Building		38,975	1	38,975
	Divisional Spaces	11,622			
	Accounting	3,750			
	Business Education Learning Center	8,560			
	Hotel Operations	450			
	Information & Computer Science	10,763			
	LAN/Computer Maint. Room	600			
	Office Admin. & Technology	6,480			
	Sales & Mktg/Gen Business	750			
Nursing Division					
10	Nursing Div. Bldg./Divisional Spaces		17,676	1	17,676
Trade and Industry Division					
11 & 12	Trade & Industry Bldg. (2 Buildings)		30,869	1	30,869
	Divisional Spaces	8,049			
	Electronics Technology	9,777			
	Drafting & Engineering Aide Prgm.	13,043			
13	Agriculture Program		21,750	1	21,750
14	Agroforestry		28,125	1	28,125

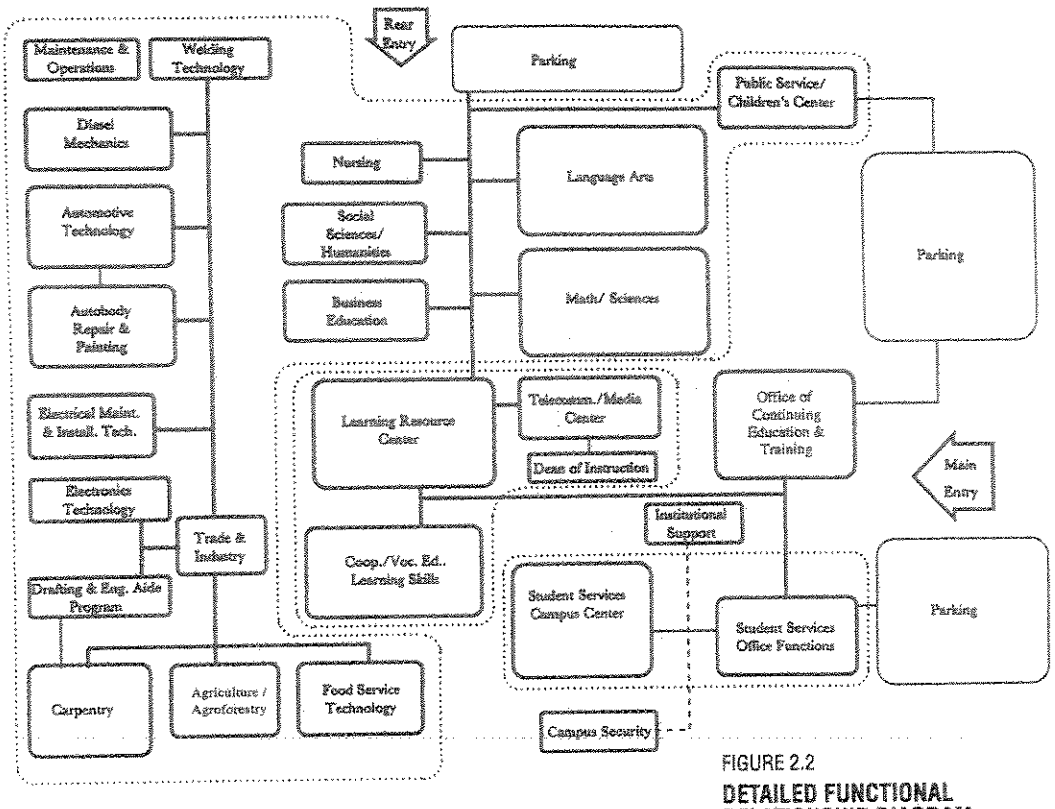


FIGURE 2.2

DETAILED FUNCTIONAL RELATIONSHIP DIAGRAM

HAWAI'I CC
LONG RANGE DEVELOPMENT PLAN UPDATE

May 2003

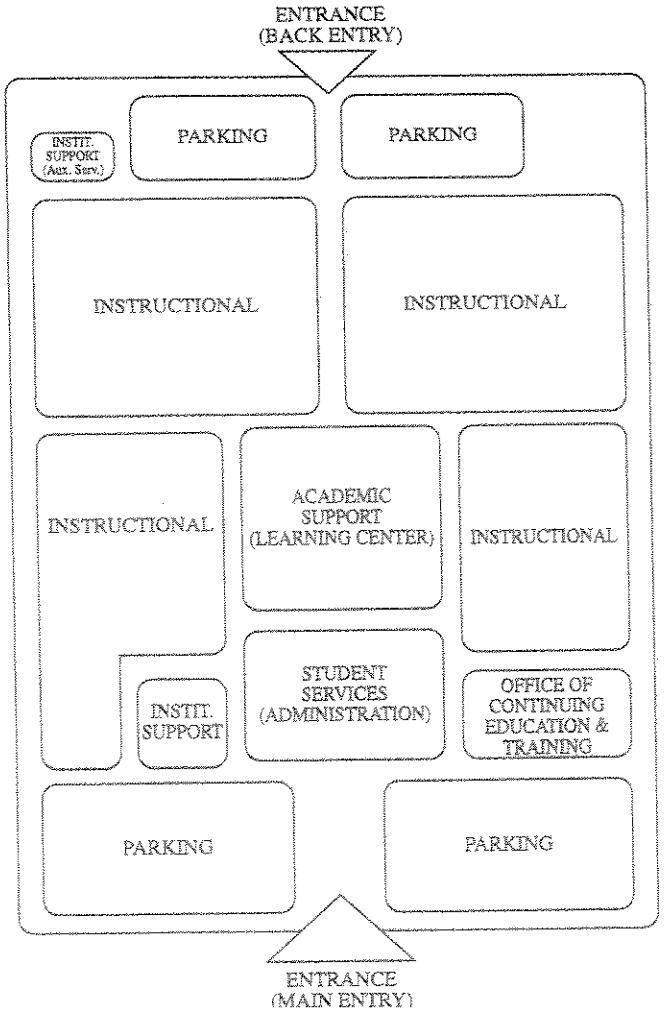


FIGURE 2.1

IDEALIZED FUNCTIONAL RELATIONSHIPS

HAWAI'I CC
LONG RANGE DEVELOPMENT PLAN UPDATE

May 2003

TABLE 2.3
BUILDING FOOTPRINTS FOR 3,000 FTE CAMPUS

Building #	Department		GSF	# of Stories	Building Footprint
INSTRUCTIONAL BUILDINGS (CONTINUED)					
15	Auto Body Repair & Painting		41,495	1	41,495
16	Automotive Technology		45,273	1	45,273
17	Carpentry		48,690	1	48,690
18	Diesel Mechanics Program		38,232	1	38,232
19	Electrical Maintenance & Install. Technology		24,492	1	24,492
20	Food Service		40,689	1	40,689
21	Welding & Sheet Metal Technology		18,672	1	18,672
SUPPORT BUILDINGS					
Academic Support					
22	Learning Resources Center		29,895	2	14,948
23	Learning Skills/Coop. Vocational Ed.		30,420	2	15,210
24	Telecommunications/Media Center	37,452	40,302	2	20,151
	Dean of Instruction	2,850			
Student Services					
25	Student Services Office Building		38,203	1.5	25,468
	Administration	5,622			
	Admissions & Records	5,670			
	Bridges Programs	6,795			
	Counseling & Guid./Human Dev.	13,425			
	Financial Aid	4,080			
	Special Programs	2,010			
	Main Services (Fire Control/Elec. Sys. Ctr.)	600			
26	Student Services "Campus Center" Building		54,051	1.5	36,034
	Student Activities	18,768			
	Student /Faculty Health Center	1,791			
	Multi-Purpose Room	3,750			
	Bookstore	7,116			
	Contract Food Service	22,626			

TABLE 2.3
BUILDING FOOTPRINTS FOR 3,000 FTE CAMPUS

Building #	Department		GSF	# of Stories	Building Footprint
SUPPORT BUILDINGS (CONTINUED)					
Institutional Support					
27	Institutional Support Office Bldg.		16,393	1.5	10,929
	Provost	5,385			
	Administrative Services	1,320			
	Business Operations	3,110			
	Personnel Services	1,380			
	Computing Services	3,198			
	Security Command Center	1,980			
28	Operations & Maintenance Bldg		14,823	1	14,823
Office of Continuing Education and Training					
29 & 30	Office of Continuing Ed. & Training (2 Buildings)		49,923	1.5	33,282
	Office of Continuing Ed. & Training	49,923			

3.0

Site Analysis and Recommended Site
for the 3,000 FTE Komohana Campus

3.0 SITE ANALYSIS AND RECOMMENDED SITE FOR THE 3,000 FTE KOMOHANA CAMPUS

3.1 Objective

This section of the Hawai'i CC LRDP Update commences with an updated site analysis of the existing 267-acre State-owned parcel mauka of Komohana Street site (see Figure 3.1) and recommends a parcel configuration for a new campus site of approximately 122 acres to accommodate an ultimate student population of 3,000 FTE. This section also includes a discussion of the selected site along with the factors which affect the development of the new, permanent Hawai'i CC Komohana campus.

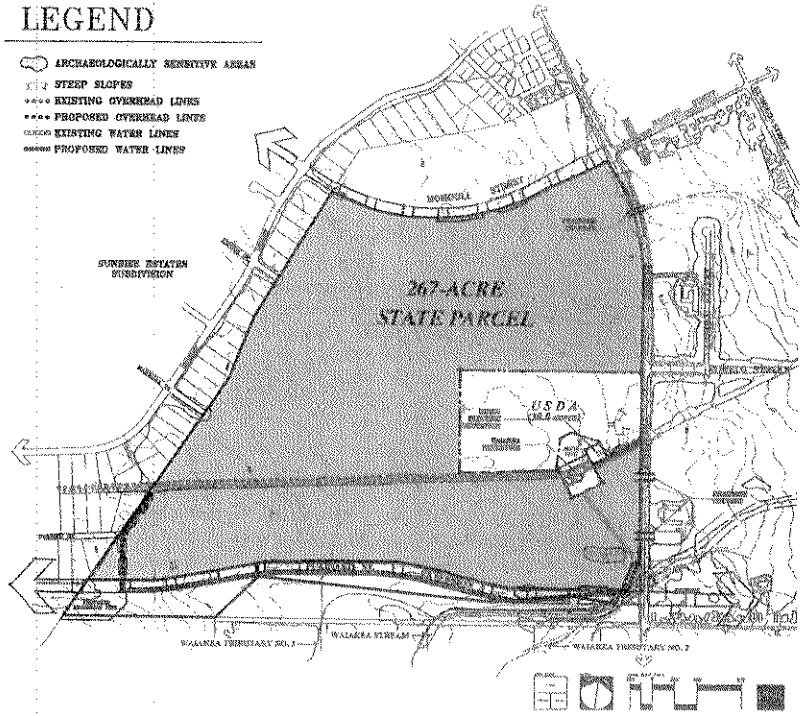


Figure 3.1: Komohana Site

3.2 Description of the 267-acre State-owned Parcel

3.2.1 Location and Site Conditions

The 267-acre State-owned parcel is located in the city of Hilo mauka of the UH-Hilo University Park and is bordered by Komohana Street to the east, the Pū'ainakō Street Extension (currently under construction) to the south, and the Sunrise Estate Subdivision to the north and west of the property. (Figure 3.1.) The State-owned parcel is identified as TMK 2-4-01:122 and is classified as ceded land by the State of Hawai'i Department of Land and Natural Resources. A description of the existing site conditions are presented below.

Existing and Proposed Land Uses. The 267-acre State parcel wraps around the 30-acre USDA Agricultural Research Center site (TMK: 2-4-01:169), an archaeological site (TMK: 2-4-01:170, 1.42 acres), the Waiākea Reservoir (TMK: 2-4-01:40, 2.066 acres) and the half-acre Hawai'i Electric Light Company, Ltd. (HELCO) substation (TMK: 2-4-01:166). Water and power line easements linking to the water and power facilities traverse the property in an east to west direction. (See Figure 3.1). The northern portion of the 267-acre State parcel has been designated for the proposed Nowelo Street Extension and as a future expansion area for University of Hawai'i at Hilo's University Park.

Climate. The project site is usually subjected to northeasterly (onshore) winds during the day. These winds predominately range from 4 to 12 miles per hour. However, diurnal heating and cooling occasionally gives rise to offshore (southwesterly) breezes at night. Daytime temperatures in degrees Fahrenheit range from the upper 70's to the low 80's, while temperatures at night range from the low 60's to upper 70's. The mean annual rainfall in this area is estimated at about 141 inches, or about 10 to 15 inches per month. Although the wet season usually occurs from October through April, rain falls approximately 280 days out of the year.

Topography and Slopes. Elevation within the study area ranges from approximately 280 feet mean sea level (at the northeast corner of the site) to about 480 feet mean sea level (at the southwest end of the site). The study area is moderately sloped with an average slope of 3 percent. There are a few areas with steeper gradients along the western edge of the property, but because they are limited, they will not pose a constraint to development.

Flooding and Drainage. The Flood Insurance Rate Map of 1988, identifies the majority of the study site as Zone X, "areas determined to be outside the 500-year flood plain." Areas identified as being subject to flooding are concentrated primarily in the northern and southern portions of the parcel. A large area in the northern portion of the parcel has been identified as Zone A, "special flood areas inundated by the 100-year flood." Because detailed hydraulic analyses have not been performed, no base flood elevations have been determined for this zone. The Waiākea Stream and its tributaries border the southern portion of the site. Flood hazard associated with the Waiākea Tributary No. 3 intrude into a small portion of the southern boundary of the site. This area is designated Zone AH, "special flood hazard areas inundated by the 100-year flood, with flood depths of 1-3 feet."

An existing bridge (over the Waiākea Stream) and three drainage culverts crossing under Komohana Street direct drainage through the property to lands makai of the study area. The bridge and two of

the drainage culverts are located in the southern portion of the site (south of Nowelo Street). The remaining culvert is located in the northern edge of the site.

Storm runoff generated from areas above the parcel could be intercepted and conveyed through or around the site by new drainage facilities to existing drainage structures crossing under Komohana Street. Runoff generated on-site would be handled by a network of drain pipes and drywell inlets. Overflows from drywell inlets during large storms could be accommodated by unlined or lined swales/ditches and directed to existing drainageways.

Wetlands. According to the State digitized GIS (geographic information system) maps showing the 1978 National Wetlands Inventory Maps, there is a palustrine (marshy), scrub/shrub, broadleaf evergreen, seasonal wetland (PSS3C) along the Waiākea Stream to the south of the study area. Additional information related to wetlands is limited due to the existing vegetation which makes penetration of this area difficult. There is a higher probability that wetlands may be encountered in the northern portion of the parcel, specifically along the edge of the 1881 lava flow. A more detailed study will need to be completed prior to construction.

Soils. According to the USGS Soil Conservation Service, there are four soil types within the study area. Lava flows, pāhoehoe (rLW) comprises the majority of the site. Located primarily in the central portion of the site, this soil type has a billowy, glassy surface that is relatively smooth. Pāhoehoe lava usually has no soil covering and is typically bare of vegetation. Pāhoehoe lava is very slowly permeable, but water will move readily and rapidly through cracks. Keaukaha, extremely rocky muck (rKFD) is the other dominant soil type within the study area. This soil consists of a very dark brown muck about 8 inches thick overlaying the pāhoehoe lava. Runoff potential on this type of soil is medium, and the erosion hazard is slight. Very small portions of Ola'a extremely stony silty clay loam (OlD) and Ola'a silty clay loam (OlaC) are located within the southern portion of the study area.

Surrounding Land Uses. Vacant State lands and the Pū'ainakō Street extension border the southern portion of the parcel. Residential developments adjacent to the study site include the Sunrise Estate Subdivision to the north and west (mauka) of the study area and the Komohana Gardens Subdivision, located south of the vacant State lands which are adjacent to the southern portion of the site. The eastern portion of the site is separated from the 116-acre UH-Hilo University Park by Komohana Street. It is currently being developed by the University, and has a number of existing tenants (primarily research and Astronomy related facilities).

Flora. A preliminary overview of existing flora within the study area was conducted by Char and Associates in 1994. The overview indicated that the central to southern portions of the site are comprised of older pāhoehoe flows with a well-developed layer of soil. As a result, these areas have been disturbed for agricultural purposes and the vegetation is disturbed. Introduced or alien species such as strawberry guava and melastome are generally the dominant components on these two sites. Additionally, the southern makai portion of the site is easier to access for field studies. The central to northern portions of the site is comprised of a geologically more recent 'a'a flow which has not been disturbed by agricultural activities. The flow is covered by a native forest composed of 'ōhi'a trees, uluhe fern, and other native species. Rare species are probably more likely to be found in the areas covered by native forest.

Archaeological Sites. A preliminary overview of the likelihood of encountering archaeologically sensitive areas within the study area was conducted by Cultural Resource Management in 1994. From a cultural perspective and given the present level of available data on the study area, the Hawai'i CC site could be located anywhere within the study area. However, if other criteria related to field work logistics, such as ease of access, vegetation and ground visibility are considered, the southeast/makai corner of the site would be the best location for the site of the new campus as it is the least heavily vegetated, most accessible, and the known presence of the historic agricultural features in the area should not pose a problem. Next to this, the southwest/mauka corner of the site has the second best accessibility, and although the vegetation is quite dense, the area exhibits a higher probability of prior disturbance than the northern portion of the study area. The northern portion of the study area contains areas of native floral communities that may indicate minimal prior disturbance (although the successful re-emergence of native species associations in previously disturbed areas have been documented in neighboring areas), is densely populated with the uluhe or false staghorn fern, making ground as well as horizontal visibility extremely difficult, and historic sugar cultivation maps indicate that this areas was not cultivated. These latter maps show that the southern portion of the site had been used for sugar cultivation and is likely to have undergone significant disturbance. Further studies will be required to satisfy Chapter 343, HRS requirements.

In addition, an archaeological site was recently identified during the recent planning for the Proposed USDA Agricultural Research Center. The site is located adjacent to the proposed USDA facility and the existing water tank and electrical substation parcels. As noted earlier, it has been identified as a separate TMK parcel, 2-4-01:170, and occupies 1.42 acres.

Visual Resources. The most significant views can be experienced from the mauka western end of the study area. From this area, there are panoramic views of Hilo and the Pacific Ocean. There are limited views along Komohana Street.

Electrical and Communications Systems. Hawai'i Electric Light Company (HELCO) Inc.'s Komohana Substation is located on about a half-acre area of land along the eastern side of the study area near Komohana Street. The Komohana Substation presently has a 7.5 MVA substation transformer. HELCO has installed an additional 10 MVA substation transformer within the substation site. This additional capacity will be used to serve the proposed facilities. Road construction for Pū'ainakō Street will entail relocation and/or temporary removal of electricity/telephone poles and transmission lines. However, improved Levels of Service due to the Pū'ainakō Street extension will provide superior energy service to the facilities.

Existing overhead 69 kV and 12.47 kV lines extend from the substation through a 50-foot wide utility easement through the property to the University Park and lands east of the project area. The 69 kV line also extends westward through a 50-foot wide easement which runs in an east-west direction and beyond through the study area. They will need to be relocated. According to initial discussions with HELCO representatives, these overhead lines are eligible for a one-time free-of-charge relocation, subject to the State of Hawai'i providing an alternate route with easements at no cost to HELCO.

The Telephone System is presently being provided by Verizon Hawai'i from Kapi'olani Street and Lanikāula Street. The service may be adequate, but the campus telephone system will need to be upgraded and extended to the study area.

The Cable Television System is presently being provided by Jones Spacelink from Lanikāula Street. The service may be adequate, but the signal strength within the campus may need to be upgraded and extended to the study area.

Water System. The 0.5 million gallon (MG) Waiākea Reservoir is located on a 2.066-acre parcel directly adjacent to the HELCO substation. An 8-inch waterline extends from the reservoir along the 50-foot wide utility easement to the University Park. Two 8-inch waterlines extend from the reservoir in a southeasterly direction through the project site and connect to 8-inch waterlines located under Komohana Street. Also, two waterlines (12-inch and 6-inch) extend from the reservoir in a westerly direction through the 15-foot wide easement which runs through the study area. The waterlines currently run above ground and are a constant maintenance problem for the County Department of Water Supply (DWS). Their preference is to underground the waterlines. Further study and review will be required regarding the relocation of the waterlines.

A 1.0 MG concrete reservoir located along the southwestern edge of the study area near the Sunrise Estates Subdivision is currently under construction. Access to the proposed reservoir will be from the future Pū'ainakō Street extension or from Puiolu Street in the Sunrise Estates Subdivision. A proposed influent line from the reservoir will connect up to the existing 12-inch waterline which traverses the site and connects with the Waiākea Reservoir. Also, a 12-inch waterline will run from the reservoir under the Pū'ainakō Street extension currently under construction and will connect with a proposed 12-inch waterline under Komohana Street.

Water service to the project site could be provided from the Piihonua #2 water system, which the Waiākea reservoir is a part of, or the proposed 16-inch waterline which will be fed by the new 1.0 MG concrete reservoir. Further study must be done to determine whether new sources or storage must be developed.

The study area is located mauka of the Underground Injection Control (UIC) line which regulates the use of injection wells for disposal of domestic and non-domestic wastewater. No State wells are located in or near the study area.

Sewer System. The study area currently does not receive sewer service. One of the existing sewer lines capable of servicing the study area is located at the intersection of Kilauea Avenue and Lanikāula Street. This 21-inch sewer line can service the project via Komohana, Mohouli, Kumukoa, and Lanikaula Streets to the intersection of Lanikāula Street and Kilauea Avenue. Service to the study area could also be provided through a connection with an existing 18-inch sewer line at the intersection of Kawili Street and Kilauea Avenue. This alternate route would run via Komohana, Pū'ainakō, and Kāwili Streets, to the intersection at Kilauea Avenue. The existing sewer lines above the two proposed connection points were rejected by the County of Hawai'i Sewer Division as being incapable of servicing the project site. Further analysis of the sewer system and coordination with the County's Wastewater Division must be done to determine the most feasible sewer route, as other developments in the proximity of the study area are currently planned.

Roadways and Circulation. From a regional perspective, the study area is accessed via Kanoelehua Avenue/Volcano Highway/State Highway 11 (which is a segment of the round-the-island "Belt Highway" which carries traffic into Hilo from the southern part of the island), the Saddle Road/Highway 20 (which begins at the mauka end of Kaūmana Drive/Waiānuenue Avenue crossing

the island and connecting the Kona and Kohala districts with East Hawai'i), and the Hilo Bayfront Highway/State Highway 19 (which carries traffic to Hilo from the northern parts of the island). Also, with the completion of the Pū'ainakō Street Extension Project, Pū'ainakō Street will serve as link in the arterial flow between Highway 11 (Volcano Highway) and the Saddle Road (Highway 20), bypassing Hilo Town.

Existing and proposed roadways in the vicinity of the study area which directly influence circulation patterns in and around the study area are described below.

Komohana Street. Komohana Street is a two-lane roadway with a 120-foot right-of-way. This street borders the eastern edge of the property and provides direct cross town access between north and south Hilo. It also serves as a north-south bypass of the commercial areas of Hilo.

Mohouli Street. Mohouli Street, an existing 2-lane roadway with a 60-foot right-of-way, extends from Kīlauea Avenue in the east and was recently extended to Ainakō Avenue in the Lower Kaumana community.

Pū'ainakō Street. Pū'ainakō Street, which presently terminates near the southeastern edge of the property, is a four-lane roadway between Highway 11 and Kīlauea Avenue, and a two-lane roadway between Kīlauea Avenue and Komohana Street. Pū'ainakō Street is currently being extended 4.5 miles west to Kaūmana Drive and will serve as a link in the arterial flow of traffic through the Hilo area. In addition, the extension project proposes the widening of Pū'ainakō Street to a 120-foot right-of-way with four lanes between Kīlauea Avenue and Komohana Street to the east. Construction is estimated to be completed by January 2004.

Kukuau Street. This roadway is a two-lane roadway which provides access to the Sunrise Estate Subdivision. It is located to the west of the study area.

Nowelo Street (University Park Entry Road). This roadway provides access to the UH Hilo Research Park. At the entrance to the park the roadway has an 85-foot right-of-way, which tapers to a 60-foot right-of-way. The roadway has been extended to connect the Research Park with the UH Hilo Campus. Extending Nowelo Street above Komohana Street is planned to provide access to the USDA Agricultural Research Center site. Roughly $2.7 million have been allocated for the improvements. Further westward extension of Nowelo Street could provide an alternate entrance to the Hawai'i CC campus.

3.3 Recommended Site, Site Characteristics and Factors Affecting the Development of the Site

Based on the information provided in the site assessment, the recommended site for the Hawai'i CC Komohana Campus is a 122-acre parcel bounded by the USDA Agricultural Research Center, the proposed extension of Nowelo Street and the existing water tank and electrical substation to the north; Komohana Street to the east; the Pū'ainakō Street extension to the south and vacant State-owned land to the west. (See Figure 3.2.) This site is recommended as it is easily accessible (from the proposed Pū'ainakō Street Extension, Komohana Street, and the proposed Nowelo Street Extension), is located away from the flood zones and areas with higher probabilities of encountering

wetlands and archaeological resources. The recommended site is also configured to best utilize the remaining property for the development of a campus. Site characteristics of the recommended site are described below.

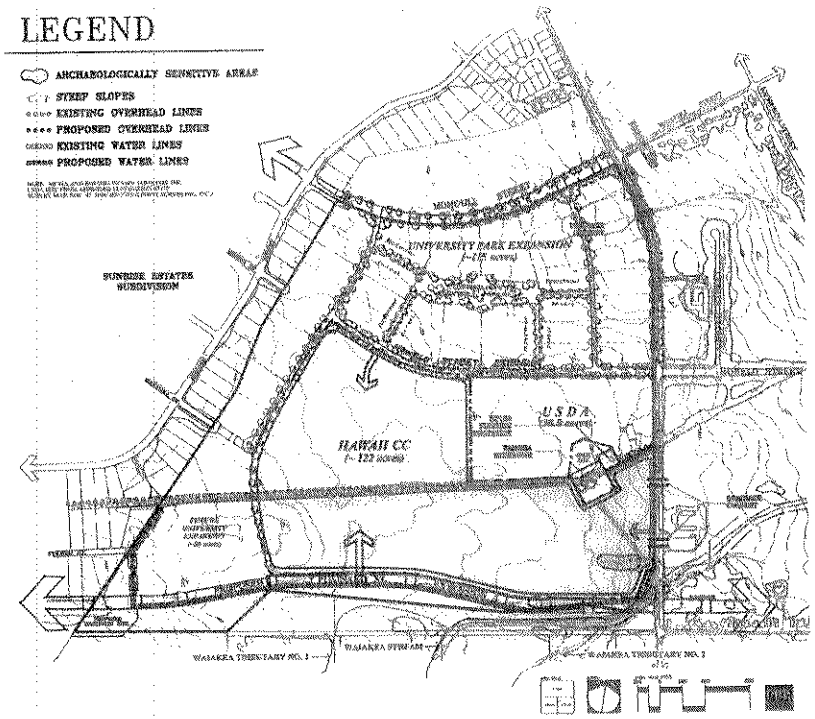


Figure 3.2: Selected Komohana Campus Site

3.3.1 Site Area and Existing Conditions

The proposed Hawai'i CC campus is an irregular-shaped parcel on 122 acres of land in the southeast corner of the larger 267-acre State-owned parcel (see Figure 3.2). The property has been identified as ceded land by the State Department of Land and Natural Resources. With the exception of utility easements running through the central portion of the site (which connect to the Komohana Electrical

3.3.2 Topography

Elevation within the study area ranges from approximately 320 feet mean sea level (msl) at the eastern edge of the site, to about 390 feet msl at the western end of the site. The study area is moderately sloped with an average slope of 3 percent. Steeper gradients are present along the eastern edge of the property, in the area near the Komohana Substation and Waiākea Reservoir, and in the southwestern corner of the site.

3.3.3 Climatic Conditions

Hilo's rainy climate requires design and planning considerations which encourage the use of covered walkways and clustering of structures to minimize exposure to the rainy weather.

3.3.4. Flora

A preliminary overview of existing flora within the study area was conducted by Char and Associates. The overview indicated that the study area is comprised of older pāhoehoe flows with a well-developed layer of soil. As a result, this area has been disturbed for agricultural purposes and the vegetation is disturbed. Introduced or alien species such as strawberry guava and melastome are generally the dominant components on the site. Where feasible, existing trees and rare or native species will be incorporated into the design of the campus.

3.3.5 Archaeological Resources

The Environmental Impact Statement for the Pū'ainakō Street Extension project identified one archaeological site within the recommended site and another in close proximity to the recommended site. The archaeological site identified in the recommended site is located in the southeastern portion of the site. The archaeological remains are from the plantation era and primarily reflect activities associated with the commercial cultivation of sugar cane. The site is classified as "no longer significant (in terms of historic preservation criteria)," and no further work is required in the mitigation phase.

3.3.6 Flooding and Drainage

The majority of the recommended site is identified as Zone X, "areas determined to be outside the 500-year flood plain." A small portion of the northwestern end of the site is identified as being within an area identified as Zone A, "special flood areas inundated by the 100-year flood" by the Flood Insurance Rate Map on file with the County Department of Public Works. However, no structures will be proposed in this area. Drainage improvements to the Waiākea Stream, at the point where it crosses Komohana Street, is evident near the southeast corner of the site. Additional improvements to Waiākea Stream are being done by the Pū'ainakō Street Extension, currently under construction.

Storm runoff generated from areas above the project site could be intercepted and conveyed through or around the site by new drainage facilities to the two existing drainage structures running under Komohana Street (along the eastern portion of the site). Runoff generated on-site would be handled

by a network of drain pipes and drywell inlets. Overflow from drywell inlets during large storms could be accommodated by unlined or lined swales/ditches and directed to existing drainageways. The drywell drainage facilities for storm runoff must meet State Department of Health (DOH) requirements, particularly those stated in Hawai'i Administrative Rules, Section 11-23. A Underground Injection Control (UIC) Permit may or may not be required depending upon DOH determination.

3.3.7 Visual Resources

The most significant views can be experienced from the mauka western end of the study area. From this area, there are panoramic views of Hilo and the Pacific Ocean. There are limited views along Komohana Street. Once the site is cleared of the existing overgrowth, views to the ocean and mountains should be prevalent throughout the site.

3.3.8 Surrounding Land Uses

The Pū'ainakō Street Extension and vacant State lands border the southern portion of the site. The Komohana Gardens Subdivision is located south of the vacant lands, adjacent to the southern portion of the site. HELCO's Komohana substation is located on about a half-acre area of land northeast of the campus site. Adjacent to the substation is the 0.5 million gallon (MG) Waiākea Reservoir located on a 2.066-acre parcel of land. Also adjacent to these utilities is the 1.4-acre archaeological site and the USDA Agricultural Research Center on a 30-acre parcel of land. Further north and west of the project site is the remaining state-owned parcel which will be developed by UH Hilo as an expansion of University Park which lies east of Komohana Street off Nowelo Street.

3.3.9 Easements

Existing overhead 69kV and 12.47kV lines extend from the substation through a 50-foot wide utility easement to the University Park and lands east of the project area. The 69kV line also extends westward through a 50-foot wide easement which runs in a east-west direction and beyond through the project site. These overhead lines will need to be relocated to an area off-site for the development of the campus. As noted earlier, preliminary discussions with HELCO will allow for a one-time relocation free of charge, subject to the State of Hawai'i providing an alternate route with easements at no cost to HELCO.

An 8-inch waterline extends from the reservoir along the 50-foot wide utility easement to the University Park. Two 8-inch waterlines extend from the reservoir in a southeasterly direction through the project site and connect to 8-inch waterlines located under Komohana Street. As the site is developed, these two lines will require relocation underground within a 30-foot easement to be located during later phases of this study. Also, two waterlines (12-inch and 6-inch) extend from the reservoir in a westerly direction through the 15-foot wide easement which runs through the project site. This easement will need to be widened to a 30-foot easement when the lines are relocated underground. A 0.5 MG concrete reservoir is proposed to be located along the southwestern edge of the study area near the Sunrise Estates Subdivision. Access to the proposed reservoir will be from the future Pū'ainakō Street extension or from Puloku Street in the Sunrise Estates Subdivision. A proposed influent line from the reservoir will connect up to the existing 12-inch waterline which traverses the site and connects with the Waiākea Reservoir. Also, a 12-inch waterline is proposed

to run from the reservoir under the future Pū'ainakō Street extension and connect with a proposed 12-inch waterline under Komohana Street.

3.3.10 Electrical and Communication Requirements

The Komohana Substation presently has a 7.5 MVA and a 10 MVA substation transformer within the site. This additional capacity from the installation of the 10 MVA transformer will be used to serve the proposed Hawai'i CC facilities. Telephone service to the UH-Hilo campus is presently being provided by Verizon Hawai'i from Kapi'olani Street and Lanikāula Street. The existing campus telephone system will need to be upgraded and extended to the study area. The Cable Television System is presently being provided to UH-Hilo campus by Jones Spacelink from Lanikāula Street. The service may be adequate, but the signal strength within the campus may need to be upgraded and extended to the study area.

3.3.11 Water and Sewer System Requirements

Water will be provided from the Waiākea Reservoir and linked through the 12-inch, 8-inch, and 6-inch waterlines which currently traverse the site. These lines will need to be relocated underground during the development of the site.

The study area currently does not receive sewer service. Service to the study area could be provided through a connection with an existing 18-inch sewer line at the intersection of Kāwili Street and Kīlauea Avenue. This route would run via Komohana, Pū'ainakō and Kāwili streets, to the intersection at Kīlauea Avenue. The existing sewer lines above the two proposed connection points were rejected by the County of Hawai'i Sewer Division as being incapable of servicing the project site. Further analysis of the sewer system and coordination with the County's Wastewater Division must be done to determine the most feasible sewer route, as other developments in the proximity of the study area are currently planned.

3.3.12 Traffic Access and Circulation

The roadways in the vicinity of the study area, which will be directly impacted by the campus include Komohana Street and the Pū'ainakō Street Extension. Based on the existing and proposed traffic circulation, the primary access to the campus will likely be located off of the Pū'ainakō Street Extension with a secondary access provided from an extension of Nowelo Street to the project. In addition to providing access to the campus, the Nowelo Street Extension would provide access to the UH Hilo's University Park expansion area and the USDA Agricultural Research Center. Another secondary/emergency access to the project site would be provided off of Komohana Street. The planning team has initiated preliminary discussions with the County of Hawai'i Department of Public Works regarding roadway access for the site. In the preliminary discussions, the County has indicated that the Pū'ainakō Street Extension will eventually be turned over to the State of Hawai'i Department of Transportation. The State will not make a decision on the acceptance of the entrance until preliminary plans are prepared for the campus. Correspondence with the State is currently on-going regarding acquiring the access to the property.

Within the campus, an internal road network will serve the campus. The main backbone of the internal road network will be a loop road connecting the major parking areas located at the periphery

of the campus. This will encourage drivers to park and walk to their destinations. A well-planned, non-motorized path network will be developed on campus to facilitate ease in pedestrian activities and access.

3.4 Procedural Requirements of Government Regulations

3.4.1 Land Use Regulations

The Hawai'i CC campus is entirely within the State Land Use Agricultural District. The proposed campus is designated on the County of Hawai'i General Plan Land Use Pattern Allocation Guide (LUPAG) map for "University Use". To accommodate the proposed campus development, a State Land Use District Boundary Amendment (SLUDBA) will be required to amend the land use designation from "Agricultural" to "Urban" or, a Special Permit must be approved by the State Land Use Commission (SLUC). The County of Hawai'i has proposed initiating SLUDBA for this area and the adjacent "Urban Expansion" designated area to change the land use designation to "Urban."

The County zoning designation for the campus site is within the Agricultural zoned district (A-1a). Under the County zoning, the facility is permitted, as its use is consistent with the existing General Plan designation; however, as is the case for schools in the Agricultural District, a Special Permit from the SLUC may be required for development of the campus. The maximum building height within the Agricultural zoned district is 45 feet. The majority of buildings proposed for the campus are anticipated as one to two-story structures, which will be in compliance with the existing zoning. A variance will be required for taller structures, such as a clock tower or landmark building.

3.4.2 Chapter 343, HRS Environmental Impact Statement Process

Development of the proposed facility would require an environmental assessment, and if necessary, environmental impact statement due to the use of State lands or funds for the project.

3.4.3 ADA (American Disability Act)

The ADA (Americans with Disabilities Act) of 1990 sets guidelines for accessibility to buildings and facilities by individuals with disabilities. These guidelines are to be applied during the design, construction, and alteration of buildings and facilities covered by Titles II and III of the ADA to the extent required by regulations issued by Federal agencies, including the Department of Justice and the Department of Transportation, under the ADA.

Site Considerations: Primary site accessibility shall be provided from all entrance points to the site to all individual facilities that require access. Parking for individuals with disabilities and accessible routes in accordance with ADA must be provided to link all campus facilities.

Building Consideration: All facilities must be totally accessible to individuals with disabilities, as governed by the ADA.

- At least one entrance, preferably the principal entrance, must interface with an accessible route on the site.

- Access must be provided to all floors of all buildings except in unusual circumstances.
- All toilet facilities must be accessible.
- Emergency egress must be provided for the disabled equal to that provided for able bodied occupants.

The requirement to provide access to all floors almost ensures that every new building two stories or higher must include an elevator(s). With higher building heights, there would be an opportunity to concentrate campus facilities with a core accessible to pedestrians and individuals with disabilities, resulting in: shorter walking times between classes, lower infrastructure and covered walkway construction cost, and more open space and/or future expansion area options.

The Americans with Disabilities Act (ADA) of 1990 sets guidelines for accessibility to buildings and facilities by individuals with disabilities. All facilities will be designed to meet the Americans with Disabilities Act Accessibility guidelines and the requirements of Section 103-50 of the Hawai'i Revised Statues. These guidelines will be applied during the design and construction of new facilities covered by the ADA to the extent required by regulations issued by federal agencies including the Department of Transportation.

All facilities will be designed to meet the Americans with Disabilities Act Accessibility guidelines and the requirements of Section 103-50 Hawai'i Revised Statues (HRS), except: 1) where compliance would cause substantial harm to cultural, historical, religious, or significant natural features and characteristics; 2) where compliance could substantially alter the nature of the setting or the purpose of the facility, or portion of the facility; 3) where compliance would require construction methods or materials that are prohibited by Federal, State, or local regulations or statutes; and 4) where compliance would not be feasible due to terrain or prevailing construction practices.

4.0

Revised Ultimate Site Plan

4.0 REVISED ULTIMATE SITE PLAN

4.1 Objective

The objective of this phase of the Hawaii CC LRDP Update process was to revise the Ultimate Site Plan based on the new project site. The preparation of the original Ultimate Site Plan approved in 1996 included the development of detailed landscaping and engineering "ultimate" plans, design guidelines, and the recommendations and decisions behind their designs. The plan was analyzed for accessibility, and a Barrier-Free Access Plan was prepared and included in the report. As a result, such detailed engineering and design plans were not repeated for this report. This report describes the changes to the revised site plan and updates cost estimates based on those changes.

4.2 Revised Ultimate Site Plan

The Revised Ultimate Site Plan strives to maintain the vision for the campus developed in the original 1996 LRDP. Based on a central gathering space and intersecting pedestrian spines, the main concepts are restated below:

- Promote a pedestrian friendly environment through the siting of uses within convenient walking distances.
- Provide a clearly defined pedestrian spine and a separation between major vehicular and pedestrian pathways.
- Provide efficient vehicular circulation throughout the campus.
- Provide a sense of arrival at the entry to the campus.
- Provide a visual connection with the University Park, the mountains, and the ocean.
- Create opportunities to provide strong organizational elements throughout the campus.
- Provide buffers between or physically separate the noisier shop uses and the classroom facilities.
- Provide a buffer for campus facilities from the existing electrical substation and reservoir.

To successfully implement the concept and develop a campus which fosters a strong sense of place, the Revised Ultimate Site Plan (Figure 4.1) is organized around the key physical design elements or "building blocks" essential in the development of the form of the campus. These building blocks include: plazas and open spaces, the pedestrian circulation system, buildings and their functional siting, landscaping, gateways, entries, edges, vehicular circulation and parking areas, and service needs.

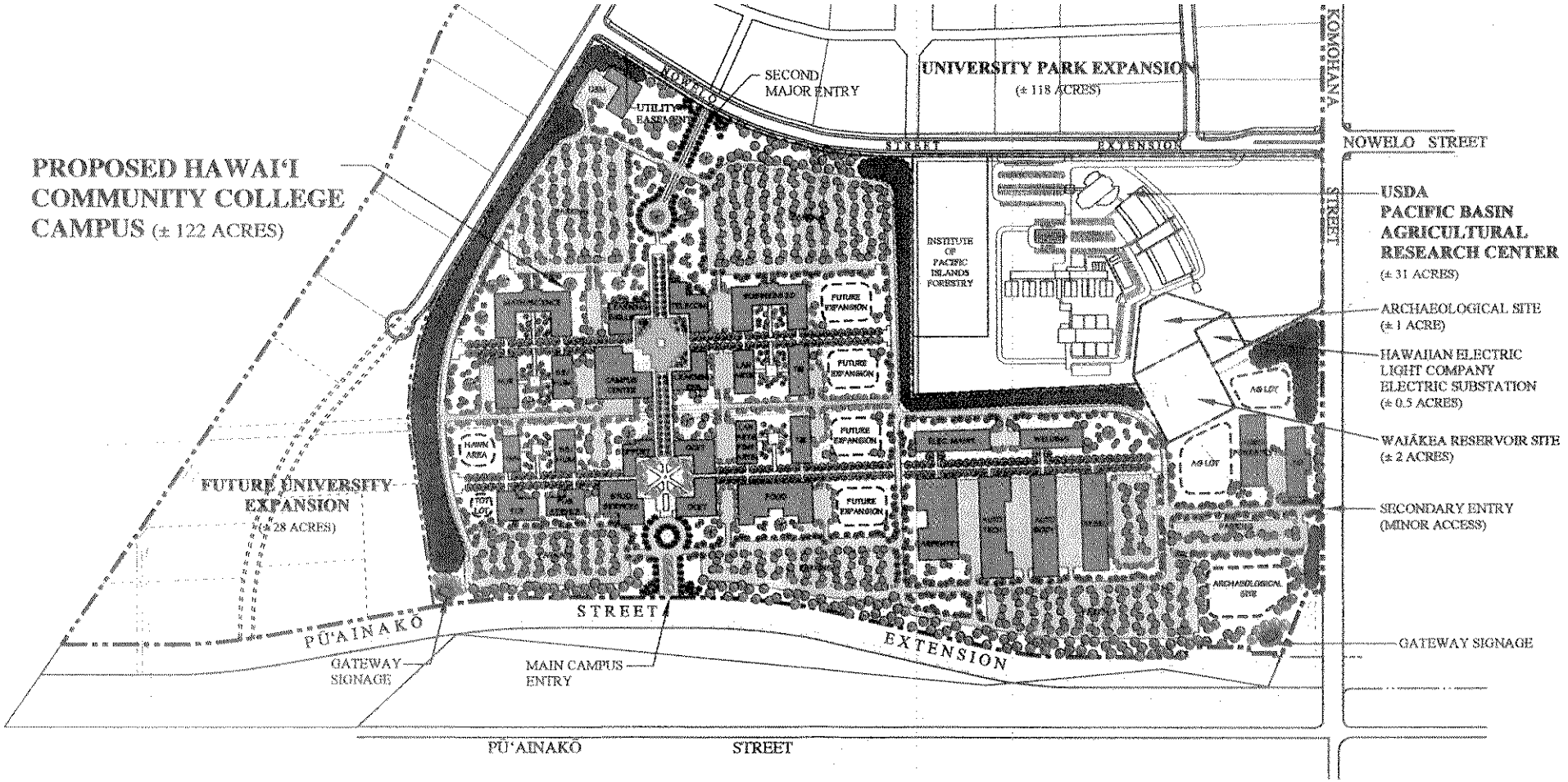


Figure 4.1: Komohana Campus Revised Ultimate Site Plan

AREA SCALE 1 Acre | NORTH | LINEAR SCALE (FEET) 0 200 400 800 | 05/21/2003 | PBR HAWAII | HILO, ISLAND OF HAWAII

NOTE: LANDSCAPING SHOWN FOR ILLUSTRATION PURPOSES ONLY.

Like the 1996 plan, the Revised Ultimate Site Plan weaves these elements together in a cohesive yet efficient site plan. Connections to major area roadways and neighboring facilities, where feasible or desirable, are also provided. Highlights of the revised plan are described below.

4.2.1 Plazas, Open Spaces and Pedestrian Circulation

The Revised Ultimate Site Plan revisits the original concept of establishing a hierarchical system of open spaces. The Central Plaza and Entry Courtyard, connected by the North-South Mall, a major pedestrian spine, remain as the backbone of the campus. A clock tower located in the middle of the Central Plaza will continue to be the focal point and landmark element of the campus. The buildings housing facilities central to Hawai'i CC function such as the Campus Center, Student Center, Telecommunications/Media Center, Institutional Support, and the Learning Resources/Skills will enclose the Central Plaza and Entry Courtyard. Secondary courtyards and groupings of classroom buildings are organized around the main spine and connected by secondary pathways.

Like the original plan, major pedestrian paths will be fully accessible and covered to protect students, faculty, staff, and visitors during Hilo's rainy weather. These paths are shown in the Revised Ultimate Site Plan. The covered walkways along the North-South Mall will be designed as arcades and loggias along the sides of the buildings fronting the mall and central plaza. This will allow for easy access at varying locations into these support facilities and provide vistas to the central core of the campus. The secondary paths stemming from North-South Mall will be stand-alone covered walkway providing links to each instructional facility. These walkways would be sized at sixteen feet wide, to handle the flow of students between classes, while also providing a clearly defined paths between instructional facilities and the central core. Additional minor pathways will consist of covered and uncovered walkways, located to provide additional access between buildings and parking lots, and to define courtyards and plazas. Although these minor paths are not shown in Figure 4.1, they should be fully accessible and designed with each facility during their respective development phases.

4.2.2 Buildings / Functional Siting

The campus is designed to be composed of one and two story structures. Building footprints are shown on the Ultimate Site Plan (see Figure 4.1), and square footages are listed earlier in Table 2.3. The functional siting of the buildings is discussed below. The Design Guidelines published in the 1996 LRDP provides the overall design direction, materials, and standards for building projects.

The Revised Ultimate Site Plan arranges the buildings in groups, based on the concept that instructional departments should be planned as recognizable entities of the college, and both academic and non-academic facilities should relate to each other while being clearly identifiable entities on the campus.

The three support facilities used most frequently by visitors or night students: Student Services Administration Building, Institutional Support Office Building (including the security command center), and OCET, form the entry plaza or "front door" to the campus. These buildings are clustered around the Entry Courtyard and are located close to the Main Entry off Pū'ainakō Street and major parking facilities.

The Campus Center, along with three major academic support facilities (Learning Resource Center, Telecommunications/Media Center, and Learning Skills/Vocational Cooperative Education Facility), form the boundaries of the campus's Central Plaza. The Campus Center, located at the southwest corner of the plaza, shall include a large covered space to provide shelter for large gatherings. The siting of this covered space will allow large gatherings to overflow into the central plaza without inhibiting the main flow of pedestrian movement through the center of campus. The academic support facilities would be designed with covered walkways integrated into their facades that front the Central Plaza and connecting to the covered pedestrian circulation system from the North-South Mall to one of the major secondary paths.

The academic instructional facilities are sited around the Central Plaza and Entry Courtyard buildings. These buildings are sited to create smaller open spaces and courtyards along the two major secondary pathways. Main entries to the buildings would be connected to the covered walkway system, however, covered arcades are not required for these classroom and lab type facilities.

Both the Early Childhood Education (ECE) Building and the Hawaiian Culture Buildings are located at the end of a pedestrian spine so that private outdoor areas on the edge of the campus can be utilized as a Tot Lot for the Children's Center and an outdoor cultural practice area for Hawaiian studies away from the college's academic facilities. The Tot Lot would be fenced. The ECE Building is also located adjacent to the front parking lot so that a drop-off area can be provided.

Most of the Trade and Industry (T&I) shop buildings are grouped on the eastern side of the campus in the area south of the USDA Agricultural Research Center. The shop facilities are sited so as to lessen the impact of their noise and vehicular traffic on the rest of the campus. These include Auto Body Repair & Painting, Auto Technology, Carpentry, Welding, Diesel Mechanics, and Electrical Maintenance & Installation.

The Agriculture and Agroforestry buildings are located at the far eastern end of this wing, adjacent to Komohana Street so that they are close to the existing UH Hilo Komohana Agriculture Building as well as the USDA Agricultural Research Facility. The proximity of these facilities may encourage interaction between the Hawai'i CC, UH Hilo, and USDA agricultural programs. In addition, there is roughly 2.5 acres of space available between the buildings and the HELCO substation and Waiākea Reservoir that can be used for agricultural experimentation and demonstration lots.

The T&I divisional offices and other quieter program spaces such as Drafting are located in the main part of the campus on the eastern wing. In addition, the Food Service program, which has the unique function of serving as an instructional and a support facility, has a prominent location at the front of the campus near one of the main parking lots so that students, staff, faculty, and visitors have easy access to the dining services. The lawn area in front of the Food Services building could be designed to host special functions and activities such as fundraisers.

The Operations and Maintenance facility is a one story structure with vehicle storage and other warehouse type functions. It is located in the back of the campus off of the main loop road, tucked in the northwestern corner of the campus.

Future expansion areas are also included in the Revised Ultimate Site Plan. These areas are outlined with dashed lines and allow for additional buildings to be sited should the campus facility needs grow. In the interim, these areas can be used to house the portables no longer needed at the Manono Campus as discussed in Section 5.0.

4.2.3 Landscaping

The landscaping for the campus should follow the "Hawaiian Garden" concept as recommended and discussed in the 1996 LRDP. Courtyards with theme gardens and accent plantings along the major pedestrian paths and entries will enhance the campus' sense of hierarchy and educational value. In areas where *'ohia lehua* and *hapu'u* groves are established, these plants should be preserved or transplanted wherever possible. In addition, the north and west edges should be augmented with native plant material to create a natural edge which can blend into adjacent parcels. The archaeologically sensitive area located on the plan is envisioned to remain an undisturbed natural area. The use of *'ohia lehua* and *hapu'u* fern is encouraged to re-establish native plants in this area. A plant materials list was included with recommended materials for the various types of spaces on the campus. An updated Plant List is provided in Table 4.1.

4.2.4 Gateways and Entries

Gateways and entries present opportunities to enhance the College's image to the community and define its identity, while creating a sense of arrival at the entrance to the campus. Gateway elements, are signage and special landscaping features provided at key intersections along the periphery of the campus. Two gateways are proposed for the site and include: the corner closest to the intersection of Komohana and Pū'ainakō streets and another along the Pū'ainakō Street extension in the southwest corner of the site.

Two major entries are also planned for the campus. Elements important to the design of entries include generous drop off locations and landscaping designed for directing views into the campus. The primary entry to the campus will be provided off the Pū'ainakō Street extension with double traffic lanes, a generously landscaped median, and ten foot wide sidewalks. This entry will be embellished with special landscaping treatment, signage, and lighting. The second major entry, from the Nowelo Street extension, will include a landscaped median, signage, and street tree plantings. Both the primary and secondary entries will have a large turnaround loop which could display a landmark work of art or other special entry feature. Accent lighting and appropriate signage should be installed as well.

A minor entry could be provided off Komohana Street if allowed by the County of Hawai'i. It would serve mainly as an alternative yet more direct entry for the Agriculture/Agroforestry programs and the T&I programs and would help keep the heavier traffic away from the main campus. It would also serve as an emergency egress for the campus.

4.2.5 Edges

The edges, or borders of a campus, are important in clarifying the boundaries of a campus, as well as serving as a buffer to adjacent properties. The perimeter planting concept for the Hawaii CC campus is to create an edge for the campus in order to reinforce a sense of identity and define the boundaries of the campus.

4.2.6 Vehicular Circulation and Parking Areas

The campus will be accessed from the main entry off of the Pū'ainakō Street extension. The Pū'ainakō Street extension will provide a major link between the Volcano Highway (Highway 11) and the Saddle Road (Highway 20), and a logical main access point to the campus.

A second, rear entry would be provided to the site by the proposed mauka extension of Nowelo Street. Currently Nowelo Street runs makai from Komohana Street into the University Park. Once the proposed bridge connection over Waiākea Stream is completed Nowelo Street will provide a direct connection to UH-Hilo's main campus and the research facilities in the University Park. The extension of Nowelo Street across Komohana Street will promote access between the Hawai'i CC campus and these facilities.

As noted earlier, an additional point of access is being considered for limited, controlled access. It would be off of Komohana Street, near the Agriculture facility. This location would allow direct access to the agriculture and shop facilities for large trucks when necessary.

The primary parking areas are located along the northern and southern boundaries, off of the main and rear entries. The proposed location of the main parking lots ensures that vehicle movement would be limited to the periphery, giving priority to the pedestrian nature of the campus. The need for convenient, accessible parking for individuals with disabilities (if minor parking lots are too far from the buildings), and restricted, specialty parking and loading zones is addressed with smaller, interior parking lots located near facilities and the primary pedestrian pathways.

All parking will be at-grade as there is ample space available in the site plan. Over 2,500 stalls can be developed as shown in the revised ultimate site plan in Figure 4.1. This exceeds the program requirements noted in Section 2. Therefore, not all the parking areas need to be developed in their entirety and can be phased in as needed.

The entry drives and large parking lots would be provided with concrete curbs in keeping with their more formal function as the main entry, and approach points for most of the college community. In the primary parking lots the use of curbs, rather than wheel stops, allows for wider landscaped areas to break up the rows of automobiles.

A 24-foot wide loop road will connect the front and rear parking lots and entries. A second loop road will encircle the T&I facilities and its parking area. Service and emergency access is provided off the loop roads. Each facility would be provided with a service drive which would also allow for the movement of emergency vehicles into the interior of the site. The minimum width of the service drives would be twenty feet to meet the code requirements for the movement of fire engines throughout the site. If additional fire access is required, twenty foot wide easements would need to be identified between the buildings.

4.2.7 Solid Waste Handling

Each facility would be provided with a service area as shown on the Revised Ultimate Site Plan (but ultimately sized and located during the project planning phase of each facility). These areas would handle solid waste removal and all delivery/loading functions, along with providing maintenance access, to each facility. These service areas have been located away from major pedestrian paths, courtyards, and building entries. Landscaping would be used for screening the areas from the rest of the campus.

A campus facility for composting green waste should be included off of the Operations and Maintenance facility service court. This area would also serve as a main collection point for campus-wide recycling programs.

4.3 Architectural Barrier-Free Access Plan

The Revised Ultimate Site Plan is designed to promote a pedestrian friendly campus, including accommodating barrier-free routes throughout the campus. All pedestrian paths and buildings will be designed to be fully accessible. In addition, the number of accessible stalls will follow ADA standards. The Barrier-free Access Plan guidelines as presented in the 1996 LRDP should be followed and is therefore not detailed in this report.

4.4 Grading and Drainage Plan

The updated Grading and Drainage Plan was prepared by Wesley R. Segawa and Associates, Inc.

4.4.1 Existing

The proposed campus site area is currently located on undeveloped land that rises from the east at 320 feet msl to the west at 390 feet msl. Generally, the property slopes between 2 to 5 percent. On-site runoff follows the existing terrain to the east with slight variations. Runoff from the central portion flows east toward Komohana Street and is conveyed through the street by two existing culverts. Flows from the south portion of the property discharges to Waiākea Stream. Some of the runoff from the north flows to an adjoining parcel to the north. Based on the general topographic information received, a portion of the storm runoff from the west of the site flows onto the site. A flood zone is located north of the west portion of the proposed campus site and barely infringes upon the property. This area is designated as Flood Zone A, a zone where no base flood elevations have been determined.

4.4.2 Off-site Improvements

Drainage from the proposed campus as configured will discharge into Waiākea Stream to the south. However, diversion of surface water runoff onto the Pū'ainakō Street extension is not permitted by the State (see Appendix A). Improvements along the Pū'ainakō Street extension as recommended in the 1996 LRDP may be needed. Another option is to accommodate runoff along the Nowelo Street extension on the north side of the campus. In addition, Komohana Street may be required to accommodate runoff from the east side of the proposed campus.

4.4.3 On-site Improvements

As proposed in the 1996 LRDP, development of the campus will generally follow the existing terrain. The grading concept established for the various portions of the campus in the earlier LRDP remains applicable to the new campus configuration and should be used as a guide for development of the campus. With gentle to moderate slopes throughout the project site, grading challenges should not be a major issue. Walkway slopes will be kept below 5 percent to meet current ADA requirements.

As proposed in the 1996 LRDP, drainage for the site will comprise of an underground piping system discharging into drywells and catch basins. The drywells will be connected in series with the last drywell overflowing into the Pū'ainakō Street Extension or Komohana Street systems. The drywells and catch basins will help mitigate the additional flows from the increase in impervious surfaces caused by the new improvements. A main drain line connecting to the main entrance of the campus will be constructed to convey run-off from the campus to the Pū'ainakō Street Extension (based on preliminary information obtained from Hawai'i County and State of Hawai'i). (See Appendix A.)

4.5 Water System

The updated Water System Plan was prepared by Wesley R. Segawa and Associates, Inc.

4.5.1 Existing

The Waiākea Reservoir is located near the northeast boundary of the proposed campus site. As a part of the Pihonua #2 water system, two transmission lines currently run above ground through the proposed campus from the reservoir to the western boundary. These lines will need to be placed underground and will require rerouting around the campus. A 30-foot wide easement will be required for the two lines (15-feet for each waterline). Alternative realignments were considered. The waterlines could run parallel to the Pū'ainakō Street Extension Right-of-Way as long as it is outside of the newly paved area of the roadway extension. Another alternative alignment includes the future Nowelo Street Extension north of the campus. However, if neither are feasible, the waterlines could be placed underground in its currently location. The easement will need to be expanded to 30-feet in width and no buildings should be sited over the water line easement. Construction of a new reservoir is being completed southwest of the site but is being built to accommodate the UH Hilo campus further east. The Pihonua #2 system and the new reservoir were not planned to accommodate the proposed campus.

4.5.2 Off-Site Improvements

The campus is not included in any of the water master plans obtained and is currently not included in any water allocation studies. Discussions with the Department of Water Supply indicated that the existing system does not meet the needs of the new campus and the new reservoir mentioned earlier was not sited to accommodate the campus either. Therefore, a new reservoir and/or source further

west will need to be developed to accommodate the demands of the proposed campus. Consideration must also be given to other proposed developments when determining the upgrade requirements.

4.5.3 On-Site Improvements

Unlike the earlier 1996 LRDP, separate domestic water and fire protection water systems are proposed for the campus. Both systems will connect along the Pū'ainakō Street Extension at the main campus entry. The fire protection waterlines will be a looped system that follows the campus roadways, with fire hydrants installed along the roadways at intervals to adequately cover the proposed buildings throughout the campus.

4.6 Sewer System

The updated Sewer System Plan was prepared by Wesley K. Segawa and Associates, Inc.

4.6.1 Existing

There is currently no county sewer service in the immediate proximity of the proposed campus site. The closest sewer line is an 8-inch line located near the intersection of Pū'ainakō and Kāwili Streets. This line eventually connects to an 18-inch line located at the intersection of Kāwili Street and Kīlauea Avenue. The 18-inch line is a part of a network of sewer mains that eventually discharges at the Hilo Wastewater Treatment Plant.

4.6.2 Off-Site Improvements

Since there are currently no nearby county sewer lines, off-site sewer improvements will be required. The new sewer line to serve the campus site will likely be installed along the Pū'ainakō Street Extension right-of-way. The line can either connect to the 18-inch line currently located along Kīlauea Avenue or to the 8-inch line located near the intersection of Pū'ainakō and Kāwili Streets. Should the latter option be chosen, upgrading of the 8-inch line will likely be required since the campus was not included in any sewer master plans. Alternatively, an off-site line could be constructed along the north side of the campus along the future alignment of Nowelo Street Extension. From here it would run east eventually along Lanikāula Street to the intersection with Kīlauea Avenue where the line is 21 inches. Whichever alternative is ultimately selected, other nearby developments will also need to be considered when sizing the line. The USDA and a joint UH Hilo China/U.S. Center are currently being planned near the proposed campus site.

4.6.3 On-Site Improvements

The main sewerline for the campus will extend from the northern portion of the campus to the entrance connection along Pū'ainakō Street (based on preliminary information obtained from Hawai'i County and State of Hawai'i). (See Appendix A.) This connect will be near the main entrance to the campus. Development in the western portion of the campus will be phased to connect to this main line. Development located on the east side of the project site, will connect to

a line further east of the main entrance. The connections will be subject to Wastewater Division approval.

4.7 Electrical System

The updated Electrical System Plan was prepared by Ronald N.S. Ho and Associates, Inc. with assistance from the Hawaiian Electric Light Company.

4.7.1 Existing

From the Komohana Substation, located near the northeast boundary of the proposed campus site, overhead utility lines are currently routed through the proposed campus and beyond. These overhead utility lines will require rerouting to an area off-site before any development of the campus.

4.7.2 Off-Site Improvements

As noted in the 1996 LRDP, HELCO will bear the cost for a one-time relocation of the existing overhead 69 kilovolt (kV) transmission lines. In order to understand the process of having the lines relocated, correspondence with Mr. Ralph Ratific, Jr., a Customer Designer in the Customer Engineering Division of HELCO was exchanged. Copies of Mr. Ratific's letters are included in Appendix A. According to HELCO, there are no specified steps in initiating the relocation of the overhead transmission line except to open a service request. Hawai'i CC needs to submit a letter to HELCO requesting the relocation. In addition, the State (DAGS) will be required to provide a suitable route where the overhead line and poles could be relocated and grant an easement at no cost to HELCO.

A letter dated October 5, 1995 from William K. Palea, HELCO's T&D Designer was included in the 1996 LRDP as Appendix 5.1. In it he states that it will take approximately two years to complete the design, conduct a public hearing, and complete an environmental assessment. The time estimate was confirmed by Mr. Ratific. However, he clarified that HELCO would be responsible for those activities. A public hearing is not required if the transmission line is not located near residential areas. However, HELCO will normally request Public Utility Commission (PUC) to schedule a public hearing to give residents the opportunity to express their concerns.

Several alignments have been discussed for consideration. Relocation to the new Pū'ainakō Street extension has been considered since the roadway is now under construction and is away from the residential area. However, this alignment adds considerable cost to relocated due to the distance and the number of poles required. The future Nowelo Street extension is another possibility. However, construction of Nowelo Street extension is not known at this time. Also HELCO has no plans to bring utility along that alignment at this time except for the service request received from the USDA. Partial relocation of the existing transmission line was also considered. The relocation of line will only entail a section of the line that may be in the way of construction or conflict with the proposed campus.

The last item discussed was the existing request for power by the USDA and two other projects nearby (which were unknown at the time of our correspondence). Tentatively, HELCO's proposal

TABLE 4.1
Revised Plant List

Common Name	*Botanical Name*	*Ultimate Size+ (height, spread)*	*Gateways*	*Roads*	*Entries and Drop-off Areas*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Parking Lots*	*Edges (Perimeter Planting)*	*Accent Planting*	*Theme Gardens •*
TREES											
KUKUI TREE	Aleurites moluccana	40 ft, 30 ft		X		X	X	X			X (H,E)
CHERIMOYA	Annona cherimola	15 ft									X (E)
SOURSOP	Annona muricata	15 ft									X (E)
QUEEN PALM	Arecastrum romanzoffianum	50 ft		X	X		X			X	
BREADFRUIT	Artocarpus communis	50 ft									X (E)
JACKFRUIT	Artocarpus heterophyllus	50 ft									X (E)
STARFRUIT	Averrhoa carambola	20 ft									X (E)
CHINESE BAMBOO	Bambusa angulata	40 ft									X (C)
HONG KONG ORCHID	Bauhinia blakeana	30 ft, 30 ft				X	X			X	X (O)
TRUE KAMANI*	Calophyllum inophyllum	35 ft, 35 ft			X		X				
HAWAIIAN TREE FERN (HAPU'U)	Cibotium splendens	10 ft, 6 ft					X		X	X	
TRUE KOU*	Cordia subcordata	30 ft, 35 ft		X				X	X		X (H)
WILIWILI*	Erythrina sandwicensis	30 ft, 30 ft					X			X	X (H)
MOUNTAIN APPLE ('OHI'A 'AI)	Syzygium malaccensis	50 ft, 20 ft							X		X (E)
WEEPING BANYAN	Ficus benjamina	60 ft, 80 ft					X				
JACARANDA	Jacaranda acutifolia	50 ft, 40 ft		X			X			X	

*Indicates Native Plant Material
+ Ultimate sizes of trees and palms are approximates and may vary due to environmental conditions.
• Theme Gardens: (H) = Hawaiian Origin; (C) = China Origin; (J) = Japan Origin; (o) = Cosmopolitan; (E) = Ethnobotanical

to provide permanent electrical service to the USDA is to under build a 12 kV distribution system beneath the existing transmission line. This involves approximately two to three pole spans. There is a possibility that the permanent service to USDA may be affected if HELCO is required to relocate all of its transmission line from the State property. A partial relocation may alleviate this problem. It is recommended that a meeting should be held as soon as possible with all affected parties to coordinate the electrical service to the properties.

4.7.3 On-Site Improvements

The on-site improvements for the revised ultimate site plan will follow the basic design as proposed in the 1996 LRDP for electrical, telecommunication (cable and telephone), and life safety systems, except for the potential electrical building loads and the location of the HELCO electrical meter and switching station and the telephone system main distribution frame locations. The potential building loads have been updated and are provided in Table 4.2. The single HELCO meter and switching station would be located in an approximate location near the property line closest to the point where the HELCO service enters the campus. If an easement for the relocated lines is granted along Nowelo Street, a direct connection to the Phase I buildings can be easily made. If the lines are relocated along Pū'ainakō Street, the onsite network must be laid out so as not to interfere with subsequent construction phases. The telephone system main distribution frame would need to be located in the Telecom/Media Center instead of the Student Services Building as noted in the 1996 LRDP since the Student Services Building is slated for construction in Phase 2. The CATV system main and computer/data system main will remain in the Telecom/Media Center.

Common Name	*Botanical Name*	*Ultimate Size+ (height, spread)*	*Gateways*	*Roads*	*Entries and Drop-off Areas*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Parking Lots*	*Edges (Perimeter Planting)*	*Accent Planting*	*Theme Gardens •*
FISHTAIL PALM	Caryota mitis	25 ft			X		X			X	
ARECA PALM	Chrysalidocarpus lutescens	30 ft		X			X			X	
COCONUT PALM*	Cocos nucifera	50 ft					X			X	
SAGO PALM	Cycas revoluta	10 ft	X		X		X			X	X (J)
CYCAD PALM	Cycas circinalis	20 ft	X		X		X			X	
FIJI FAN PALM	Pritchardia pacifica	30 ft	X	X	X		X			X	
LOULU PALM*	Pritchardia affinis, var.	30 ft	X	X	X		X				
MACARTHUR PALM	Ptychosperma macarthurii	30 ft			X		X			X	
RHAPIS PALM	Rhapis excelsa	10 ft			X		X			X	
ROYAL PALM	Roystonea regia	75 ft	X	X	X	X	X			X	
JOANNIS PALM	Veitchia joannis	50 ft	X	X	X		X			X	
MANILA PALM	Veitchia merrillii	15 ft	X	X	X		X			X	X (O)
SHRUBS											
RED GINGER	Alpinia purpurata		X		X		X			X	
SHELL GINGER	Alpinia speciosa		X		X		X			X	
AZALEA	Azalea spp. and hybrids				X		X			X	X (J)
DWARF CARISSA	Carissa grandiflora "Boxwood Beauty"		X		X		X				
NATAL PLUM	Carissa grandiflora				X		X		X		
HAPU'U PULU*	Cibotium chamissoi		X		X		X			X	X (H)

*Indicates Native Plant Material
+ Ultimate sizes of trees and palms are approximates and may vary due to environmental conditions.
• Theme Gardens: (H) = Hawaiian Origin; (C) = China Origin; (J) = Japan Origin; (o) = Cosmopolitan; (E) = Ethnobotanical

Common Name	*Botanical Name*	*Ultimate Size+ (height, spread)*	*Gateways*	*Roads*	*Entries and Drop-off Areas*	*Pedestrian Spine and Paths*	*Plazas/ Open Spaces*	*Parking Lots*	*Edges (Perimeter Planting)*	*Accent Planting*	*Theme Gardens •*
GIANT CRAPE MYRTLE	Largerstroemia speciosa	30 ft, 30 ft		X	X	X	X			X	
MAGNOLIA	Maglolia grandiflora	30 ft, 20 ft				X				X	
MANGO	Mangifera indica	50 ft									X (E)
OHIA LEHUA*	Metrosideros collina subsp. Polymorpha	100 ft, 20 ft				X	X		X	X	X (H)
PAK-LAN	Michelia alba										X (C)
MULANG	Michelia champaca										X (C)
NONI	Morinda citrifolia	20 ft									X (E)
BANANA	Musa nana	2 ft									X (E)
HALA*	Pandanus odoratissimus	30 ft, 30 ft			X		X			X	X (H)
AVOCADO	Persea americana	30 ft									X (E)
JAPANESE RED PINE	Pinus densiflora	50 ft									X (J)
JAPANESE BLACK PINE	Pinus thunbergii	20 ft									X (J)
PLUMERIA	Plumeria sp.	30 ft, 30 ft			X		X			X	X (O)
GOLD TREE	Tabebuia donnell-smithii	25 ft, 25 ft		X		X	X			X	
PINK TECOMA	Tabebuia pentaphylla	30 ft, 30 ft				X	X			X	
TAMARIND	Tamarindus indica	50 ft									X (E, O)
MILO*	Thespesia populnea	25 ft, 30 ft								X	X (H)
PALMS											
ALEXANDRA PALM	Archontophoenix alexandrae	60 ft				X				X	

*Indicates Native Plant Material
+ Ultimate sizes of trees and palms are approximates and may vary due to environmental conditions.
• Theme Gardens: (H) = Hawaiian Origin; (C) = China Origin; (J) = Japan Origin; (o) = Cosmopolitan; (E) = Ethnobotanical

Common Name	Botanical Name	Ultimate Size+ (height, spread)	Gateways	Roads	Entries and Drop-off Areas	Pedestrian Spine and Paths	Plazas/ Open Spaces	Parking Lots	Edges (Perimeter Planting)	Accent Planting	Theme Gardens •
BIRDS-NEST FERN	Aspienium nidus									X	
TUTTLE CARISSA	Carissa grandiflora "Tuttle"						X				
FALSE HEATHER	Cuphea hyssopifolia		X		X		X			X	
DAYLILY	Hemerocallis sp.		X		X		X			X	
LIRIOPE	Liriope spp.		X		X		X			X	X (J)
LAUA'E FERN	Microsorium scolopendria		X		X		X	X			X (O)
WALKING IRIS	Neomarica caerulea		X		X		X			X	X (J)
MONDO GRASS	Ophiopogon japonicus		X		X		X	X			X (J)
POTHOS	Pothos aureus		X		X		X				
SPATHIPHYLLUM	Spathiphyllum sp.		X		X		X			X	
AUSTRALIAN CARPET GRASS	Eremochloa ophiuroides		X	X	X	X	X	X	X		X
VINES											
YELLOW ALLAMANDA	Allamanda cathartica 'Hendersonii						X			X	
BLEEDING HEART VINE	Clerodendron thomsoniae						X			X	
CONGEA, PINK SANDPAPER VINE	Congea tomentosa						X			X	
RED JADE VINE	Mucuna bennettii						X			X	
JADE VINE	Strongylodon macrobotrys						X			X	

*Indicates Native Plant Material
+ Ultimate sizes of trees and palms are approximates and may vary due to environmental conditions.
• Theme Gardens: (H) = Hawaiian Origin; (C) = China Origin; (J) = Japan Origin; (o) = Cosmopolitan; (E) = Ethnobotanical

Common Name	Botanical Name	Ultimate Size+ (height, spread)	Gateways	Roads	Entries and Drop-off Areas	Pedestrian Spine and Paths	Plazas/ Open Spaces	Parking Lots	Edges (Perimeter Planting)	Accent Planting	Theme Gardens •
CROTON	Codiaeum variegatum		X		X		X			X	
HYBRID TI	Cordyline sp.		X		X	X	X		X	X	
TI*	Cordyline terminalis		X		X	X	X		X	X	X (H)
SPIDER LILY	Crinum asiaticum		X		X		X			X	
QUEEN EMMA LILY	Crinum augustum		X		X		X			X	
GARDENIA	Gardenia jasminoides		X		X	X	X			X	
TIARE	Gardenis taitensis		X		X	X	X			X	
HELICONIA	Heliconia sp.		X		X		X			X	
HIBISCUS (NATIVE)*	Hibiscus arnottianus, spp.		X		X	X	X		X	X	
RED IXORA	Ixora macrothyrsa		X		X		X			X	
LEEA	Leea coccinea				X		X				
MONSTERA	Monstera deliciosa		X		X		X			X	
YELLOW AFRICAN IRIS	Morea bicolor		X		X		X			X	
MOCK ORANGE	Murraya paniculata						X		X		
PHILODENDRON	Philodendron selloum		X		X		X			X	
TRAVELLER'S TREE	Ravenala madagascariensis				X		X			X	
GIANT BIRD OF PARADISE	Strelitzia nicolai				X		X			X	
GROUNDCOVER											
MAIDENHAIR FERN	Adiantum sp.						X			X	

*Indicates Native Plant Material
+ Ultimate sizes of trees and palms are approximates and may vary due to environmental conditions.
• Theme Gardens: (H) = Hawaiian Origin; (C) = China Origin; (J) = Japan Origin; (o) = Cosmopolitan; (E) = Ethnobotanical

Table 4.2: Updated Potential Building Loads for the Komohana Campus

BLDG NO.	BUILDING DEPARTMENT	BLDG. Footprint	# FLOORS	GROSS SF	VA/SF	DEMAND KVA	
1	SOCIAL SCIENCE / HUMANITIES	13,751	1	13,751	15	206	
2	SOCIAL SCIENCE / HUMANITIES	13,751	1	13,751	15	206	
3	HAWAIIAN CULTURE	9,173	1	9,173	15	138	
4	PUBLIC SERVICES	12,798	1	12,798	15	192	
5	EARLY CHILDHOOD ED. DIV. / CHILDREN'S CENTER	18,471	1	18,471	15	277	
6	LANGUAGE ARTS	25,409	1	25,409	15	381	
7	LANGUAGE ARTS	25,409	1	25,409	15	381	
8	MATH / SCIENCE	38,916	1.5	58,374	15	876	
9	BUSINESS EDUCATION	38,975	1	38,975	20	780	
10	NURSING DIVISION / DIVISIONAL SPACES	17,676	1	17,676	15	265	
11	TRADE & INDUSTRY	15,435	1	15,435	15	232	
12	TRADE & INDUSTRY	15,435	1	15,435	15	232	
13	AGRICULTURE PROGRAM	21,750	1	21,750	15	326	
14	AGROFORESTRY	28,125	1	28,125	15	422	
15	AUTO BODY REPAIR & PAINTING	41,495	1	41,495	15	622	
16	AUTOMOTIVE TECHNOLOGY	45,273	1	45,273	15	679	
17	CARPENTRY	48,690	1	48,690	15	730	
18	DIESEL MECHANICS PROGRAM	38,232	1	38,232	15	573	
19	ELECTRICAL MAINTENANCE & INSTALL. TECHNOLOGY	24,492	1	24,492	15	367	
20	FOOD SERVICE	40,689	1	40,689	20	814	
21	WELDING & SHEET METAL TECHNOLOGY	18,672	1	18,672	15	280	
22	LEARNING RESOURCES CENTER	14,948	2	29,896	15	448	
23	LEARNING SKILLS / COOP. VOCATIONAL ED.	15,210	2	30,420	15	456	
24	TELECOMMUNICATIONS / MEDIA CENTER	20,151	2	40,302	20	806	
25	STUDENT SERVICES OFFICE	25,466	1.5	38,232	15	573	
26	STUDENT SERVICES "CAMPUS CENTER	26,034	2.5	54,051	15	811	
27	INSTITUTIONAL SUPPORT OFFICE	16,899	1.5	16,394	20	328	
28	OPERATIONS & MAINTENANCE	14,823	1	14,823	20	296	
29	OFFICE OF CONTINUING EDUCATION & TRAINING	24,962	1	24,962	20	499	
30	OFFICE OF CONTINUING EDUCATION & TRAINING	24,962	1	24,962	20	499	
31	FUTURE EXPANSION	74,500	2	149,000	15	2,235	
32	PARKING LOT LIGHTING			1,259,500	0.18	227	
33	DRIVEWAY LIGHTING			378,000	0.15	57	
34	WALKWAY LIGHTING			192,000	0.15	29	
	TOTAL			2,824,587	GSF	16,244	KVA
	LOAD DATA	SYSTEM VOLTAGE:	12.47 KV		3 PHASE		752 Amps

5.0 FACILITIES TRANSITION AND PHASING PLAN

5.1 Objective

The objective of this section of the Hawaii CC LRDP Update is to develop an incremental Facilities Transition and Phasing Plan which will satisfy the short and long range requirements for phasing the relocation of Hawaii CC from the existing Manono Campus to the new Komohana Campus.

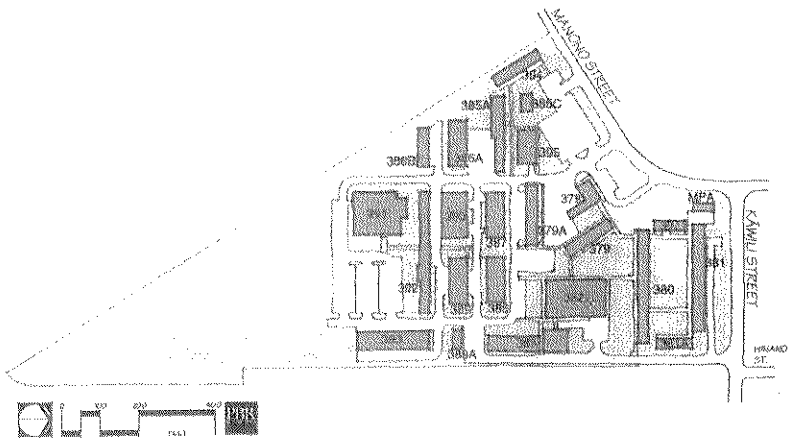


Figure 5.1: Manono Campus

For the interim Manono Campus, this plan identifies existing space requirements and allocations and projects future space requirements and space allocations to accommodate a maximum student population of 1,550 Full Time Equivalent (FTE).[1] This section summarizes the alternatives explored and the preferred transition plan including a discussion on parking requirements. It then discusses the proposed phasing plan for the Komohana Campus and order-of-magnitude cost estimates for the facilities and infrastructure improvements. A time schedule for project development highlighting the various phases for improvements to the existing Manono campus and development of the Komohana campus is also included in this section.

[1] Calculation and rationale described in Section 5.3 below.

5.2 The Manono Campus

Located in the city of Hilo east of the proposed Komohana Campus, the Manono Campus occupies a triangularly shaped parcel of 20.7 acres. (See Figure 5.1.) Approximately 5.4 acres of land extending from the central portion of the campus to the southern end of the property is vacant land. The campus is bordered by East Kāwili Street to the north and Manono Street to the northwest. Surrounding land uses include single family residences to the west and a mix of commercial, light industrial and residential uses to the north of the campus. To the east, land uses associated with the Kanoelehua Industrial Area as well as a State Department of Transportation baseyard abut the property.

Space and infrastructure limitations at the current Hawai'i CC Manono Campus restrict the extent of further development on the Manono property. Nevertheless, the Manono Campus must serve as the interim campus for Hawai'i CC until construction of the initial phase of the Komohana Campus is completed.

5.3 Projected Timeline, Campus Growth, and Program Requirements for Interim Student Population at Manono Campus

5.3.1 Projected Timeline

Hawai'i CC administration has estimated that the earliest Phase 1 construction of the new Komohana Campus may be completed is the year 2010. Until then, the Manono Campus will have to accommodate any growth or new programs offered by Hawai'i CC as well as some programs that currently operate at the UH Hilo Upper Campus but will likely be displaced in the near future.

5.3.2 Interim Student Population

From 1989 to 2001, the student population of Hawai'i CC averaged 1,609 FTE with a maximum of 2,005 FTE reached in 1994. Total headcount has averaged 2,267 during the same time period, peaking at 2,815 in 1994 as well. It is important to note, however, that the historical numbers include students from the Manono Campus as well as those who are enrolled through Hawai'i CC but whose classes are held at the UH Hilo Upper Campus and West Hawai'i. It is assumed that most of these classes will continued to be held at these locations during the interim while the Komohana Campus is being constructed. Therefore historic student counts are higher than those expected to be accommodated at the interim Manono Campus.

Based on an ultimate FTE of 3,000 for Hawai'i CC and projections of historical student counts (1989-2001) using linear regression and University guidelines as recommended by Hawai'i CC administration, it is estimated that by the year 2010, Hawai'i CC will need to accommodate roughly 1,550 FTE at its interim campus at Manono. Although the projected FTE is lower than historical maximum reached in 1994, Hawai'i CC will be adding new programs such as Agroforestry as well as expanding existing programs such as Hawaiian Culture and computer training which will require the expansion of classroom facilities at Manono. In addition, Hawai'i CC is expecting to move some program space (such as Nursing) and all of its student support services and offices from UH Hilo facilities to the Manono Campus during the interim period.

5.3.3 Interim Program Requirements

In determining required program space at the interim Manono Campus, the following assumptions were made per Hawai'i CC administration recommendations:

1. All existing programs at the Manono Campus will remain at Manono.
2. All programs accommodated at the UH Hilo Upper Campus will remain at the Upper Campus during the interim except for Nursing which will move to the Manono Campus.
3. Agriculture will move from the UH Hilo Komohana Building to the Manono Campus during the interim.
4. UH Hilo's Art and Na Pua No'eau Programs will remain at Manono.
5. The status of Building 383 Hale Aloha (UH Hilo Dormitories) is unknown and should not be considered as available space during the interim.
6. Current and proposed University improvement projects include the following building renovations. Respective programs to be housed during the interim are noted.
   a. Building 389A: Hula Studio (completed)
   b. Building 393: Agriculture, Agroforestry and Early Childhood Education (in progress)
   c. Building 386B: Carpentry (in progress)
   d. Building 387: Learning Center and Telecom/Media Center
   e. Building 389: Nursing (currently occupied by UH Hilo Maintenance)
   f. Building 386A: Classroom/Office (currently shared with UH Hilo Agriculture Program)

Additional interim program requirements and space needs for the Manono Campus were developed by Hawai'i CC administration and are summarized below in Table 5.1. A detailed program is included in Appendix B. Whenever possible, general classrooms, computer labs, and open lab spaces will be shared among programs and have been accounted for in the required area.

Table 5.1: Additional Program Space Requirements for Interim Manono Campus

Program	Required Area (Estimated Assignable SF)
Hawaiian Culture	3,615
Computer Facilities & Classrooms	4,325
OCET	5,650
Advising/Transfer Center	635
Career Center	2,288
Student Center	4,600
Institutional Support	6,282
TOTAL	27,395

5.4 Alternatives and Order-of-Magnitude Cost Analysis for the Interim Manono Campus

A variety of alternatives to accommodate the additional space requirements were explored for the transition plan. They included renovation of existing buildings, adding second stories to existing buildings, site-constructed portable structures, and modular (prefabricated) portable buildings.

5.4.1 Renovation Alternative

Preliminary inspection by architectural consultants, Urban Works, determined that many of the buildings at Manono Campus are in poor condition and would require extensive reconstruction to renovate. In addition, based on previous renovation costs for Building 388 (construction cost: $205/SF) and the potential for hazardous materials mitigation, renovation of existing buildings to accommodate additional program space beyond those that are currently approved was eliminated as a viable option.

5.4.2 Second Story Additions Alternative

Urban Works also evaluated existing buildings for their potential of adding a second floor. Their investigations determined that the only buildings that are structurally capable of supporting a second floor are Buildings 386A, 387, 388, 389, 390, and 393. Of these, Building 388 has been renovated for classrooms, Building 393 is being renovated for the Agriculture, Agroforestry, Early Childhood Education programs, and 387 will be renovated for the new Learning Center and Telecom/Media Center. The remaining three buildings were investigated in more detail and the architects determined that it would cost approximately $500,000 per building to add a second floor. Because of additional structural elements, stairs and elevators, the additional assignable square footage that would be created is only 2,100 SF resulting in a $238/SF cost for the additions. Furthermore, the renovation of the three buildings would not provide enough space for the additional program requirements. Additional structures or space would be required to fulfill interim space needs for Hawai'i CC.

5.4.3 Site-constructed Portables Alternative

Due to the structural and cost limitations of altering existing buildings, the idea of using portables for interim space needs was investigated. The portables would be constructed in the vacant area on the southern end of campus and would not displace existing programs or classes during construction. It would also allow reuse of the structures once interim programs move to the new Komohana Campus.

The first type of portables considered for the additional space requirements is site-constructed portables. Similar to those used by the State Department of Education, the portables would be of wood construction with covered exterior walkways, built on-site and cut apart when disassembly is required for relocation. Urban Works estimated the cost of these structures (including site preparation and infrastructure costs) to be roughly $200/SF, not much cheaper than the renovation of existing buildings.

5.4.4 Modular (Prefabricated) Portables - Preferred Alternative

The second type of portables evaluated are modular, prefabricated portables. Hawaii Modular Space (HMS), a local company that has successfully installed several of these customizable structures in Hawai'i including Kaiser High School and Chaminade University. Although based on prefabricated modular units, the portables can be customized for any size or use and a variety of architectural materials and finishes can be implemented in the design of the structures. Installed cost as estimated by Hawai'i Modular Space for standard classrooms and offices is roughly $85/SF. For special labs or structures, the cost increases to $90/SF. With covered walkways, landscaping, and civil costs included, the cost estimate for the standard modular portables is $172/SF. As the lowest cost alternative that allows flexibility in design and implementation, the modular portables was selected as the preferred alternative.

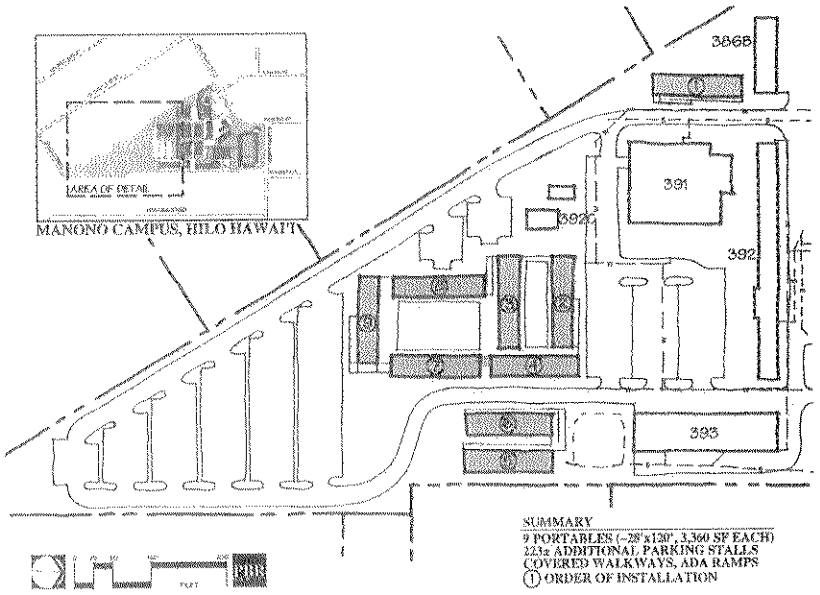


Figure 5.2: Proposed Portable Buildings and Parking Lot Layout at Manono Campus

5.5 Interim Transition Plan for Manono Campus

To accommodate the additional program space required by Hawai'i CC during the interim, a site plan was developed for the open area at the southern end of the campus. (See Figure 5.2.) The site plan uses "typical" portables (description below) to allow for flexibility in phasing the various additional program space requirements. It also shows additional at-grade parking that could be developed on the remaining land.

In the proposed layout, there are nine typical portables shown. The portable buildings are numbered in the site plan according to the proposed order of installation. The first units are located closest to existing utilities to minimize civil costs. Should additional portables be needed, they could be installed either east of Portable 9 or west of Portable 8, eliminating the two small parking pods shown in Figure 5.2 (a loss of approximately 20 parking stalls).

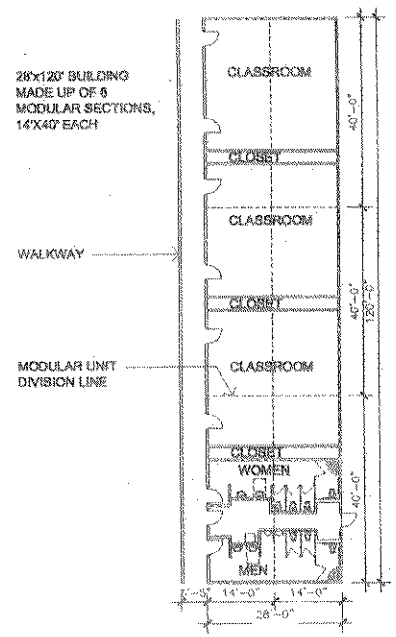


Figure 5.3: Typical Floor Plan for Portable Buildings at Manono Campus

5.5.1 Portable Building Design

The "typical" portable is based on specifications provided by HMS for their units (detailed in Appendix C) and a limitation on the size of the modules that could be trucked to the campus. HMS staff has performed a site visit and determined that the ideal size for the modules is 14 feet wide by 40 feet long. The typical portable building used in the site plan contains modules pieced together two wide and three long. The resulting portable will be 28 feet wide by 120 feet long, or 3,360 SF in total area. (See Figure 5.3.)

To provide Hawai'i CC with the maximum flexibility in phasing and timing the expansion at Manono, the portables are not linked to any particular program. The typical portable is shown in Figure 5.3 as a general classroom building with three classrooms, closet storage, and restrooms. However, each portable building can be designed and constructed as needed by Hawai'i CC to include a mix of classrooms, offices, larger lab spaces, restrooms, and accessory spaces such as storage rooms.

Furthermore, HMS reports that there is quite a bit of flexibility in the size of the buildings that could be built as long as the size of the module to be trucked to the campus does not exceed 14 feet wide by 44 feet long.[2] Any number of modules can be pieced together both in width and length to build the desired building size. For example, the typical portable constructed of modules 2 wide by 3 long could extend its total length by 12 feet by using 14' x 44' modular units rather than the 14' x 40' units used in the typical portable.

In addition, HMS notes that architectural finishes can vary greatly in order to create appealing yet functional buildings. Air conditioning and other HVAC systems can easily be installed in the portables. The choice of materials and fixtures is limited only by the designer's imagination and the construction budget. An outside architect can be hired to do the design or HMS staff can do it in-house.

5.5.2 Parking

The Manono Campus currently has 281 parking stalls (both paved and unpaved, including 17 accessible stalls). In the proposed plan, roughly 223 additional parking stalls (7 of which are accessible) will be provided. This will bring the total number of stalls to 504.[3] Based on Hawai'i County Code, 277 stalls are required for the entire campus.[4] However, based on the University's recommended standard of 1 stall for every 2 FTE, 775 stalls would be required. The number of stalls at Manono Campus would be adequate according to County Code, but not by recommended University standards.

5.6 Proposed Phasing Plan for Komohana Campus

In order to plan for the full build out of the Komohana Campus, it was necessary to divide the construction into logical development phases for the infrastructure, building, and site amenity requirements. There are four major phases proposed in this LRDP Update. (See Figure 5.4.) It is assumed that all site work, infrastructure, and landscaping related to each facility would be installed accordingly. The phases can be broken down into smaller subphases as needed by Hawai'i CC in order to develop construction budgets.

[2]HMS and Hawai'i CC Facilities staff performed a site inspection of the Manono Campus in March 2002 and verified that HMS trailers (Cantor Trucking) can access the campus with modular pieces 14' wide and 44' long no major alterations to the existing campus roadways. HMS also confirmed that a maximum height of 14' is the allowable height to avoid overhead lines from the dock in Hilo to the Manono Campus. Their standard trailer heights are 12'. County requirements require escorts for 12' wide or wider transports. HMS will handle all trucking requirements (permits and escorts) as needed for the construction of the modular buildings.

[3]The total number of stalls would be reduced by approximately twenty stalls if an additional portable is added west of Portable 8 rather than the 2 parking pods shown in Figure 5.2.

[4]Hawai'i County Code calculates parking requirements for schools based on student headcount (one stall for every 10 students) and office space (one stall for every 400 SF of office space). Based on a student headcount of 2,200 as projected for 1,550 FTE, and 22,575 SF of office space, 220 stalls plus 57 stalls, for a total of 277 stalls would be required per County Code.

5.6.1 Phase 1

The first phase would involve major infrastructure work, both to relocate the existing electrical and water lines and to provide for new utility services. The first four buildings to be built would be three academic support facilities (Telecommunications/Media Center, Learning Resource facility, and the Campus Center) and the Business Education building. These facilities are flexible enough to temporarily house academic instructional uses along with abbreviated versions of the programs that will ultimately be housed within them.

By providing these core support facilities first, the central plaza of the campus will be defined and the rest of the campus can logically be developed from this core. Although these facilities are located at the back of the campus, it is expected that the Nowelo Street extension will be completed by the time the first phase of the Komohana Campus begins construction. The entry off Nowelo Street would be developed along with a majority of the northeast parking lot. If the Nowelo Street extension is not completed by the time access is needed for Phase 1 improvements, a temporary road through campus from the Pū'ainakō Street extension may be required. This temporary road should be located and designed so that it does not interfere with proposed Phase 2 improvements. One suggestion is to construct the road from the Pū'ainakō Street main entry, through the southeastern parking lot and north to the campus loop road to the northeastern parking lot. In this way the "temporary" road becomes part of the Phase 2 improvements and the main entry and southeastern parking lot can be constructed around the temporary road as noted below. A temporary service drive would also be required to access the Campus Center and Learning Resources from the northeast parking lot and Telecom/Media Center and Business Education service area. This short segment of road would no longer be needed once Phase 2 is completed.

The one temporary structure required for this first phase would be a temporary warehouse type building for the Operations and Maintenance functions. The offices and mail functions could be housed in one of the four permanent facilities. However, there will be a need for maintenance storage space. It is envisioned that this temporary facility could either be developed with portable buildings from the Manono Campus that are no longer needed there, or it could be a prefabricated, Butler-type shell that could be easily erected. The temporary O&M facility could be located in the "future expansion" area to the east of the Business Education building. In this way, there will be existing roadway access for the facility off the northeast parking lot and the facilities can continue operations during the construction of the permanent O&M facilities in Phase 2.

Grading for the first phase will include clearing, grubbing and grading for the cluster of buildings in the north-central portion of the campus. Grading of the parking lot north of the Business Education Building will also be included in this phase. A main drain line connecting to the main entrance of the campus will be constructed in Phase 1 to convey run-off from the Phase 1 area of the site to the Pū'ainakō Street Extension. Drywells and a piping system will be constructed in the Phase 1 parking lot and downspout extensions and drywells will dispose of building run-off for this phase. The first phase would also include fire lines along the roadways near the buildings constructed in that phase and a main line extending to the entrance connection. The Phase 1 domestic waterlines will extend from the entrance connection to the buildings for that phase. Waterlines will then branch out to the remaining phases as each phase is constructed. The HELCO transmission lines that cut across the campus site will be relocated in this phase, and electrical and

telecommunication service (which includes cable and telephone service) to the campus and to Phase I buildings will be established. Finally, during Phase 1, the main sewerline for the campus will extend from the Phase 1 buildings to the entrance connection along Pū'ainakō Street. This connection will be near the main entrance to the campus. The connections described in this and subsequent phases below will be subject to Wastewater Division approval.

5.6.2 Phase 2

The second phase would involve completing the Central Plaza, with the Learning Skills facility (which would temporarily house additional functions). The North-South Mall would be extended to the Entry Courtyard and the four buildings (Institutional Support, Student Services, and two OCET buildings) enclosing the courtyard will be constructed. The Math and Science Building and the Food Service Technology facility are also included in the phase. The Math & Sciences building is a functionally unique facility that is required for its laboratories and other specialized instructional spaces. However, there will be other general classrooms that may be used by other programs while the campus continues to develop. The Food Services facility will provide much needed dining services for the growing campus and can host fundraising activities to support the continued development of the campus.

With the construction of the Entry Courtyard facilities and the Food Services building, the main entry off Pū'ainakō Street will need to be completed, as well as the northwest and southeast parking lots and the connecting loop road to the east of the future expansion areas. The permanent O&M facility will need to be built towards the end of this phase since the Komohana Campus will begin to outgrow the temporary facilities. It is located in the far northwest corner of the campus.

Phase 2 grading will occur in the areas designated for development. The drainage system for this phase will consist of a system similar to Phase 1, with piping connecting to the Phase 1 system. Water line service for domestic and fire protection water systems will also include fire lines along the roadways near the buildings and water lines branch out to this phase. The sewer, electrical, telecommunication and life safety systems for this phase will connect to the main lines constructed in Phase 1.

5.6.3 Phase 3

The third phase would complete the majority of the academic instructional facilities in the main part of the campus except for the T&I buildings. The facilities in this phase would provide permanent locations for academic programs which would be initially housed in the various support facilities thereby freeing up the support facilities for the continued growth of the campus. These buildings include: Social Sciences & Humanities, Language Arts, Nursing, Hawaiian Culture, Public Services, and Early Childhood Education. The third phase also includes the southwest parking lot and the completion of the loop road around the core academic facilities.

Phase 3 grading will occur in the areas designated for development. The drainage system for this phase will consist of a system similar to Phase 1, with piping connecting to the Phase 1 system. Water line service for domestic and fire protection water systems will also include fire lines along the roadways near the buildings and water lines branch out to this phase. The sewer, electrical,

telecommunication and life safety systems for this phase will connect to the main lines constructed in Phase 1.

5.6.4 Phase 4

The fourth phase involves the completion of the campus by adding the T&I buildings and related parking lot and roadways on the eastern portion of the Komohana Campus. The T&I Divisional Offices and drafting and engineering facilities will complete the core of the campus. The remaining T&I facilities, including the Carpentry, Automotive Technology and Body Repair, Welding, Electrical Maintenance and Installation, Diesel Mechanics, Agriculture, and Agroforestry facilities, will be constructed. The related T&I parking lot, internal roadways, and minor entry on Komohana Street would also be developed during this phase.

Phase 4 grading will occur in the areas designated for development. The drainage system for this phase will consist of a system similar to the other phases, but will discharge to Komohana Street or the Pū'ainakō Street Extension, near Komohana Street. Water line service for domestic and fire protection water systems will also include fire lines along the roadways near the buildings and water lines branch out to this phase. Most of Phase 4, located on the east side of the project site, will connect to a line further east of the main entrance. The sewer, electrical, telecommunication and life safety systems for this phase will connect to the main lines constructed in Phase 1.

5.7 Order-of-Magnitude Cost Estimates

The order-of-magnitude cost estimates for the proposed LRDP Update for both the interim Manono Campus and the new Komohana Campus is summarized below in Table 5.2 and detailed in Appendix D. It should be noted that a 10 percent contingency has been included in the construction cost estimates for each phase. Cost estimates are based on 2003 dollars and no escalation has been provided for inflation. Design costs are calculated by taking 10 percent of the construction costs and tallied below.

Table 5.2: Order-of-Magnitude Cost Estimates for the Interim Manono Campus and the Komohana Campus

PHASE	CONSTRUCTION COSTS	DESIGN COSTS
Interim Manono Campus Improvements	$5,163,202	$516,320
Komohana Campus Phase 1	$51,882,380	$5,188,238
Komohana Campus Phase 2	$74,224,590	$7,422,459
Komohana Campus Phase 3	$38,290,560	$3,829,056
Komohana Campus Phase 4	$93,368,550	$9,336,855
TOTAL COSTS	**$262,949,282**	**$26,294,928**

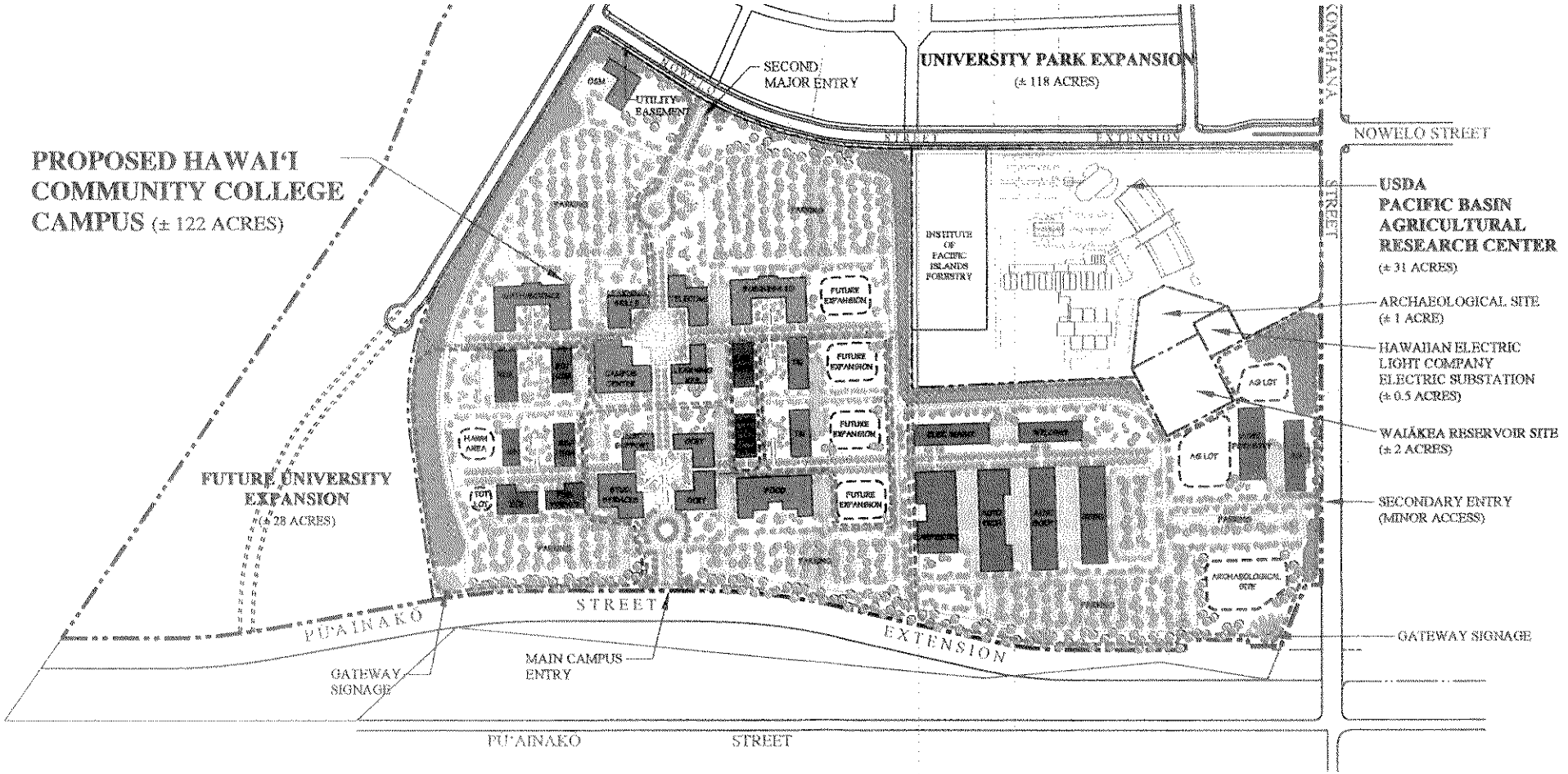
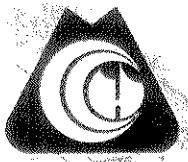


Figure 5.4: Komohana Campus Proposed Phasing Plan



Appendix A

BENJAMIN J. CAYETANO
GOVERNOR

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

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
JADINE Y. URASAKI

IN REPLY REFER TO:
HWY-PS
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MAY 2 3 2001

RECEIVED
MAY 24 2001
WRSA-Honolulu Office
Project #

Mr. Neal Fukumoto, P.E.
Wesley R. Segawa & Associates, Inc.
735 South Street, Suite 203
Honolulu, Hawaii 96813-5127

Dear Mr. Fukumoto:

Subject: Hawaii Community College Request for Assistance to Securing Access and Utility Easements along Pusinako Street Extension
Waiakea, South Hilo, Hawaii Department of Transportation, Highways Division

Thank you for your transmittal requesting access and utility easements along Pusinako Street Extension for the Kanohana Campus of Hawaii Community College in Hilo. We have the following comments:

1. Applicant must prepare and submit to us a Traffic Impact Analysis Report (TIAR) for our review and approval.

2. Channelization/signalization and street lighting must be provided at proposed intersections, where warranted.

3. A bicycle route/lane must be provided along the entire campus frontage.

4. Pedestrian improvements conforming to the American With Disabilities Act (ADA) must be provided by the applicant on both sides of the Pusinako Street along the campus frontage.

5. A Drainage report with calculations must be prepared for our review and approval. Diversion of surface water run-off onto Pusinako Street Extension is not permitted.

6. Because of the terrain of the area, safety improvements along the Pusinako Street Extension may be required.

7. All required mitigation measures must be implemented by the applicant at his own expense.

8. Construction plans for all work done within the Puainako Street Extension right-of-way must be submitted to our Hawaii District Office for review and approval.

If you have any questions, please contact Stanley Tamura, Hawaii District Engineer, at 808-933-8866.

Very truly yours,

BRIAN K. MINAAI
Director of Transportation

WESLEY R. SEGAWA & ASSOCIATES, INC.
CONSULTING CIVIL & STRUCTURAL ENGINEERS

July 27, 2001

Mr. Stanley Tamura, Hawaii District Engineer
State of Hawaii
Department of Transportation, Highways Division
Hawaii District Office
50 Makaala Street
Hilo, Hawaii 96720

SUBJECT: Hawaii CC LRDP Update and Technology Plan
Project No. CC-99-9014

This letter serves as a follow up to our telephone conversation of July 17, 2001.

Hawaii Community College (HCC) is proceeding with the development of their Komohana Campus. The primary entrance to the campus will be from the proposed Puainako Street Extension. HCC also plans to extend utility lines (possibly sewer, water, and power) within the Puainako Street Extension right-of-way (ROW). Puainako Street Extension is a County route that will eventually be turned over to the State. Pursuant to our conversation, we understand that the Department has no objections to the new entrance at this time. However, approval of this entrance, with the inclusion of utilities within the ROW, is contingent upon the extent of improvements and the completion of a traffic study. With these contingent items in mind, HCC will proceed with the development of the campus with its primary entrance located at Puainako Street Extension.

Should your understanding of our conversation differ from the above, please notify us immediately of any additions and/or revisions upon receipt of this letter. We greatly appreciate the Division's assistance on this project.

Sincerely,
WESLEY R. SEGAWA & ASSOCIATES, INC.

Neal Fukumoto, P.E.

nf

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736 South Street, Suite 203 • Honolulu, Hawaii 96813-5127 • (808) 536-4495 • Fax (808) 524-4466 • E-Mail wrsahnl@aol.com
Hilo (808) 935-4677 • Fax (808) 935-2070 Kailua-Kona (808) 329-8249 • Fax (808) 329-7457

WESLEY R. SEGAWA & ASSOCIATES, INC.
CONSULTING CIVIL & STRUCTURAL ENGINEERS

July 27, 2001

County of Hawaii
Department of Public Works
Engineering Division
25 Aupuni Street
Hilo, Hawaii 96720

Attention: Mr. Casey Yanglhara

SUBJECT: Hawaii CC LRDP Update and Technology Plan
Project No. CC-99-9014

This letter serves as a follow up to our telephone conversation of July 17, 2001.

Hawaii Community College is proceeding with the development of their Komohana Campus. The primary entrance to the campus will be from the proposed Puainako Street Extension. A secondary entrance to access parking areas from Komohana Street is also planned. Pursuant to our conversation, the Division has no objections to the new secondary entrance at this time. However, approval of this entrance is contingent upon the extent of improvements and the completion of a traffic study. With these contingent items in mind, HCC will proceed with the development of the campus with its primary entrance located at Puainako Street Extension and its secondary entrance located at Komohana Street.

Should your understanding of our conversation differ from the above, please notify us immediately of any additions and/or revisions upon receipt of this letter. We greatly appreciate the Division's assistance on this project.

Sincerely,
WESLEY R. SEGAWA & ASSOCIATES, INC.

Neal Fukumoto, P.E.

nf

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736 South Street, Suite 203 • Honolulu, Hawaii 96813-5127 • (808) 536-4495 • Fax (808) 524-4466 • E-Mail wrsahnl@aol.com
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Harry Kim
Mayor

County of Hawaii
DEPARTMENT OF PUBLIC WORKS
25 Aupuni Street, Room 202 • Hilo, Hawaii 96720-4252
(808) 961-8321 • Fax (808) 961-8630

Dennis K. W. Lee
Director

RECEIVED
AUG - 3 2001
WRSA-Honolulu Office
Project #

July 31, 2001

Neal Fukumoto, P.E.
Wesley R. Segawa & Associates, Inc.
736 South Street, Suite 203
Honolulu, Hawaii 96813-5127

SUBJECT: HAWAII COMMUNITY COLLEGE
LRDP Update and Technology Plan
Project No. CC-99-9014

This is in response to your letter concerning access locations for the proposed Hawaii Community College Komohana Campus. We have no objections for the primary access of the campus to be taken from the Puainako Street Extension, and the secondary access to be taken from Komohana Street, provided they are properly designed at optimum locations with any needed traffic improvements, under the direction of our Department.

Besides our review, the proposed access location onto the Puainako Street Extension shall meet with the approval of the State of Hawaii, Department of Transportation. Our County will be turning this roadway over to the State upon its completion.

Should there be any questions, please feel free to contact Mr. Casey Yanagihara in our Engineering Division at (808)961-8923. You may direct your State access questions to the HDOT, in care of Mr. Robert Taira.

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__DL __GL
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Galen M. Kuba, P.E.
Acting Deputy Director

CKY

7 0020 ltr

copy: HDOT (S. Tamura)

CUST 3-3-1
H-W/G

May 14, 2003

RECEIVED
MAY 15 2003
RONALD N.S. HO & ASSOC., INC.

Ron Ho & Associates
2138 Algaroba Street
Honolulu, HI 96826-2734

Attention: Mr. Rand Sueno

Gentlemen:

Subject: Hawaii Community College PN94125A

This is in reply to your inquiry of May 7, 2003, concerning the following two items:

1. The relocation cost of the existing HELCO's 69KV transmission line located within the proposed Hawaii Community College site.

   a. Reference is made to appendix 5.1; a letter from William Palea to Ron Ho dated October 5, 1995, stating that cost of relocating the existing 69KV transmission will be borne by HELCO. The relocation letter was in response to the inquiry concerning the relocation of the 69KV line located within the U.H. Technology & Research Park, however the same will apply for the transmission line referenced in your correspondence of May 7, 2003.
   b. One condition of the relocation is that the State of Hawaii must provide an alternate route with easements for the Transmission line over state land at no cost to HELCO.

2. Cost effectiveness between separate meters vs. one primary meter.

   a. The monthly customer charge for "P" rate is $357.00 plus energy charges.
   b. The monthly customer charge for "J" rate is $56.00 each multiplied by the number of services to individual buildings.
   c. Based on the preliminary master plan there are approximately 27 buildings that may require individual services. The total monthly customer charge for 27 meters will be $1,512.00.

If you require a detailed break down as to the charges by different rates, please contact Debra Gomez Ota of our Customer Service Department. She can be reached at 969-0131.

Should you have any questions, please call me at 969-0333.

Sincerely,

Ralph Ratific, Jr.
Customer Designer
Customer Engineering Division

RRjr:fc

CUST – 3-3-1
H-W/G

June 5, 2003

Ms. Kimi Yuen
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 630
Honolulu, HI 96813-3484

Dear Ms. Yuen:

Subject: Hawaii Community College 69KV Transmission Line Relocation

This is a follow up to our telephone conversation of June 4, 2003, concerning the relocation of the existing HELCO's transmission line within the State property. There are no specified steps in initiating the relocation except to open a service request. The University should submit a letter to HELCO requesting the relocation. In addition the State (DAGS) will be required to provide a suitable route where the poles could be relocated and grant easement at no cost to HELCO.

Reference is made to the letter dated October 5, 1995 from Mr. William K. Palea, HELCO's T & D Designer, which states that it will take approximately two (2) years to complete the design, conduct a public hearing and if required complete an environmental assessment. This will be handled by HELCO. A Public Hearing is not required if the transmission line is not located near the residential area, however, HELCO will normally request PUC to schedule a public hearing to give residents the opportunity to express their concerns.

Several alignments have been discussed for consideration. Relocation to the new Puainako extension has been considered since the roadway is now under construction and is away from the residential area. However, this alignment adds considerable cost to relocate due to the distance and the number of poles required. The future Nowelo Street extension is another possibility. The construction of Nowelo Street extension is not known at this time. Also HELCO has no plans to bring utility along that alignment at this time except for the service request received from USDA. Partial relocation of the existing transmission line was also considered. The relocation of line will only entail section of the line that maybe in the way of construction or conflict with the proposed campus.

The last item discussed was the existing request for power by the USDA and two other projects (which were unknown at the time of our discussion). Tentatively, HELCO's proposal to provide permanent electrical service to USDA is to under build a 12KV distribution system beneath the existing transmission line. This involves approximately 2-3 pole spans. There is a possibility that the permanent service to USDA may be affected if HELCO is required to relocate all of its transmission line from the State property. A partial relocation may alleviate this problem.

We recommend that a meeting should be held with all affected parties to voice their concerns.

If you have any questions, please feel free to call me at (808) 969-0333.

Very truly yours,

Ralph Ratific, Jr.
Customer Designer
Customer Engineering Division

RRjr:fc
Request: H0015973

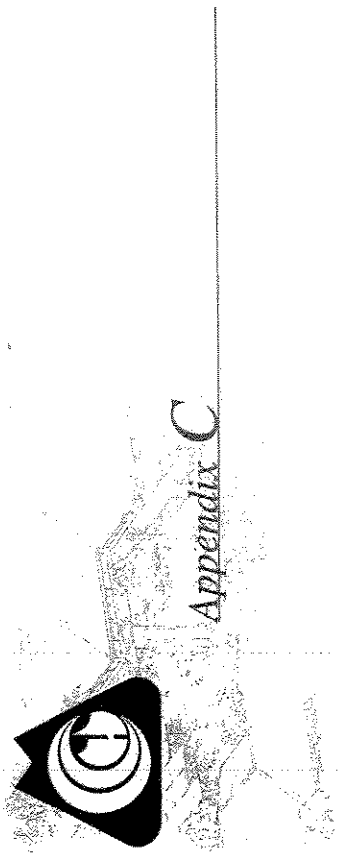
Appendix B

APPENDIX B: ADDITIONAL SPACE REQUIREMENTS FOR INTERIM MANONO CAMPUS

BLDG	PROGRAM	RM TYPE	# CR	CR (SF)	# LB	LB (SF)	# CC	CC (SF)	# AC	AC (SF)	# FS	FS (SF)	TOTAL #	TOTAL SF	NOTES*	HAWCC PROPOSED RELOCATION	ADD'L SPACE REQUIRED*
OCET																	
	OCET	Computer					1	1200					1	1,200			
	OCET	Testing Room							1	100			1	100			
	OCET	FS									1	200	1	200	ACT Manager's Office		
	OCET	FS									1	100	1	100	Reception		
	OCET	T-Lab			1	2000							1	2,000	Open Lab		
	OCET	CR	2	1800									2	1,800	SHARE WITH CS&ADV/TRNS		
	OCET	Computer						100					0	100	Computer File Server Room		
	OCET	Storage							1	150			1	150			
OCET TOTALS			*2*	*1800*	*1*	*2000*	*1*	*1300*	*2*	*250*	*2*	*300*	*8*	*5,650*		*NONE*	*5,650*
EARLY CHILDHOOD EDUCATION																	
	Early Childhood	Multi-purpose	2	1800									2	1,800			
	Early Childhood	CR	1	900									1	900			
	Early Childhood	Childcare Lab			2	2000							2	2,000			
	Early Childhood	Covered Patio							2	200			2	200			
	Early Childhood	N/A							4	400			4	400	Childrens Restroom		
	Early Childhood	Kitchen							2	300			2	300			
	Early Childhood	Laundry							1	150			1	150			
	Early Childhood	Workroom							1	500			1	500			
	Early Childhood	Storage							1	400			1	400			
	Early Childhood	FS									5	720	5	720	Faculty		
EARLY CHILDHOOD EDUCATION TOTALS			*3*	*2700*	*2*	*2000*	*0*	*0*	*11*	*1850*	*5*	*720*	*21*	*7,270*		*393*	*0*
EARLY CHILDHOOD EDUCATI Early Childhood		*N/A*							*1*	*4000*			*1*	*4,000*	*Playground*		
ADVISING/TRANSFER CENTER																	
	Advising/Transfer C	CR	1	900									1	900	SHARE WITH OCET		-900
	Advising/Transfer C	Storage							1	100			1	100	Equipment		
	Advising/Transfer C	FS									3	435	3	435	Faculty		
	Advising/Transfer C	FS									1	100	1	100	Clerical		
ADVISING/TRANSFER CENTER TOTALS			*1*	*900*	*0*	*0*	*0*	*0*	*1*	*100*	*4*	*535*	*6*	*1,535*		*NONE*	*635*
CAREER CENTER																	
	Career Center	Open Lab			1	1200							1	1,200			
	Career Center	Testing Room							1	600			1	600			
	Career Center	FS									2	285	2	285	Faculty		
	Career Center	FS									1	100	1	100	Clerical		
	Career Center	Storage							1	100			1	100			
CAREER CENTER TOTALS			*0*	*0*	*1*	*1200*	*0*	*0*	*2*	*700*	*3*	*385*	*6*	*2,380*		*NONE*	*2,288*
STUDENT LIFE CENTER																	
	Student Life	Study Area			1	1000							1	1,000			
	Student Life	Meeting Room			1	450							1	450	DELETE		-450
	Student Life	Activity Center			1	3000							1	3,000			
	Student Life	Storage			1	400							1	400			
	Student Life	FS									1	200	1	200	Student Gov't		
STUDENT LIFE CENTER TOTALS			*0*	*0*	*4*	*4850*	*0*	*0*	*0*	*0*	*1*	*200*	*5*	*5,050*		*NONE*	*4,600*

APPENDIX B: ADDITIONAL SPACE REQUIREMENTS FOR INTERIM MANONO CAMPUS

BLDG	PROGRAM	RM TYPE	# CR	CR (SF)	# LB	LB (SF)	# CC	CC (SF)	# AC	AC (SF)	# FS	FS (SF)	TOTAL #	TOTAL SF	NOTES*	HAWCC PROPOSED RELOCATION	ADD'L SPACE REQUIRED*
HAWAIIAN CULTURE																	
	Hawaiian Culture	CR	3	2700									3	2,700			
	Hawaiian Culture	Studio											0	0	Hula Studio	389A	
	Hawaiian Culture	Storage							1	240			1	240	Instrument Storage		
	Hawaiian Culture	Storage							1	340			1	240	Equipment Storage		
	Hawaiian Culture	FS									3	435	3	435	Faculty		
HAWAIIAN CULTURE TOTALS			*3*	*2700*	*0*	*0*	*0*	*0*	*2*	*580*	*3*	*435*	*6*	*3,615*		*NONE*	*3,615*
LEARNING CENTER																	
	Learning Center	Open Lab			1	3000							1	3,000	Open		
	Learning Center	Testing Room							1	1200			1	1,200	Testing Room		
	Learning Center	FS									4	575	4	575	Faculty		
	Learning Center	FS									1	100	1	100	Clerical		
	Learning Center	Storage							1	100			1	100			
LEARNING CENTER TOTALS			*0*	*0*	*1*	*3000*	*0*	*0*	*2*	*1300*	*5*	*675*	*5*	*4,975*		*387*	*0*
AGROFORESTRY																	
	Agroforestry	Computer					1	1200					1	1,200	C Lab		
	Agroforestry	CR	1	900									1	900			
	Agroforestry	T-Lab			1	1200							1	200	Wet lab w/shower&eyewash		
	Agroforestry	T-Lab			1	300							1	300	Lab prep room		
	Agroforestry	Storage							1	400			1	400			
	Agroforestry	FS									3	435	3	435	Faculty		
	Agroforestry	N/A							1	100			1	100	Restroom w/shower		
AGROFORESTRY TOTALS			*1*	*900*	*2*	*1500*	*1*	*1200*	*2*	*500*	*3*	*435*	*8*	*4,635*		*393*	*0*
COMPUTER SCIENCE																	
	Computer Science	Computer					2	3600					2	3,600	C Lab		
	Computer Science	CR	1	900									1	900	SHARE WITH OCET		-900
	Computer Science	Storage							1	150			1	150			
	Computer Science	FS									4	575	4	575	Faculty		
COMPUTER SCIENCE TOTALS			*1*	*900*	*0*	*0*	*3*	*3600*	*1*	*150*	*4*	*575*	*9*	*5,225*		*NONE*	*4,325*
TELECOM/MEDIA																	
	Telecom/Media	HITS							2	1800			2	1,800			
	Telecom/Media	Media Lab/Servers							1	1000			1	1,000			
	Telecom/Media	Production Control Room							1	300			1	300			
	Telecom/Media	Master Control Room							1	400			1	400			
	Telecom/Media	Computer					1	300					1	300	Computer Control Room		
	Telecom/Media	Computer					1	150					1	150	Computer File Server Room		
	Telecom/Media	Storage							1	150			1	150			
	Telecom/Media	FS									3	435	3	435	Staff		
TELECOM/MEDIA TOTALS			*0*	*0*	*0*	*0*	*2*	*450*	*6*	*3650*	*3*	*435*	*11*	*4,335*		*387*	*0*



APPENDIX B: ADDITIONAL SPACE REQUIREMENTS FOR INTERIM MANONO CAMPUS

BLDG	PROGRAM	RM TYPE	# CR	CR (SF)	# LB	LB (SF)	# CC	CC (SF)	# AC	AC (SF)	# FS	FS (SF)	TOTAL #	TOTAL SF	NOTES*	HAWCC PROPOSED RELOCATION	ADD'L SPACE REQUIRED*
INSTITUTIONAL SUPPORT																	
	Inst. Sup.	FS									1	200	1	200	Supervisor & Suppor		
	Inst. Sup.	Workroom			1	200							1	200			
	Inst. Sup.	N/A			1	800							1	800	Janitor Storage		
	Inst. Sup.	Storage			1	1000							1	1,000	Work Area/Supply Storage		
	Inst. Sup.	Storage			1	500							1	500	Equipment/Supply Storage		
	Inst. Sup.	Storage			1	1100							1	1,100	Ground Maint. Storage		
	Inst. Sup.	Locker Room			1	230							1	230	Men's		
	Inst. Sup.	Locker Room			1	230							1	230	Women's		
	Inst. Sup.	Storage			1	1000							1	1,000	Bulk Storage		
	Inst. Sup.	Storage			1	200							1	200	Flammable Storage		
	Inst. Sup.	Storage			1	80							1	80	Receiving/Storage		
	Inst. Sup.	Mailroom			1	100							1	100	Mail & Distribution		
	Inst. Sup.	Mailroom			1	200							1	200	Mail Receiving		
	Inst. Sup.	Switchboard			1	150							1	150			
	Inst. Sup.	FS									1	192	1	192	Security Office		
	Inst. Sup.	FS									1	120	1	120	Parking Office		
INSTITUTIONAL SUPPORT TOTALS			*0*	*0*	*13*	*5770*	*0*	*0*	*0*	*0*	*3*	*512*	*16*	*6,282*		*NONE*	*6,282*
NURSING RELOCATION			*3*	*1,236*	*7*	*2,716*	*6*	*0*	*7*	*1,009*	*12*	*1,615*	*28*	*6,576*		*389*	*0*
TOTALS			*14*	*11,236*	*31*	*23,036*	*7*	*6,550*	*36*	*9,989*	*48*	*6,825*	*136*	*57,636*			*27,395*

*SPECIFIED AND VERIFIED WITH HAWAI'I CC DEAN OF INSTRUCTION, OCTOBER 2001

Spaces will update as

Hawaii Modular Space, Inc.
91-282 Kalaeloa Boulevard Kapolei, HI 96707

808-682-5559 Phone
808-682-5199 Fax
1-800-845-8622 Neighboring Islands
Web: www.hawaiimodularspace.com
E-mail : info@hawaiimodularspace.com

Kimi Yuen
PBR Hawaii
Pacific Tower
1001 Bishop St. Ste 650
Honolulu, HI 96813
Phone: (808)521-5631
Fax: (808)523-1402

Sales Quotation

Project Name: Classroom
Please contact: Guy Murakami Ext. 14
Quote #: 000971 **Date** 5/21/2003 **Quote Expires in 30 days**

Part #	Description	Price	Qty	Extend
				$0.00
B-28X120	28X120 Custom Modular Classroom Pricing (1-4 Units)	$282,678.00	1	$282,678.00
	(5+Units)	$276,379.00	1	$276,379.00
	** Add $5590 for a standing seam metal roof Note: Estimate is FOB site installed which includes shipping charges to Hilo Trucking, Block and leveling,reconfigurations, and utility connections. Block and Level is based on a level and accessible site and soil bearing pressue of 2500 psf on non expansive soil. (Call for pricing on stairs,ramps,decks,and skirting). ALL UNITS ARE SUBJECT TO AVAILABILITY. Pricing is valid for 10 days. Guy Murakami is available to you at 808-682-5559 ext.14 Visit us at : www.hawaiimodularspace.com THIS IS AN ESTIMATE ONLY!			

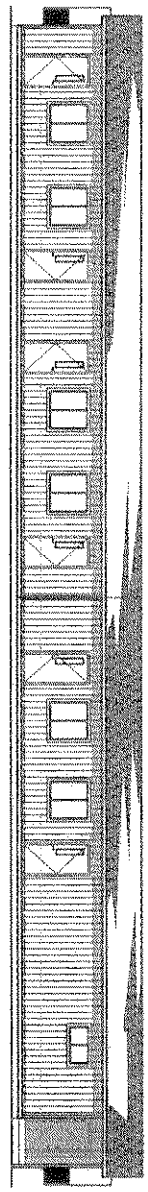
I accept the terms and conditions of this quotation.
Signed:_____
Name:_____ Title: _____
Pricing excludes any local, state or federal taxes (4.166%).
Major credit cards(MC, VISA and American Express) accepted.

DELIVERY INSTRUCTIONS:
Requested Delivery by: ____/____/____
DELIVERY BASED ON AVAILABILITY

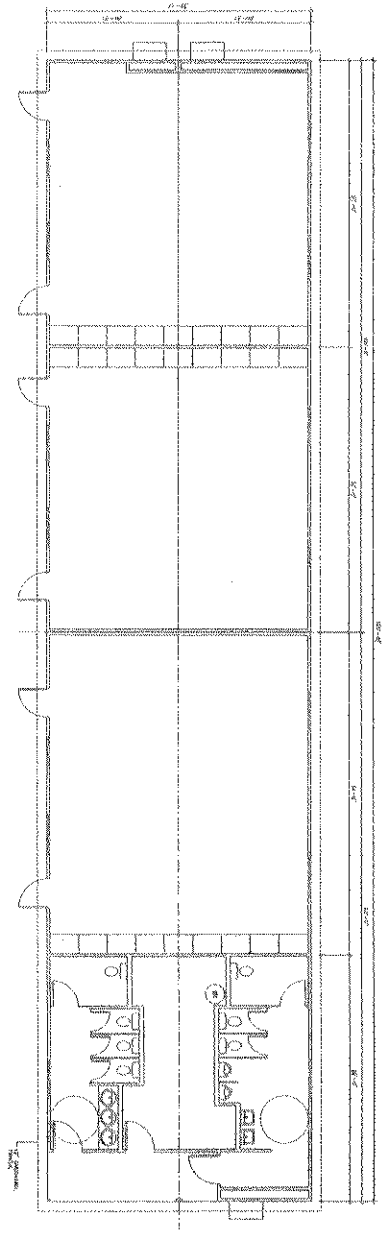
Also Available . . .
20' and 40' Ground Level
Storage Containers
For Sale or Lease
Call for Pricing!

"It Just Makes Sense"

FRONT ELEVATION



FLOOR PLAN



Blazer Industries, Inc.
SPEC SHEET

				DESIGN LOADS:	
Date:	16-May-03	Size:	28x120	Floor:	40
Customer:	**Hawaii Modular Space**	Description:	Classroom/HCRR	Wind:	80/D
Location:	Manono		Mobile	Roof:	20
Project:	**Hawaii Community College**	Insignias:	Third Party Inspection		

A. FRAME

Size/type:	14'x60' - (4) each - Transverse
Main rail:	12" Jr I-beam
Axles:	S-Brake 0-Idler with new 8:00x14.5 14 ply tires
NOTE:	**Double I-beam @ axle location**
Hitch:	Detachable

B. FLOOR

Joists:	2x8 @ 16" o/c
NOTE:	**2x8 pressure treated joists at recessed entry** **End rim @ recessed entry to be pressure treated 2x8 ripped to 6-3/4"** **Decking @ recessed entry to be pressure treated 5/8" plywood T&G - Exterior grade**
Rims:	Single 2x8 Microllam
Bottom board:	Class "A" woven poly. fabric
Insulation:	R11 fiberglass batt
Decking (1st):	5/8" Plywood T&G - Glued and nailed
Decking (2nd):	1/4" Ultraply

C. WALLS

Framing (EXT):	2x4 @ 16" o/c **Height = 97"**
Framing (INT):	2x4 @ 16" or @ 24" o/c
NOTE:	**Interior walls to bottom of rafters between Classrooms & between Classroom/Restroom**
Plenum wall:	Yes
Columns:	Wood end columns & Steel posts
Insul-Exterior:	R11 fiberglass batts
Insul-Interior:	R11 fiberglass sound attenuated batts at full height walls
Siding:	5/8" DF T1-11 with grooves 8" o/c - APA 303-18
Trims-Corners:	1x4 Clear Cedar
Mod lines:	1x4 Clear Cedar (At endwall and sidewall mod lines)
Windows:	1x4 Clear Cedar
Fascia:	1x6 Clear Cedar
Soffit:	5/16" perforated Hardipanel
Belt Rail:	1x6 Clear Cedar

D. ROOF

Framing:	2x8 Rafters @ 24" o/c **Roof pitch = 3/12**
Ceiling Joists:	2x6 @ 16" o/c @ recessed entry
Ridgebeam:	1-1/2"x24" Microllam
Insulation:	R19 Cellulose blow in
Sheathing:	7/16" OSB
Cover:	Pabco 30 year architectural shingles
Architectural:	12" roof overhang
Venting:	Continuous soffit and Trimline ridgevent
Building height:	13'-2" (Add trailer height)

E. DOORS

	EXT/INT	QTY	SIZE	TYPE	HINGES	LITE	FINISH	LOCK		CLOSER	
1	EXTERIOR	6	3'x6'8"	HM GALV	SS-BBH NRP	6"x34"	PAINT	SCHLAGE D70L		LCN 1461	
2	EXTERIOR	2	3'x6'8"	HM GALV	SS-BBH NRP		PAINT	SCHLAGE DEADBOLT	PUSH PULL	LCN 1461	
3	EXTERIOR	1	3'x6'8"	HM GALV	SS-BBH NRP		PAINT	SCHLAGE D53L		LCN 1461	

TAPE OVER EXTERIOR DOOR KEYHOLES FOR SHIPPING

EXTERIOR
HM = Insulated Steel Door w/Steel Jamb
GALV = Galvanized

F. WINDOWS

	EXT/INT	QTY	SIZE W x H	BRAND	HORIZONTAL SLIDER			GLAZING	FINISH		TINT
1	EXTERIOR	12	48"x48"	BEST BUILT	X			DUAL	WHITE VINYL		SOLAR BRONZE
2	EXTERIOR	2	48"x24"	BEST BUILT	X			DUAL	WHITE VINYL		OBSCURE

COVER WINDOWS WITH OSB FOR SHIPPING

G. INTERIOR FINISHES

Floors:	Restrooms:	Congoleum "Diamond" sheet vinyl
	All else:	1/8" VCT
Walls:	Restrooms:	5/8" Vinylwrap Sheetrock and Plastic Laminate wainscot per code
	All else:	5/8" Vinylwrap Sheetrock
	NOTE:	**Plastic Laminate wainscot to 4'-0" AFF around mop sink**
Base:	Restrooms:	6" rubber
	All else:	4" rubber
Trims:	Walls:	Vinylwrap battens on corners, above/below windows & at the top of the wainscot
	Windows:	VWCO wood surrounds and casing
	Doors:	VWCO wood interior doors, jambs & casing
Ceiling:	Entire building:	2'x4' T-bar grid and tiles **Height: 8'-0"**

H. SPECIALTIES

Toilet tissue:	Single roll (7) each
Mirror:	48"x36" (1) each and 60"x36" (1) each - Glass with no frame
Grab bar:	36" (2) each 42" (2) each
Partitions:	Metal

K. HVAC

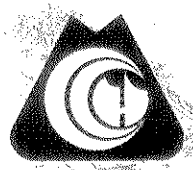
Air Conditioning:	Standard Wall Hung Bard: 3 ton 0 kw (2) each - 5 ton 0 kw (1) each
Ducting:	Overhead insulated flexduct - Rectangular fiberboard supply and return trunk lines @ 5 ton u
Diffuser:	24"x24" T-bar w/manual dampers
Thermostat:	Standard auto changeover - Bard 8403-043
Return air:	Ducted back to plenum wall & through RAG's in plenum wall down low
Outside air:	At machines
NOTES:	**Balancing on site by others** **Insulate all Wyes and Elbows** **Auto shut-offs (Duct smoke detector) provided on the 5 ton machine**

L. PLUMBING

HC Toilets:	(2) Handicap Height, Elongated Bowl, Pressure Assist	Gerber 21-318
Toilet:	(5) Standard Height, Elongated Bowl, Pressure Assist	Gerber 21-312
Urinal:	(1) Handicap, Siphon Jet, Top Spud	Gerber 27-750
Urinal:	(1) Standard, Siphon Jet, Top Spud	Gerber 27-750
Flush Valve:	(2) 1 Gallon Flush Cycle, Handicap Handle	Sloan 186-1
Lavatory:	(5) 19 x 17 Wall Hung, One Piece Wall Hanger	Gerber 12-314
Lav. Faucet:	(5) Ceramic Disc, Hot Limit Stop, ADA Lever Handle	A/S 2385.404
Mop Sink:	(1) 24 x 24 Molded Stone, Floor Mount, 2" Drain	Fiat MSB24x24
Mop Faucet:	(1) Ceramic Disc, Lever Handles, Top Brace, Integral V.B.	A/S 8344.112.004
Floor Drain:	(2) PVC Body, Polished Nickel Ring & Grate, Set in Concrete	Sioux Chief 841-3PNR
Trap Primer:	(2) Automatically Activated @ Pressue Drops	Mifab M2-500
Water Heater:	(1) 20 Gallon, 120 Volts, 2000 Watts, Energy Saver	B/W M-1-20U6SS
Vac Relief Valve:	(1) 1/2" Brass	
Sewer Lines:	PVC DWV Schedule 40 Plastic	
Water Lines:	Copper	

M. ELECTRICAL

Service:	120 / 240 Single phase - Stubbed down through floor to crawlspace
Panel:	(2) 200 amp
Material:	Conduit and MC Cable
Receptacles:	Duplex (18) 20 amp GFCI (4) 15 amp GFCI WP 15 amp (2)
Data/Comm Box:	Stub up and down (6) with 1/2" flex conduit
Wire For:	Duct smoke detector on 5 ton HVAC unit
Switches:	As required
Light:	Troffer 2'x4' - 3 tube (33) each
Tubes:	T-8, 32 watt
Ballast:	Single electronic
Porch light:	Wall mount - 70 watt High Pressure Sodium with vandal resistant Lexan cover on photo cell - (6) each
Porch light:	Soffit mount - 70 watt High Pressure Sodium with vandal resistant Lexan cover on photo cell - (2) each
Exhaust Fans:	(2) 270 CFM in Men's and (2) 180 CFM in Women's
FX Alarm:	Raceway only: Exterior Horn/Strobe (1) Interior Horn/Strobe (6) Pull Station (6)



Appendix D

APPENDIX D
DETAILED ORDER-OF-MAGNITUDE COST ESTIMATES FOR HAWAII CC LRDP UPDATE

Bldg #	Description	Quantity	Unit	Unit Cost	Construction Cost	Design Cost (10%)
MANONO INTERIM CAMPUS						
	SITEWORK					
	Earthwork				$191,600	$19,160
	Paving & Parking Lot				$370,250	$37,025
	Drainage				$180,000	$18,000
	Water				$133,750	$13,375
	Sewer				$137,250	$13,725
	Miscellaneous (erosion control, mobilization)				$65,550	$6,555
	Electrical				$345,000	$34,500
	Landscaping (installed)				$177,500	$17,750
	PORTABLE BUILDINGS[1]	9	Bldgs.	$282,678	$2,544,102	$254,410
	Walkways, other architect'l	11,340	SF	$50	$567,000	$56,700
				SUBTOTAL	*$4,712,002*	*$471,200*
				10% CONTINGENCY	*$471,200*	*$47,120*
				MANONO INTERIM CAMPUS TOTAL	**$5,183,202**	**$518,320**
KOMOHANA CAMPUS PHASE 1						
	OFFSITE COSTS					
	Water				$1,148,000	$114,800
	Sewer				$300,000	$30,000
	Roadways				$200,000	$20,000
	Electrical				$147,000	$14,700
	SITEWORK					
	Earthwork				$656,000	$65,600
	Paving & Parking Lot				$2,120,000	$212,000
	Site Improvements				$775,000	$77,500
	Drainage				$550,000	$55,000
	Water				$441,500	$44,150
	Sewer				$201,300	$20,130
	Miscellaneous (erosion control, mobilization)				$154,000	$15,400
	Electrical				$1,250,000	$125,000
	Landscaping & Hardscaping				$3,313,000	$331,300
	BUILDINGS					
9	Business Education	38,975	GSF	$220	$8,570,000	$857,000
24	Telecom./Media Center	40,302	GSF	$220	$8,870,000	$887,000
26	Campus Center	54,051	GSF	$220	$11,890,000	$1,189,000
22	Learning Resources Center	29,895	GSF	$220	$6,580,000	$658,000
				SUBTOTAL	*$47,165,800*	*$4,716,580*
				10% CONTINGENCY	*$4,716,580*	*$471,658*
				KOMOHANA CAMPUS PHASE 1 TOTAL	*$51,882,380*	*$5,188,238*

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APPENDIX D
DETAILED ORDER-OF-MAGNITUDE COST ESTIMATES
FOR HAWAII CC LRDP UPDATE

Bldg #	Description	Quantity	Unit	Unit Cost	Construction Cost	Design Cost (10%)
KOMOHANA CAMPUS PHASE 2						
	SITEWORK					
	Earthwork				$1,044,000	$104,400
	Paving & Parking Lot				$2,420,000	$242,000
	Site Improvements				$750,000	$75,000
	Drainage				$887,500	$88,750
	Water				$397,000	$39,700
	Sewer				$257,400	$25,740
	Miscellaneous (erosion control, mobilization)				$245,000	$24,500
	Electrical				$1,246,000	$124,600
	Landscaping & Hardscaping				$3,910,000	$391,000
	BUILDINGS					
	Learning Skills/Coop.					
23	Vocational Ed	30,420	$220	GSF	$6,690,000	$669,000
8	Math/Science	58,374	$225	GSF	$13,130,000	$1,313,000
25	Student Services	38,202	$220	GSF	$8,400,000	$840,000
27	Institutional Support	16,393	$220	GSF	$3,610,000	$361,000
29 & 30	OCET	49,923	$220	GSF	$10,980,000	$1,098,000
20	Food Services	30,689	$250	GSF	$10,170,000	$1,017,000
28	O&M Facility	14,823	$225	GSF	$3,340,000	$334,000
				SUBTOTAL	*$67,476,900*	*$6,747,690*
				10% CONTINGENCY	*$6,747,690*	*$674,769*
				KOMOHANA CAMPUS PHASE 2 TOTAL	*$74,224,590*	*$7,422,459*
KOMOHANA CAMPUS PHASE 3						
	SITEWORK					
	Earthwork				$600,000	$60,000
	Paving & Parking Lot				$880,000	$88,000
	Site Improvements				$425,000	$42,500
	Drainage				$550,000	$55,000
	Water				$28,000	$2,800
	Sewer				$61,600	$6,160
	Miscellaneous (erosion control, mobilization)				$140,000	$14,000
	Electrical				$805,000	$80,500
	Landscaping & Hardscaping				$2,670,000	$267,000
	BUILDINGS					
1 & 2	Social Sciences/ Humanities	27,501	$200	GSF	$5,500,000	$550,000
6 & 7	Language Arts	50,817	$220	GSF	$11,180,000	$1,118,000
4	Public Service	12,798	$200	GSF	$2,560,000	$256,000
10	Nursing	17,676	$220	GSF	$3,890,000	$389,000

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APPENDIX D
DETAILED ORDER-OF-MAGNITUDE COST ESTIMATES
FOR HAWAII CC LRDP UPDATE

Bldg #	Description	Quantity	Unit	Unit Cost	Construction Cost	Design Cost (10%)
3	Hawaiian Culture	9,173	$200	GSF	$1,830,000	$183,000
5	Early Childhood Ed./Children's Center	18,471	$200	GSF	$3,690,000	$369,000
				SUBTOTAL	*$34,809,600*	*$3,480,960*
				10% CONTINGENCY	*$3,480,960*	*$348,096*
				KOMOHANA CAMPUS PHASE 3 TOTAL	*$38,290,560*	*$3,829,056*
KOMOHANA CAMPUS PHASE 4						
	SITEWORK					
	Earthwork				$1,340,000	$134,000
	Paving & Parking Lot				$2,380,000	$238,000
	Site Improvements				$950,000	$95,000
	Drainage				$1,222,500	$122,250
	Water				$510,000	$51,000
	Sewer				$242,000	$24,200
	Miscellaneous (erosion control, mobilization)				$315,000	$31,500
	Electrical				$1,446,000	$144,600
	Landscaping & Hardscaping				$3,570,000	$357,000
	BUILDINGS					
11 & 12	T&I Buildings	30,869	$250	GSF	$7,720,000	$772,000
14	Agroforestry	28,125	$220	GSF	$6,190,000	$619,000
13	Agriculture	21,750	$220	GSF	$4,785,000	$478,500
16	Automotive Technology	45,273	$250	GSF	$11,320,000	$1,132,000
19	Electrical Maint./ Installation Technology	24,492	$250	GSF	$6,120,000	$612,000
15	Auto Body Repair & Painting	41,495	$250	GSF	$10,370,000	$1,037,000
18	Diesel Mechanics	38,232	$250	GSF	$9,560,000	$956,000
17	Carpentry	48,690	$250	GSF	$12,170,000	$1,217,000
21	Welding & Sheet Metal	18,672	$250	GSF	$4,670,000	$467,000
				SUBTOTAL	*$84,800,500*	*$8,488,050*
				10% CONTINGENCY	*$8,488,050*	*$848,805*
				KOMOHANA CAMPUS PHASE 4 TOTAL	*$93,368,550*	*$9,336,855*
				KOMOHANA CAMPUS TOTAL	**$257,766,680**	**$25,776,608**
				HAWAII CC LRDP UPDATE TOTAL	**$262,949,282**	**$26,294,928**

Notes:
1-Includes restrooms, A/C, interior and exterior basic finishes, basic cabinetry, all plumbing, electrical, HVAC systems per 5/2/03 quote from HMS (see Appendix C). Add $5590 for standing seam metal roof.
Price per building drops to $276,379 when more than 5 units ordered at a time.