LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII

DEPARTMENT OF HAWAIIAN HOME LANDS

P.O. BOX 1879

HONOLULU, HAWAII 96805

February 15, 2005

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

Dear Ms. Salmonson:

SUBJECT: Final Environmental Assessment
Waiehu Kou 4 Subdivision
TMK (2) 3-2-012: 001, Wailuku District, Maui

The Department of Hawaiian Home Lands has reviewed the comments received during the 30-day public comment period which began on September 8, 2004. We have determined that this project will not have significant environmental effects and have thus issued a Finding of No Significant Impact. Please publish this notice in the OEQC's next edition of The Environmental Notice.

We have enclosed a completed OEQC Publication Form, summary of the proposed action, and four copies of the Final Environmental Assessment.

Should you have any questions regarding this matter please contact Darrell Ing of our Land Development Division at 586-3844.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

Enc.

2005-03-08 FONSI
WAIEHU KOU 4 SUBDIVISION

Final

Environmental Assessment

PROPOSED WAIEHU KOU 4 SUBDIVISION

Prepared for:

WK3, LLC
and the Proposing Agency,
State of Hawaii, Department of
Hawaiian Home Lands

February 2005

MUNEKIYO & HIRAGA, INC.

Final
Environmental Assessment

PROPOSED WAIEHU KOU 4 SUBDIVISION

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MUNEKIYO & HIRAGA, INC.

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LIST OF FIGURES

Executive Summary

Project Name:	Proposed Waiehu Kou 4 Subdivision
Type of Document:	Final Environmental Assessment
Legal Authority:	Chapter 343, Hawaii Revised Statutes
Agency Determination:	FONSI
Applicable Environmental Assessment Review "Trigger":	Use of State and County Lands and State Funds
Location:	Island of Maui Waihee, Wailuku TMK (2)3-2-12:01
Proposing Agency:	State of Hawaii Department of Hawaiian Home Lands 1099 Alakea Street, Suite 2000 Honolulu, Hawaii 96805 Contact: Darrell Ing Phone: (808) 586-3923
Determination Agency:	State of Hawaii Department of Hawaiian Home Lands 1099 Alakea Street, Suite 2000 Honolulu, Hawaii 96805 Contact: Darrell Ing Phone: (808) 586-3923
Development Partner:	WK3, LLC 2005 East Main Street Wailuku, Hawaii 96793 Contact: Mei Lee Wong Phone: (808) 244-1500
Consultant:	Munekiyo & Hiraga, Inc. 305 High Street, Suite 104 Wailuku, Hawaii 96793 Contact: Matthew Slepin, Planner Phone: (808) 244-2015

Project Summary:

The Department of Hawaiian Home Lands proposes the development of an approximately 96-lot residential subdivision in Waihee, Maui, Hawaii. The 35.6-acre parcel will be subdivided to create lots averaging 7,500 square feet for the provision of house-lot packages to native Hawaiian beneficiaries. The proposed project is the fourth and final phase of the Waiehu Kou project.

Preface

WK3, LLC, in cooperation with the State of Hawaii, Department of Hawaiian Home Lands (DHHL), proposes the development of an approximately 96-lot single-family residential subdivision at Waihee, Maui, Hawaii (TMK 3-2-12: 01). The 35.6-acre parcel will be subdivided to create lots averaging 7,500 square feet for provision of house-lot packages for native Hawaiian beneficiaries.

Inasmuch as the proposed action involves the use of DHHL lands, this environmental assessment has been prepared pursuant to Chapter 343, Hawaii Revised Statutes. Accordingly, this report documents the proposed action and addresses potential impacts and mitigation measures anticipated in connection with project implementation.

Chapter I

Project Overview

I. PROJECT OVERVIEW

A. PROPERTY LOCATION AND LAND OWNERSHIP

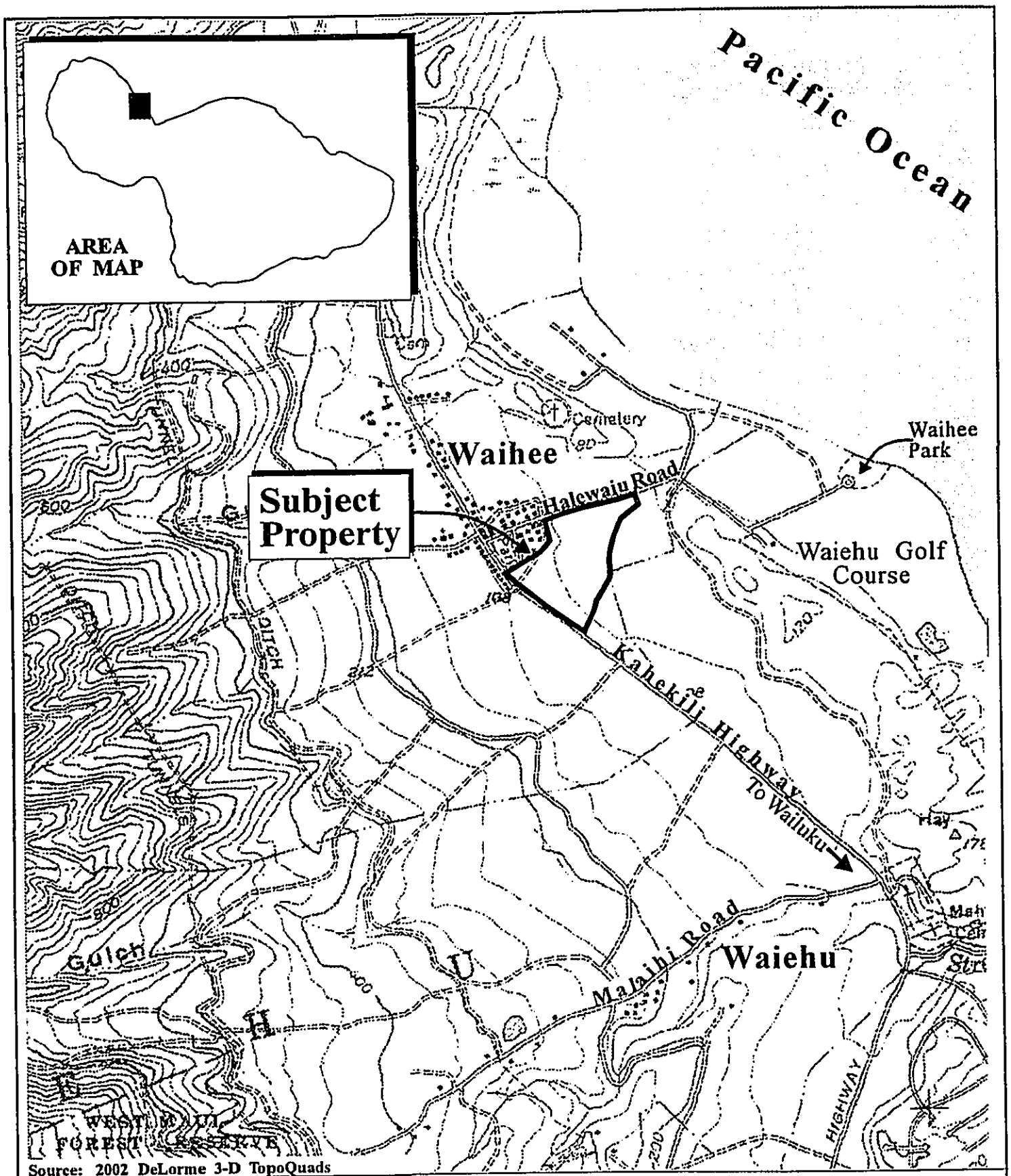
WK3, LLC, in cooperation with the State of Hawaii, Department of Hawaiian Home Lands (DHHL), proposes the development of an approximately 96-lot single-family residential subdivision at Waihee, Maui, Hawaii on lands identified as TMK 3-2-12:01. See Figure 1. The proposed subdivision, referred to as the Waiehu Kou Phase 4 Project, will be implemented in keeping with the mission of the DHHL *"to manage the Hawaiian Home Lands trust effectively and to develop and deliver land to native Hawaiians"*. The 35.6-acre parcel is located along Kahekili Highway, at the southern extent of the village of Waihee. The Waiehu Kou Phase 3 Project, a 115-lot single-family subdivision currently under construction, is located to the immediate south of the Phase 4 property.

The property is vacant and was formerly used for sugar cane and macadamia nut cultivation by Wailuku Agribusiness Company, Inc. In addition, a portion of the property along Kahekili Highway was formerly used as a plant nursery by Waihee Oceanfront, the previous owners of the property. See Figure 2. There is an abandoned 900 square foot quonset hut located on the property. The quonset hut was previously used for storage.

The DHHL is the property owner, with WK3, LLC serving as the project developer responsible for project design, subdivision and construction. As with previous phases of Waiehu Kou single-family developments, house-lot packages will be offered to qualified native Hawaiian beneficiaries.

B. PROJECT CONTEXT

The proposed Waiehu Kou Phase 4 Subdivision is the last of four (4) phases of residential subdivisions in the Waiehu area of Maui developed



Source: 2002 DeLorme 3-D TopoQuads

Figure 1 Proposed Waiehu Kou 4 Subdivision

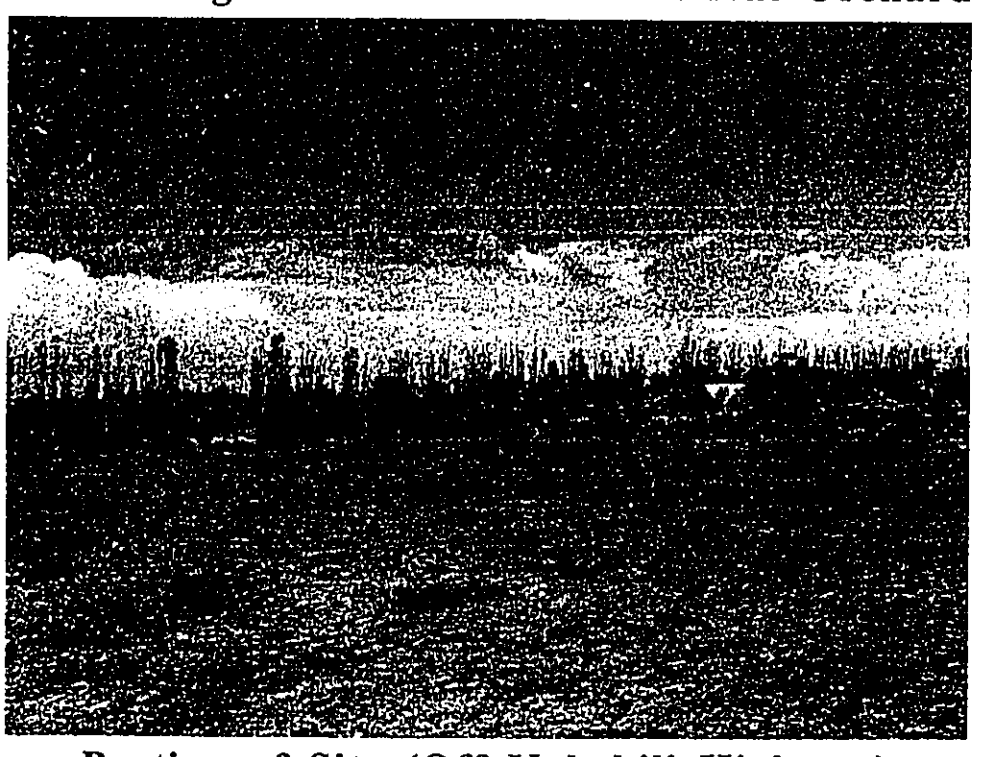
Regional Location Map

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

RECEIVED AS FOLLOWS

Portion of Site (Off Halewaiu Road)
Containing Remnant Macadamia Nut Orchard



Portion of Site (Off Kahekili Highway)
Formerly Used for Waihee Oceanfront Nursery

Figure 2 Proposed Waiehu Kou 4 Subdivision
Site Photographs

NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

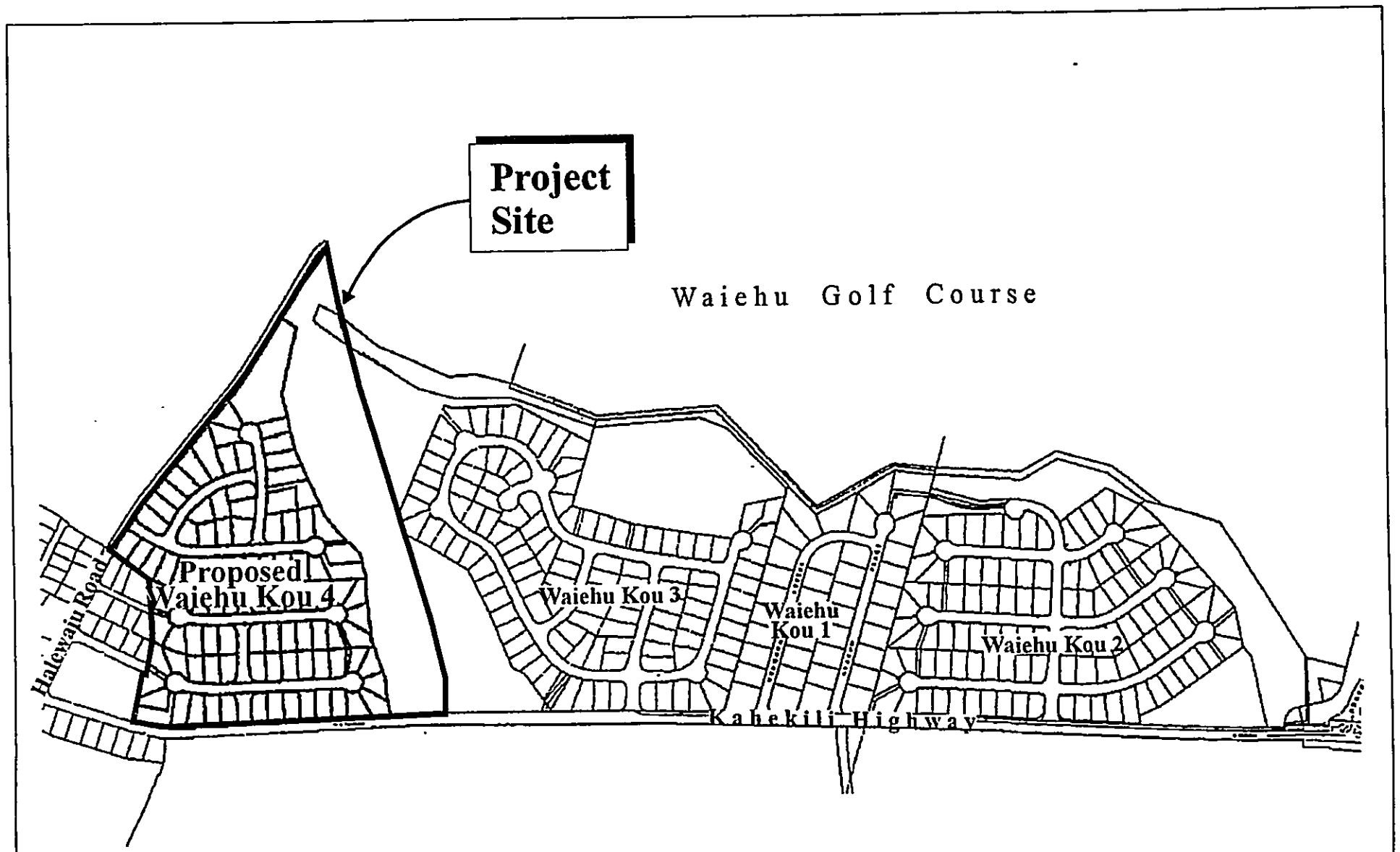
by the DHHL. In keeping with the mission of the DHHL to manage the Hawaiian Home Lands trust effectively and to develop and deliver land to native Hawaiians, the proposed project is proposed to meet the continuing homestead land needs of native Hawaiian beneficiaries. Waiehu Kou Phase 4 and the three (3) previous phases of Waiehu Kou subdivisions, all located along Kahekili Highway, between the Leisure Estates Subdivision and Waihee Village, provide a total of 359 single-family residential homestead lots, as summarized in Table 1 and depicted in Figure 3.

Table 1

SUMMARY OF WAIEHU KOU SUBDIVISIONS		
Waiehu Kou Project Phase	***Number of Units***	***Status***
Phase 1	39	Completed
Phase 2	109	Completed
Phase 3	115	Under Construction (Completion anticipated 06/05)
Phase 4	96	Proposed
Total Number of Units	**359**	

C. *PROPOSED IMPROVEMENTS*

The proposed action calls for the subdivision of the 35.6-acre parcel into approximately 96 single-family house lots ranging in size from 7,200 square feet to 8,000 square feet. See Figure 4. A total of 4 house models will be offered as part of the house-lot packages. Architectural features of the homes will be consistent with models offered in the previous phases of the Waiehu Kou subdivisions. Model types range from 2 bedroom, 1 bath homes to 4 bedroom, 2.5 bath homes with garage. See Figure 5, Figure 6, Figure 7, Figure 8, Figure 9, Figure 10, Figure 11 and Figure 12



Source: Austin, Tsutsumi & Associates, Inc.

Figure 3

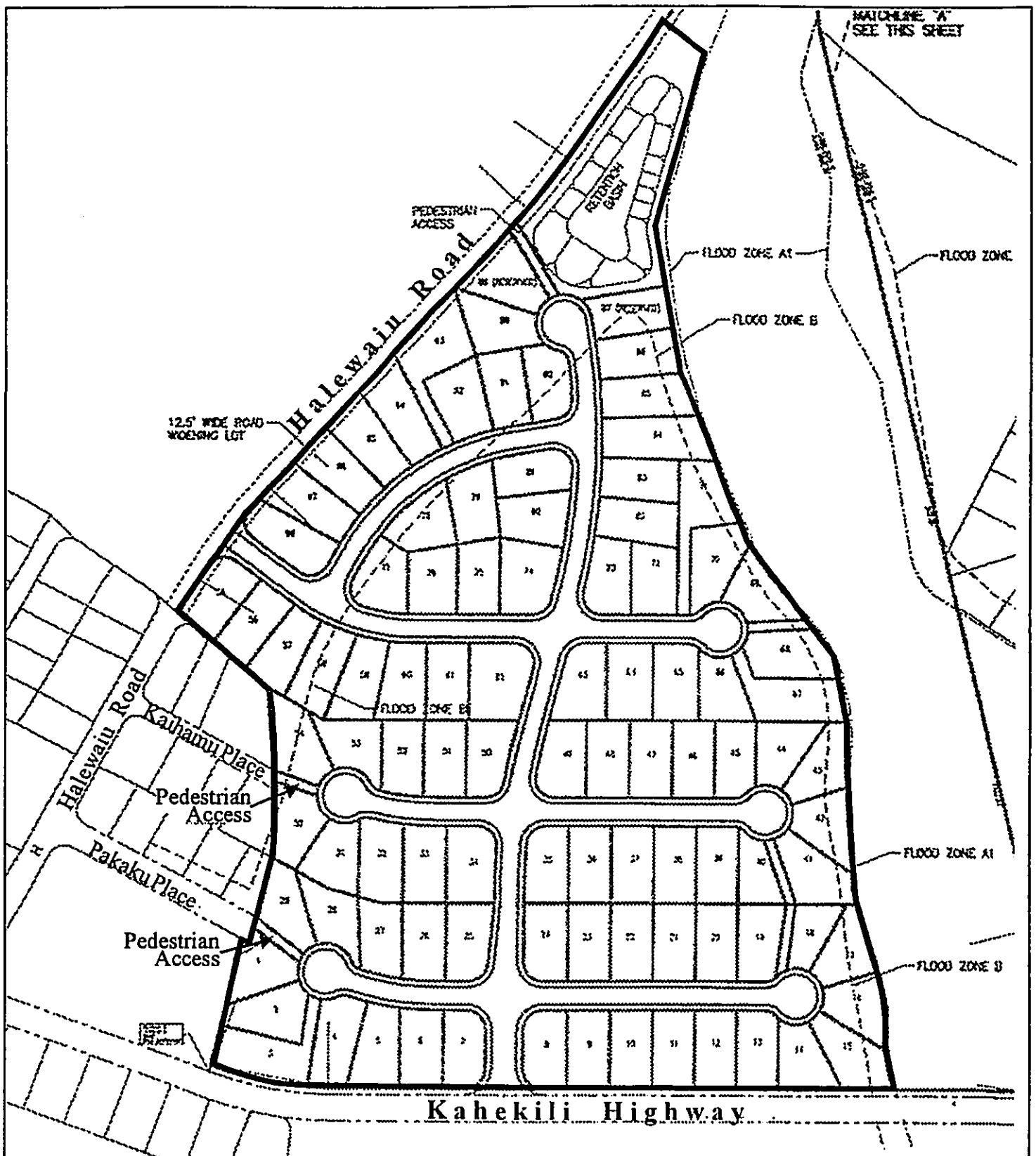
Proposed Waiehu Kou 4 Subdivision

Area Context Map

NOT FOR SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.



Source: Austin Tsutsumi & Associates, Inc.

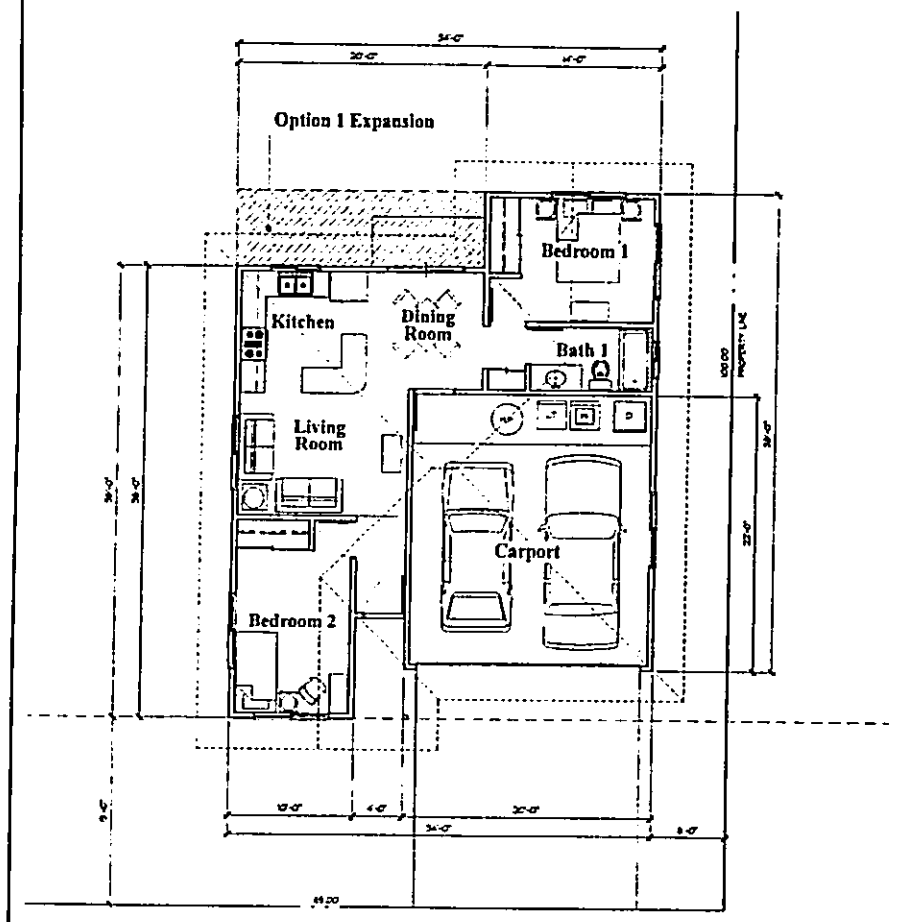
Figure 4 Proposed Waiehu Kou 4 Subdivision

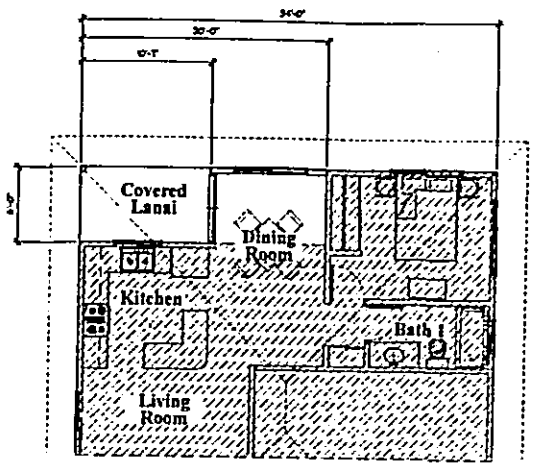
Preliminary Subdivision Layout

NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.





Option 1 Expansion

Source: GVA Architects, Inc.

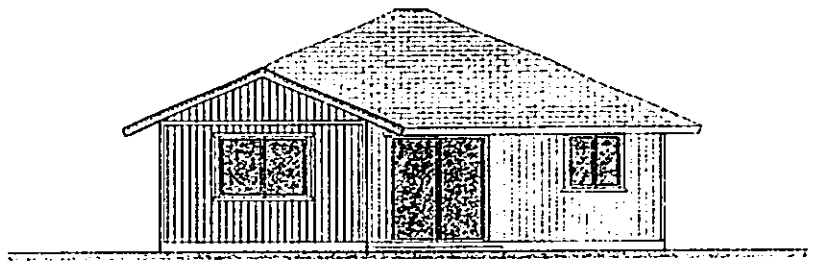
Figure 5

Proposed Waiehu Kou 4 Subdivision
Model "A" (Ulu) Floor Plan

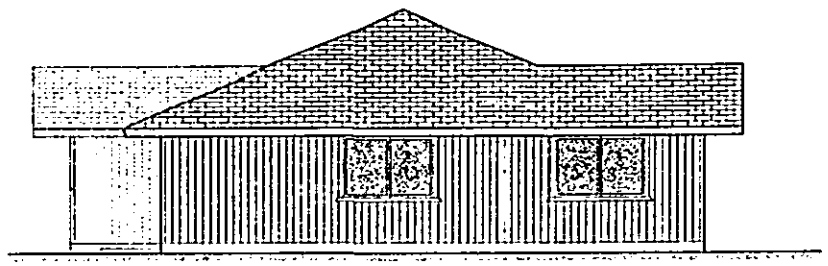
NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

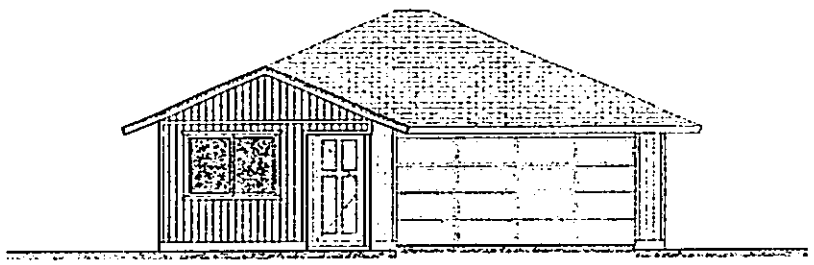
MUNEKIYO HIRAGA, INC.



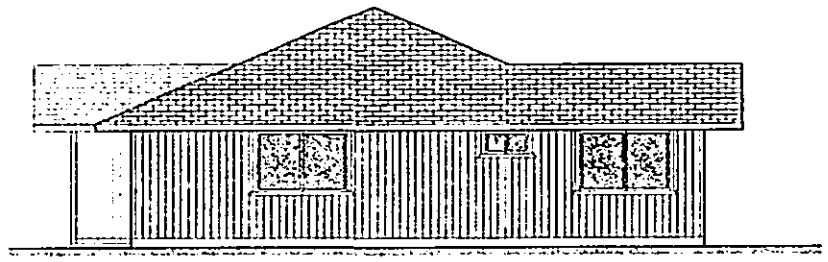
Rear Elevation



Left Elevation



Front Elevation



Right Elevation

Source: GYA Architects, Inc.

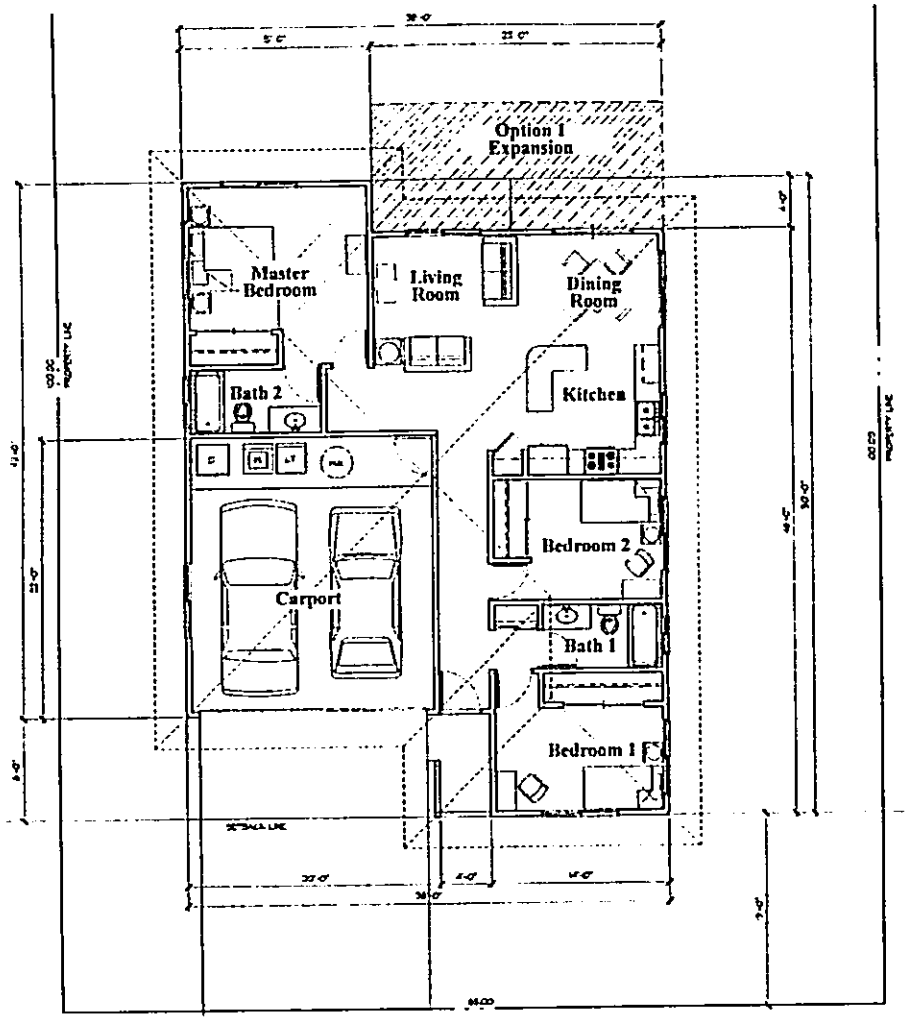
Figure 6

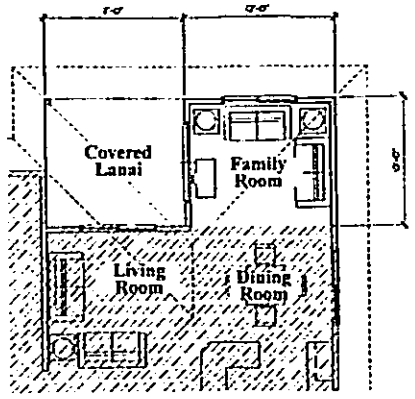
Proposed Waiehu Kou 4 Subdivision
Model "A" (Ulu) Elevations

NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO HIRAGA, INC.





Option 1 Expansion

Source: GVA Architects, Inc.

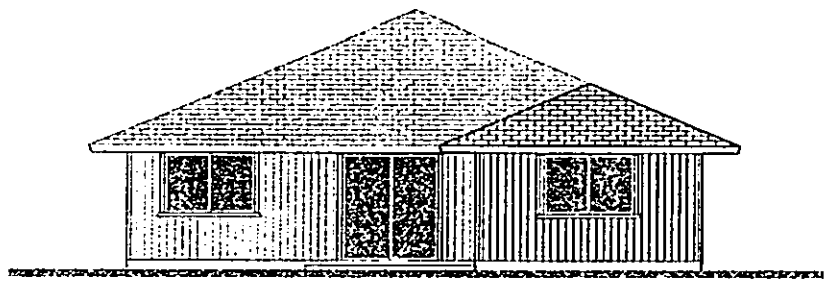
Figure 7

Proposed Waiehu Kou 4 Subdivision
Model "B" (Kamani) Floor Plan

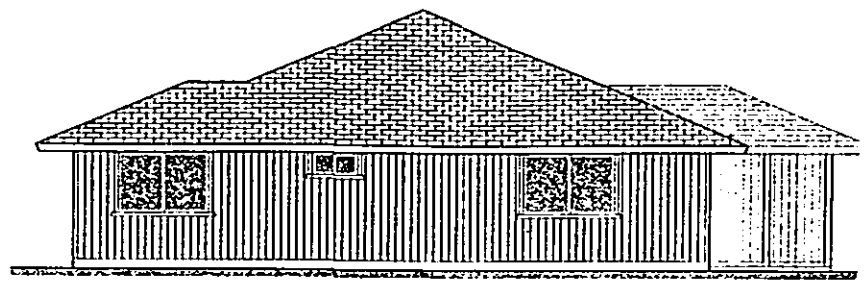
NOT TO SCALE

Prepared for: WKJ, LLC and Department of Hawaiian Home Lands

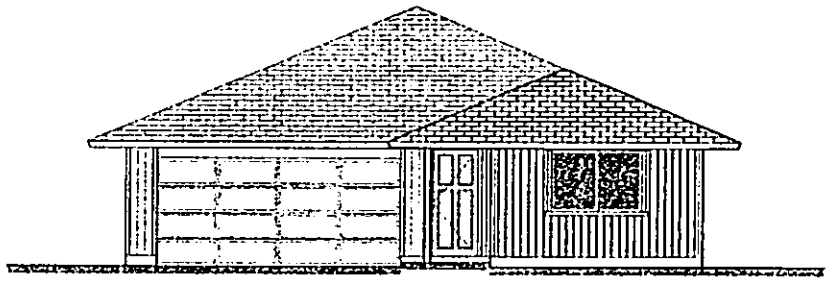
MUNEKIYO HIRAGA, INC.



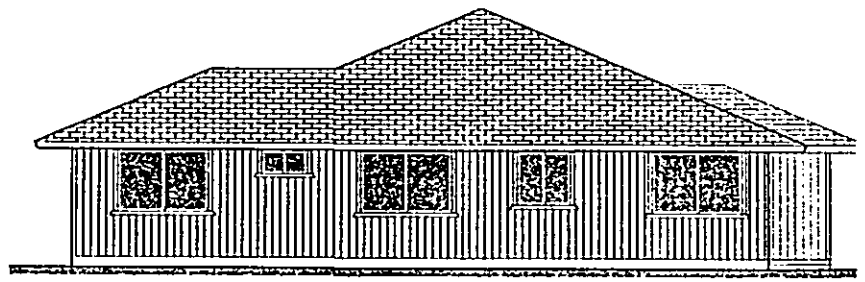
Rear Elevation



Left Elevation



Front Elevation



Right Elevation

Source: GYA Architects, Inc.

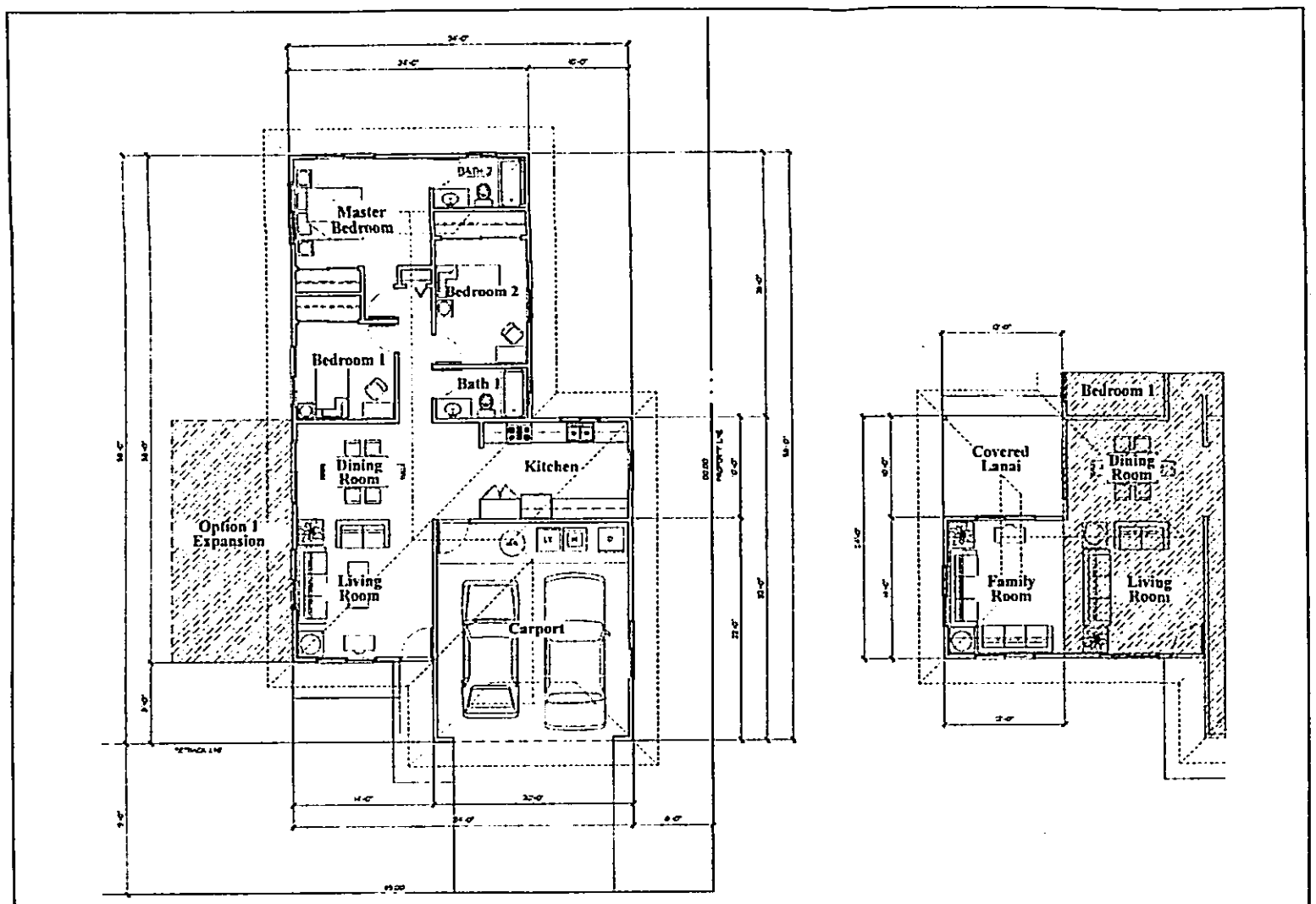
Figure 8

Proposed Waiehu Kou 4 Subdivision
Model "B" (Kamani) Elevations

NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.



Source: GVA Architects, Inc.

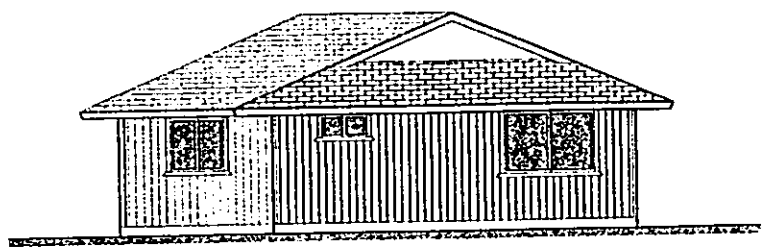
Figure 9

Proposed Waiehu Kou 4 Subdivision
Model "C" (Ohia) Floor Plan

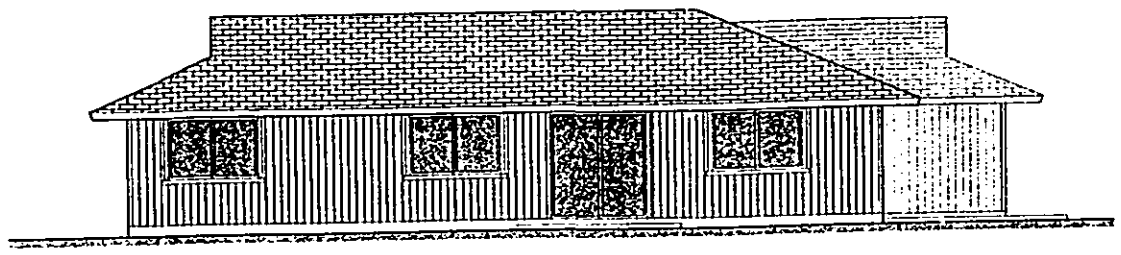
NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

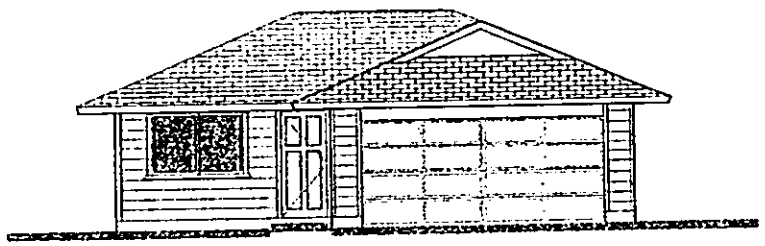
MUNEKIYO HIRAGA, INC.



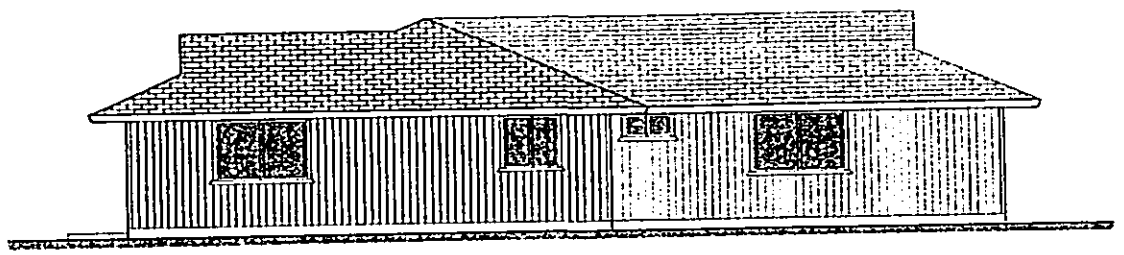
Rear Elevation



Left Elevation



Front Elevation



Right Elevation

Source: GVA Architects, Inc.

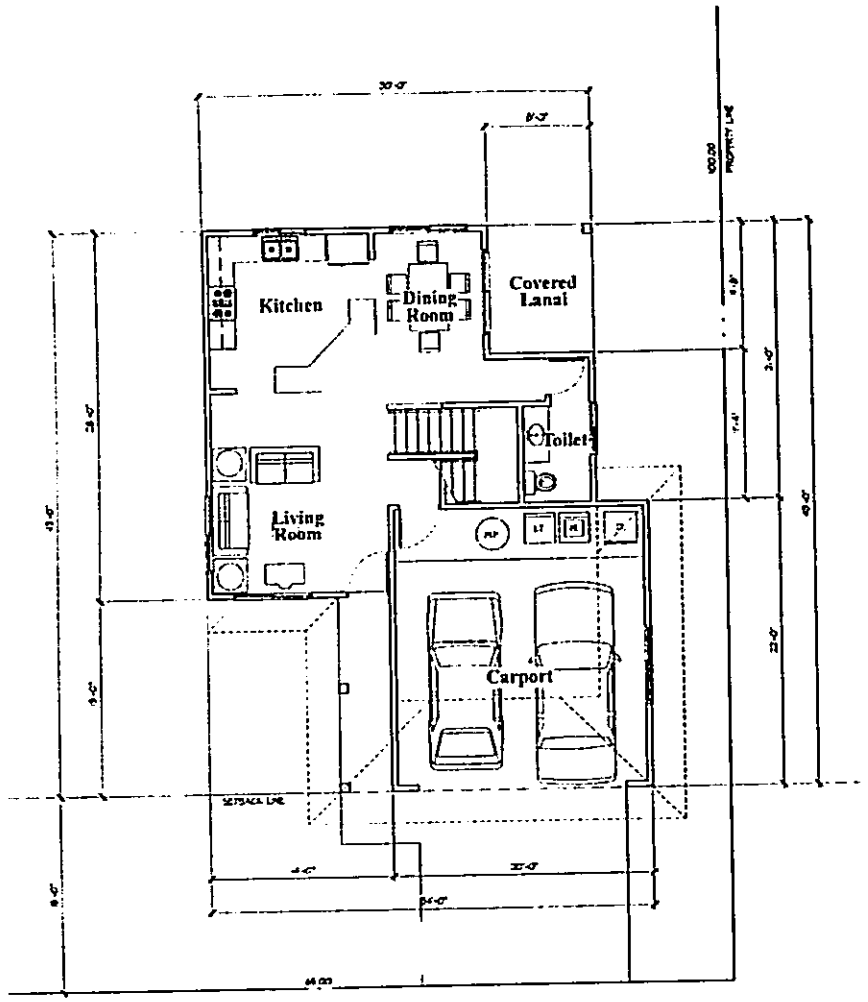
Figure 10

Proposed Waiehu Kou 4 Subdivision
Model "C" (Ohia) Elevations

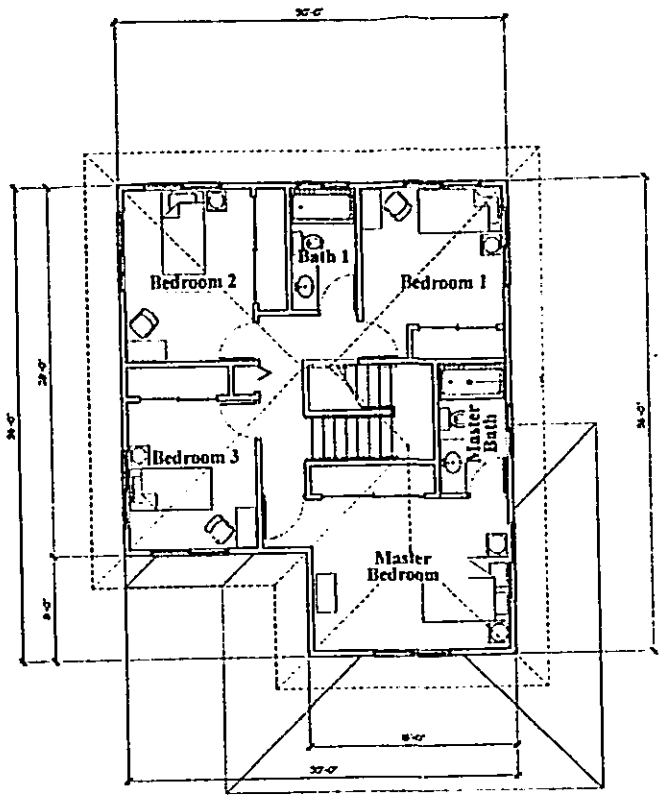
NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO HIRAGA, INC.



First Floor Plan



Second Floor Plan

Source: GYA Architects, Inc.

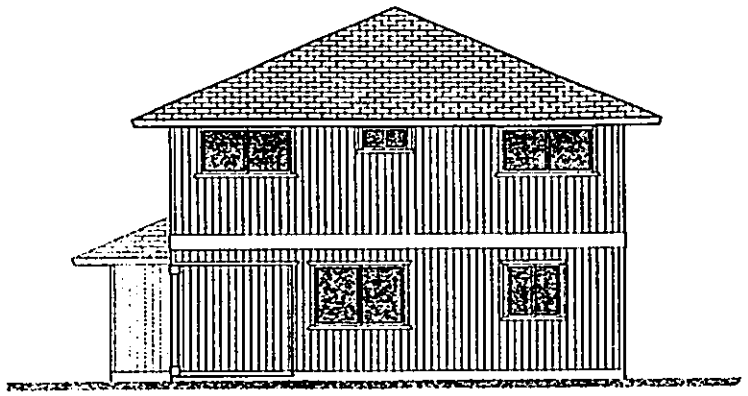
Figure 11

Proposed Waiehu Kou 4 Subdivision
Model "D" (Koa) Floor Plan

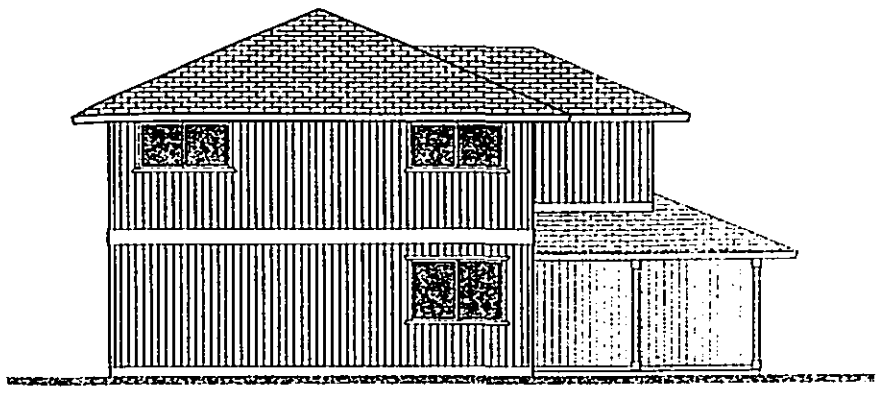
NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

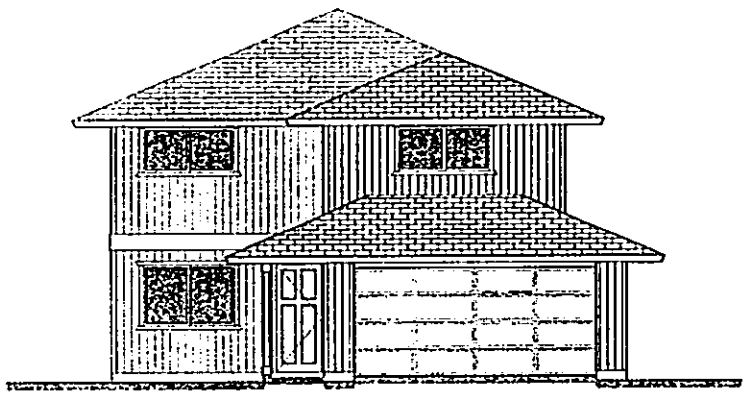
MUNEKIYO HIRAGA, INC.



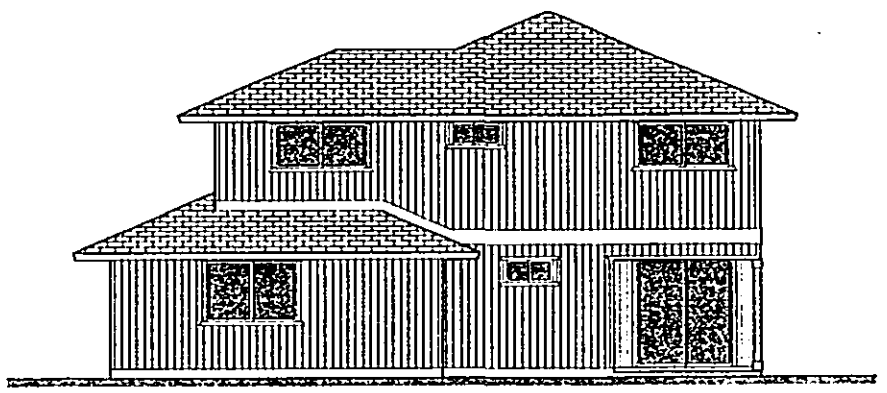
Rear Elevation



Left Elevation



Front Elevation



Right Elevation

Source: GYA Architects, Inc.

Figure 12

Proposed Waiehu Kou 4 Subdivision
Model "D" (Koa) Elevations

NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

for floor plans and elevations. Models range in size from 752 square feet to 1,470 square feet of living area. Cost of completed homes will range from $127,000.00 to $192,000.00. Each lot will be leased to qualified beneficiaries for a duration of 99 years at $1.00/year. No ohana units will be permitted in the subdivision.

Subdivision improvements will include grading and roadway improvements, as well as water, sewer and electrical/telephone/cable television systems installation. An onsite retention basin is proposed at the northeast extent of the property, along Halewaiu Road. Proposed offsite improvements include the installation of a new 8-inch diameter sewer force main, approximately 5,200 lineal feet in length, along Kahekili Highway from the entrance to Waiehu Kou Phase 2 to a sewer manhole at Waiehu Beach Road. A number of improvements along Kahekili Highway, such as the installation of curbs, gutters, and sidewalks along the property frontage and a left-turn storage lane to facilitate turning movements from Kahekili Highway into the subdivision will also be provided. Construction of subdivision improvements is anticipated to begin in October 2005, with a house construction to commence in June 2006. Occupancy of completed homes is estimated to occur between November 2006 and May 2007. The estimated cost of the subdivision improvements is $11.7 million.

D. CHAPTER 343, HAWAII REVISED STATUTES

Inasmuch as the proposed action is being developed on lands owned by the DHHL, as well as offsite work within State and County right-of-ways, this environmental assessment has been prepared in accordance with Chapter 343, Hawaii Revised Statutes.

It is noted that the DHHL will exercise its authority to meet its mission to deliver needed housing to qualified beneficiaries on a timely basis. As such, no local land use entitlement actions are required for project implementation. Exemptions being declared by Department of Hawaiian Home Lands from State and County regulations are included in Appendix "A".

Chapter II

Description of the Existing Environment

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

The subject property is located in Waihee, Maui, a rural residential village located approximately 2.5 miles to the north of Wailuku Town. Waihee, together with the project site, is surrounded by lands formerly cultivated in sugar and macadamia nuts by Wailuku Agribusiness Company, Inc. The County-managed Waihee Park is located to the immediate north of the property, while single-family residences comprise the remaining urbanized uses bordering the property at its northern extent. Lands across Kahekili Highway to the west are fallow agricultural lands, as are lands bordering the property to the east. The County's Waiehu Golf Course lies beyond, approximately 0.4 mile to the east. The DHHL's Waiehu Kou Phase 3 project (currently under construction) lies to the south of the project, as does the completed Waiehu Kou Phase I and Waiehu Kou Phase 2 subdivisions.

2. Climate

Like most areas of Hawaii, Maui's climate is relatively uniform year-round. Characteristic of Hawaii's climate, the project site experiences mild and uniform temperatures year round, moderate humidity and a relatively consistent northeasterly tradewind. Variation in climate on the island is largely left to local terrain.

Average temperatures at the project site range from lows in the 60's to highs in the 80's. August is historically the warmest month, while January and February are the coolest. Rainfall at the project site averages approximately 20 inches per year. Winds in the

Wailuku region are predominantly out of the north-northeast and northeast.

3. ***Topography and Soil Characteristics***

The subject property gently slopes in a west to east direction. Elevations at the property's western extent, along Kahekili Highway, range between 90 feet and 110 feet. Elevations at the property's eastern extent range between 35 feet and 90 feet. Having been formerly used for large scale agricultural production, the property can be characterized as generally level and even.

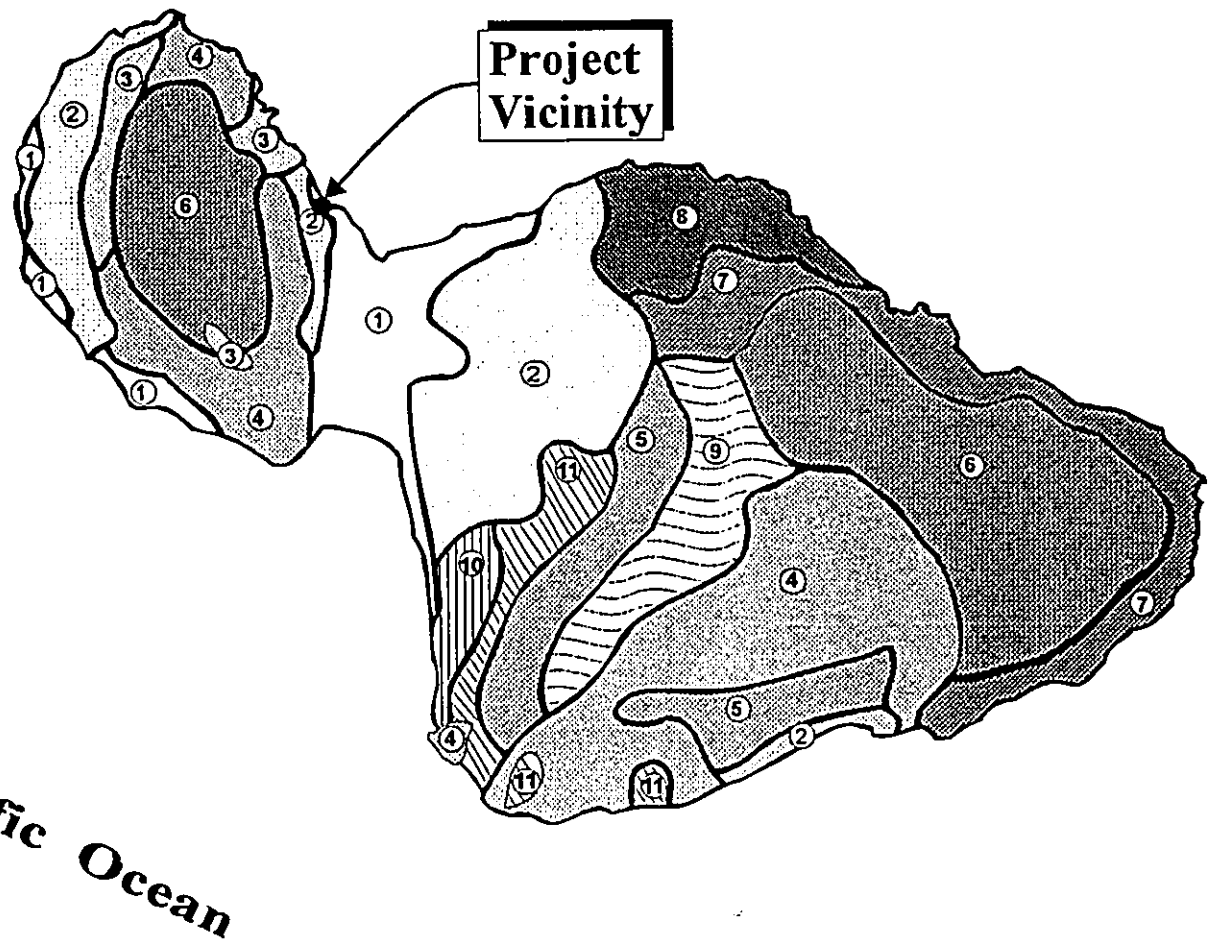
The project site is located within the Pulehu-Ewa-Jaucas association of soils, which is characterized as deep, nearly level to moderately sloping, and well drained that have a moderately fine to course texture. See Figure 13.

The northern portion of the project site lies on Iao clay, 3 to 7 percent slopes (IcB) soil. See Figure 14. This soil is found on smooth alluvial fans and valley fill. The surface layer consists of approximately 15 inches of brown clay, followed by 45 inches of very dark brown to dark brown subsoil. Both the surface layer and subsoil are neutral. IcB soil has moderately slow permeability and medium runoff with a slight erosion hazard. This soil is used primarily for sugar cane and homesites.

Iao silty clay, 3 to 7 percent slopes (IaA) underlies a portion of the project site as well. IaA soil has a similar profile to IcB soil with slow runoff and slight erosion hazard. Historically, this soil has been used for sugar cane fields.

LEGEND

- ① Pulehu-Ewa-Jaucas association
- ② Waiakoa-Keahua-Molokai association
- ③ Honolua-Olelo association
- ④ Rock land-Rough mountainous land association
- ⑤ Puu Pa-Kula-Pane association
- ⑥ Hydrandepts-Tropaquods association
- ⑦ Hana-Makaalae-Kailua association
- ⑧ Pauwela-Haiku association
- ⑨ Laumaia-Kaipoipoi-Olinda association
- ⑩ Keawakapu-Makena association
- ⑪ Kamaole-Oanapuka association



Map Source: USDA Soil Conservation Service

Figure 13 Proposed Waiehu Kou 4 Subdivision
Soil Association Map

NOT TO SCALE

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

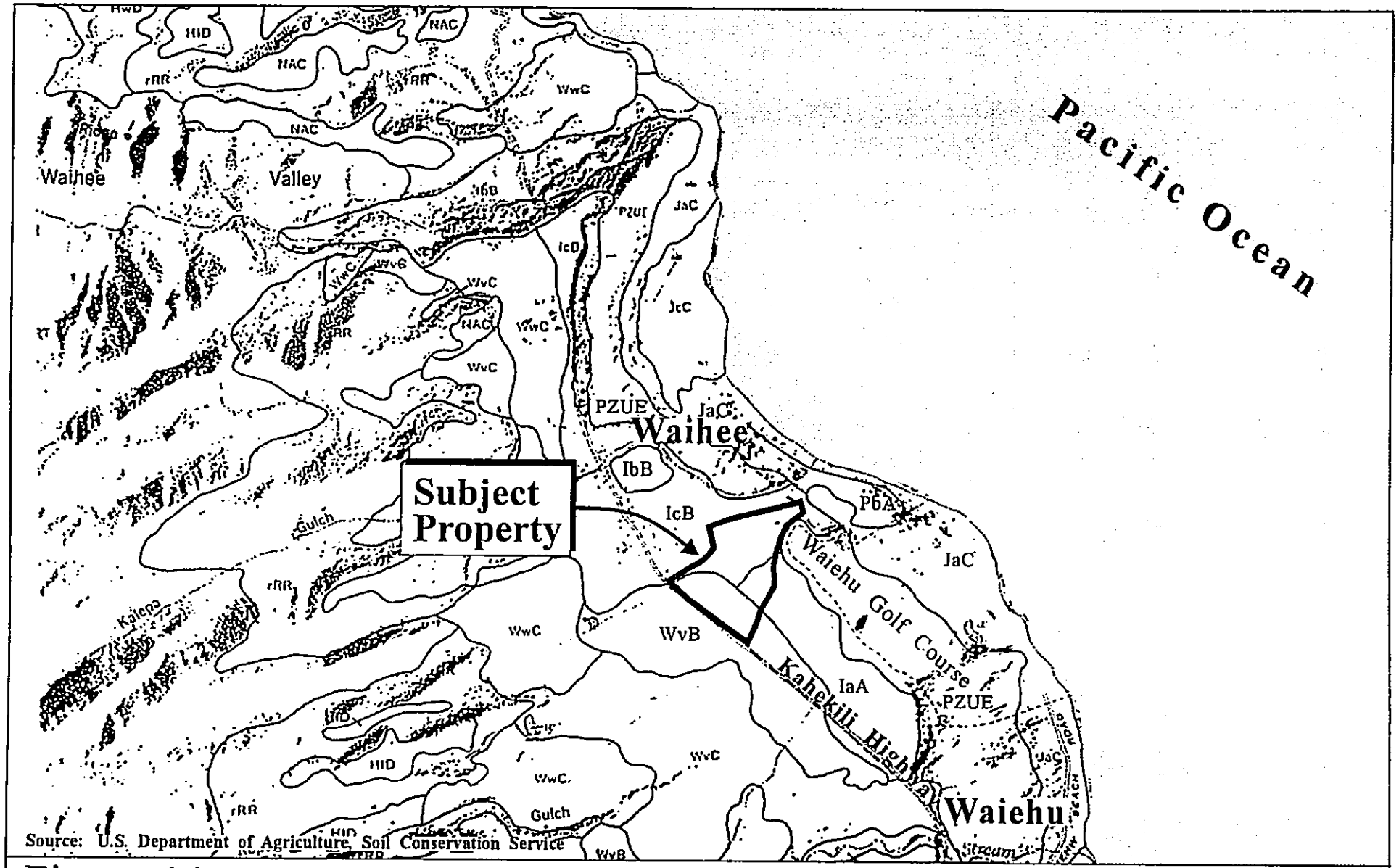


Figure 14

Proposed Waiehu Kou 4 Subdivision

Soil Classification Map

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

The western portion of the project site overlies Wailuku silty clay, 3 to 7 percent slopes (WvB) soil. In a representative profile, this soil has a 12-inch surface layer of dark reddish-brown silty clay and a 48-inch subsoil layer. WvB soil has slow runoff and a slight erosion hazard. This soil is primarily used for sugar cane and homesites (U.S. Department of Agriculture, Soil Conservation Service).

4. ***Agricultural Lands of Importance to the State of Hawaii (ALISH) and Land Study Bureau Assessment***

In 1977, the State Department of Agriculture developed a classification system to identify Agricultural Lands of Importance to the State of Hawaii (ALISH) based primarily, though not exclusively, on their soil characteristics. The three (3) classes of ALISH lands are "Prime", "Unique", and "Other", with the remaining lands termed "Unclassified". When utilized with modern farming methods, "prime" agricultural lands have a soil quality, growing season, and moisture supply needed to produce sustained crop yields economically; while "Unique" agricultural lands possess a combination of soil quality, growing season, and moisture supply to produce sustained high yields of a specific crop. "Other" lands include those that have not been rated as "Prime" or "Unique".

As reflected by the ALISH map for the Wailuku-Kahului region, the proposed project is comprised of lands that have been defined as "Prime" agricultural lands. See Figure 15.

The University of Hawaii, Land Study Bureau (LSB) developed the Overall Productivity rating, which classifies soils according to five (5) levels, with "A" representing the class of highest productivity

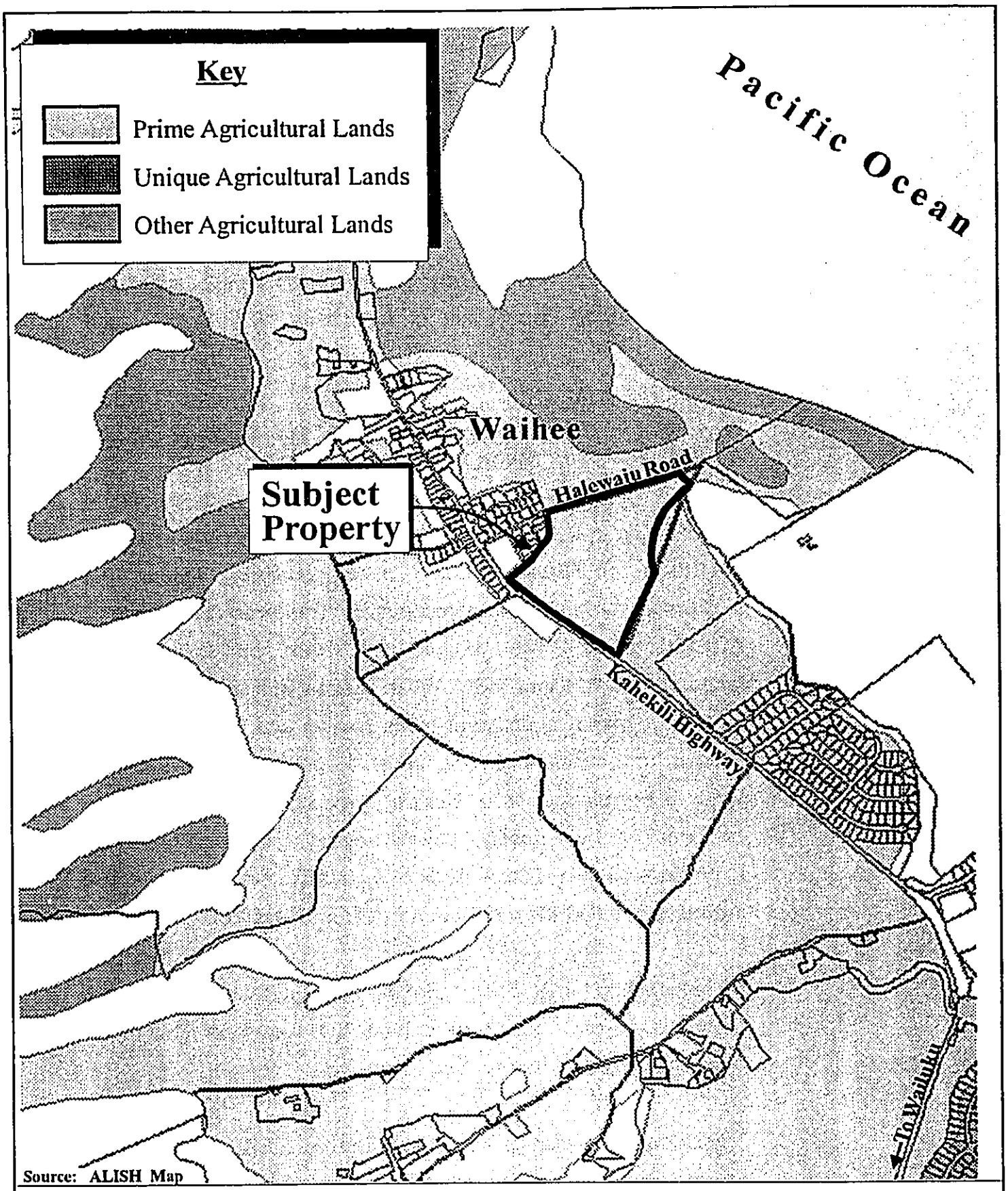


Figure 15 Proposed Waiehu Kou 4 Subdivision

Agricultural Lands of Importance to the State of Hawaii

0 500 1000 2000 Feet

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

and "E" representing the lowest. The letters are followed by numbers which further classify the soil types by conveying such information as texture, drainage, and stoniness.

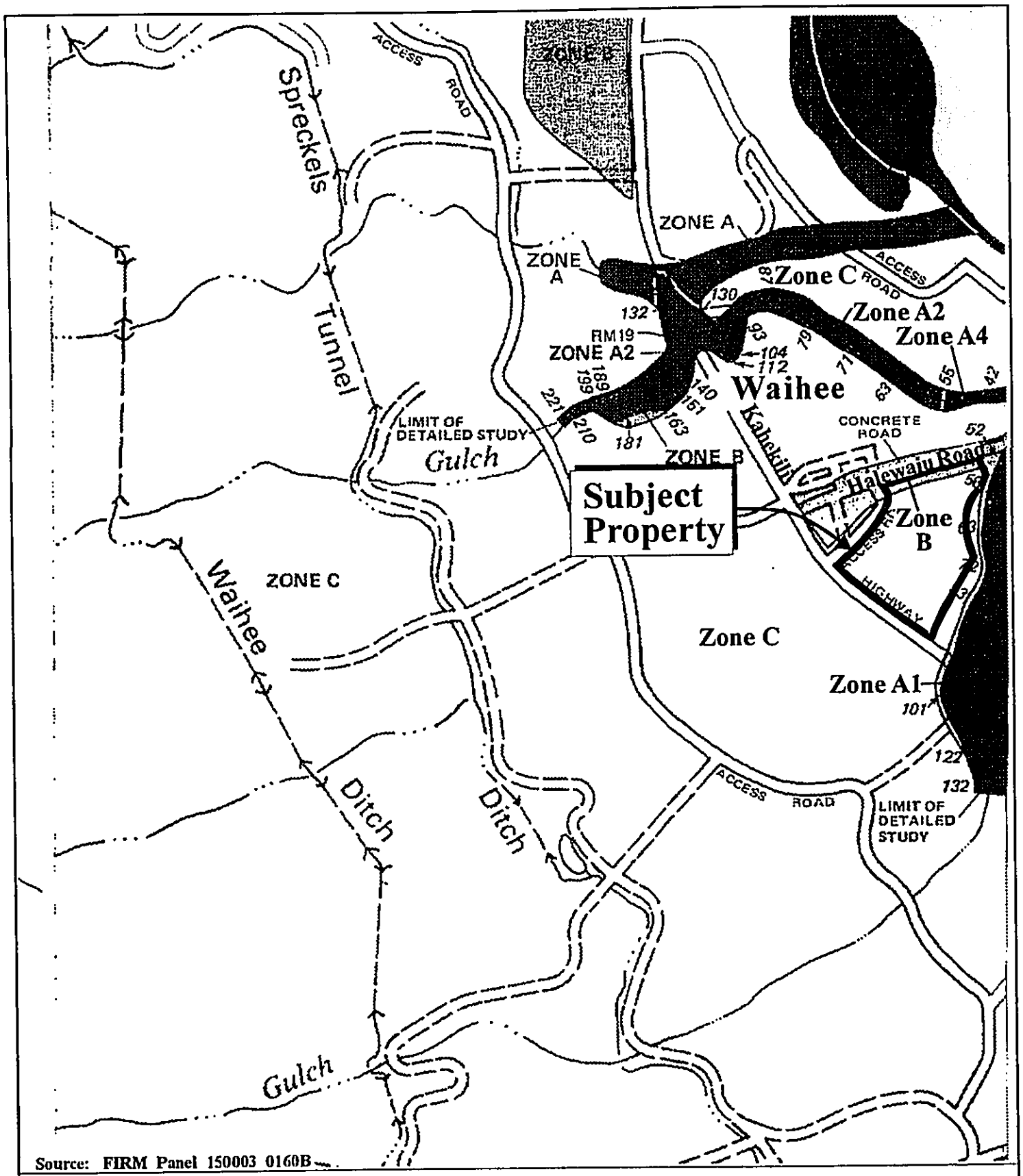
The proposed subdivision is located on land designated "B82i": irrigated, well-drained land with a non-stony, finely-textured soil. This land was formerly used for agricultural production, but is no longer.

5. ***Flood Characteristics***

The project site is located in the Flood Insurance Rate Map's (FIRM) Zone B and Zone C. See Figure 16. Zone B, covering the northern edge of the parcel, represents areas between the limits of 100-year floods and 500-year floods or certain areas subject to 100-year floods with average depths of less than one foot. The majority of the project site is located in Zone C, which designates areas of minimal flooding.

6. ***Streams and Wetlands***

There are no streams, wetlands or other water bodies within or in immediate proximity to the project site. The Waiehu Stream is located approximately one (1) mile to the south of the property, while the Waihee Stream is located about one (1) mile to the north. The Spreckels Ditch, a plantation irrigation facility, is located approximately 3,000 feet to the west or mauka of the subject property. The Pacific Ocean is located approximately one-half mile to the east of the property.



Source: FIRM Panel 150003 0160B

Figure 16 Proposed Waiehu Kou 4 Subdivision

Flood Insurance Rate Map

0 250 500 1000 Feet

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

7. ***Flora and Fauna***

As previously noted, the subject property was formerly used for sugar cane cultivation and more recently for macadamia nut orchard production. Remnant macadamia nut trees are scattered throughout the property, along with introduced weeds, grasses and shrubs. Vertical wili wili (used for wind break purposes) along with planted palm trees are also found at the portion of the site formerly used as a nursery by Waihee Oceanfront, the previous owners of the property. There are no known rare endangered or threatened species of plants at the project site.

Fauna and avifauna are also characteristic of urban areas. Fauna typically found in the vicinity include mongoose, rats, dogs and cats. Avifauna typically include mynas, several types of doves, and house sparrows. There are no rare, endangered or threatened species of fauna or avifauna found at the project site.

8. ***Archaeological Resources***

Archaeological studies were conducted as part of the 1993 proposal for the Waihee Oceanfront Golf Course project. As documented in Belt Collins & Associates' Environmental Assessment for Waihee Oceanfront Golf Course (March 1993), there were no sites located within the Waiehu Kou Phase 4 project limits (PHRI, Archaeological Mitigation Program Phase I-Mitigation Plan for Data Recovery, Interim Site Preservation, and Monitoring, November 1992).

9. ***Air Quality***

Air quality in the Wailuku-Kahului region is considered good as emissions from point sources, including Maui Electric Company's

(MECO) power plant and Hawaiian Commercial and Sugar Company's (HC&S) sugar mill as well as non-point sources such as automobile emissions, do not generate problematic concentrations of pollutants. The relatively high quality of air can also be attributed to the region's constant exposure to winds which quickly disperse concentrations of emissions. This rapid dispersion is evident during burning of sugar cane in fields located to the southeast of the Kahului residential core.

Air quality in the Waihee area is similarly considered good. In the past, with large scale agricultural activities conducted, air quality conditions were temporarily affected by agricultural-related operations. With current fallow conditions on surrounding lands in proximity to the subject property, air quality effects attributed to agricultural operations are not considered problematic.

10. Noise

There are no point sources of noise in the vicinity of the subject property. Traffic along Kahekili Highway is the predominant source of background noise in the vicinity of the proposed project. Construction noise attributed to subdivision and house construction at the adjacent Waiehu Kou Phase 3 project is considered temporary.

11. Visual Resources

The project site is located adjacent to the village of Waihee and the Waiehu Golf Course. This area of Central Maui can be characterized as a small town village with lands abutting the village formerly used for large scale agricultural production activities. The surrounding agricultural lands define the open space character of

this part of the island. In addition, the West Maui Mountains provide the visual backdrop for the village and surrounding lands. There are no significant views from the property to the ocean.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population

The population of the island of Maui has exhibited relatively strong growth over the last two (2) decades. The 2000 population was estimated at 117,644, an increase from the 1990 population of 91,361. The Year 2005 population is estimated at 127,950, while the population for the Year 2020 is projected to be 160,090 (SMS, 2002).

The estimated Year 2000 population for the Wailuku-Kahului Community Plan region was 41,503. The region's population shows an estimated increase to 44,883 in the Year 2005. By the Year 2020, population in the region is projected to increase to 55,424 (SMS, 2002).

2. Housing

According to the SMS Socio-Economic Forecast for Maui County, the island of Maui's housing supply in the year 2000 totaled 40,041 units of which 32 percent, or 12,852 were located in the Wailuku-Kahului Community Plan region. This area accounts for the largest percentage of housing units on the island. Demand for housing in this region in the year 2000 was approximately 13,000 units. Housing demand in the Wailuku-Kahului area is projected to grow to 16,826 units in the year 2010 while the expected number of households is estimated at 15,985 units. By the year 2020, the

housing demand is expected to reach 20,054 units compared to the projected household count of 19,051 units (SMS, 2002).

Based on a separate report compiled by the Hawaii Small Business Development Center Network, 4 percent of the approximately 13,000 housing units in Central Maui were vacant compared to a county-wide vacancy rate of 23 percent. Of the occupied housing units in Maui County, owners reside in 58 percent of the units. Owner occupancy for Central Maui was slightly higher at 61 percent (Hawaii Small Business Development Center).

Average sales price for homes in Central Maui were somewhat lower than the county-wide average. During the month of December 2004, the average sales price of a Central Maui single-family home was $452,478.00 compared to a county-wide average of $594,500.00 (Realtors Association of Maui, January 2005).

Household and Family Characteristics

The average household size in the Wailuku-Kahului area in the year 2000 was 3.17 compared to an island wide average of 2.90. These numbers are expected to decrease to an average of 3.03 and 2.80 respectively by the year 2010 and 2.91 and 2.72 respectively by the year 2020 (SMS, 2002).

The median household income in the Wailuku-Kahului area in the year 2000 was $43,261.00. A more detailed breakdown of household income based on the Housing and Urban Development (HUD) median county income in this region is provided in Table 2.

Table 2

HOUSEHOLD INCOME			
Number of Households Earning No More Than	***2000***	***2010***	***2020***
50% of HUD Median	4,212	5,143	6,054
80% of HUD Median	6,712	8,279	9,812
100% of HUD Median	8,682	10,734	12,742
120% of HUD Median	9,923	12,289	14,605
140% of HUD Median	10,816	13,416	15,961
Source: SMS Socio-Economic Forecast 2002.			

3. *Economy*

The Wailuku region is the island's center of governmental activities, as well as a focal point for professional and business services. Combined with neighboring Kahului, the region's economic character encompasses a broad range of commercial, service and governmental activities. In addition, the region is surrounded by significant agricultural acreages which are currently planted in sugar cane and pineapple. The vast expanse of agricultural land, managed by Hawaiian Commercial & Sugar (HC&S) and Maui Pineapple Company, is considered a key component of the local economy.

4. *Employment*

In the year 2000, the unemployment rates for Maui County and the island of Maui stood at 4.1 percent and 3.9 percent respectively; as of December 2004, Maui County and the island of Maui unemployment rates were 2.6 percent and 2.4 percent, respectively

(Labor and Occupational Information Hawaii, State Department of Labor and Industrial Relations, 2005). In the year 2000, there were a total of 32,851 civilian jobs in the Wailuku-Kahului area, representing 48 percent of the island-wide civilian jobs. Of those jobs, 25,688 were wage and salary positions while 7,163 were self-employed (SMS, 2002). In terms of job employment distribution, the Wailuku-Kahului region generally follows the county-wide trends for the labor force characteristics shown in Table 3.

Table 3

EMPLOYMENT DISTRIBUTION		
Occupational Category	***Maui County***	***Wailuku-Kahului***
Agriculture	3 percent	4 percent
Manufacturing	2 percent	5 percent
Construction	4 percent	1 percent
Transportation, Communication and Utilities	6 percent	10 percent
Trade	21 percent	22 percent
Banking and Finance	4 percent	4 percent
Hotel	14 percent	1 percent
Other Services	16 percent	18 percent
Government	9 percent	14 percent
Self-Employed	21 percent	22 percent
Source: SMS, 2002.		

C. PUBLIC SERVICES

1. Recreational Facilities

The Wailuku-Kahului region encompasses a full range of recreational opportunities, including shoreline and boating activities at the Kahului Harbor and adjoining beach parks, and individual and organized athletic activities offered at numerous County parks and the War Memorial Complex. In close proximity to the property are Wells Park, the Wailuku Community Center, Papohaku Park and Iao Valley State Park.

The County of Maui's Waihee Park is located to the immediate north of the property. Waihee Park encompasses approximately 1.9 acres and includes a ball field, paved play court, restroom facilities and picnic tables and barbecue area.

The County of Maui's Waiehu Golf Course is located about 0.4 mile to the east of the project site. This 18-hole golf course is a municipal course open to the public.

2. Police and Fire Protection

Police protection for the Wailuku-Kahului region is provided by the County Police Department headquartered on Mahalani Street, approximately 4.0 miles from the proposed project. The region is served by the Department's Central Maui patrol.

Fire prevention, suppression, and protection services for the Wailuku-Kahului region is provided by the County Department of Fire Control's Wailuku Station, located in Wailuku Town, approximately 4.0 miles from the project site.

3. ***Solid Waste***

Single-family residential solid waste collection service is provided by the County of Maui on a once-a-week basis. Residential solid waste collected by County crews are disposed at the County's 55-acre Central Maui Landfill, located 4.0 miles southeast of the Kahului Airport. In addition to County-collected refuse, the Central Maui Landfill accepts commercial waste from private collection companies.

4. ***Health Care***

Maui Memorial Medical Center, the only major medical facility on the island, services the Wailuku-Kahului region. Acute, general and emergency care services are provided by the 196-bed facility. In addition, numerous privately operated medical/dental clinics and offices are located in the area to serve the region's residents.

5. ***Schools***

The Wailuku-Kahului region is served by the State Department of Education's public school system as well as several privately operated schools accommodating elementary, intermediate and high school students. Department of Education facilities in the Kahului area include Lihikai and Kahului Schools (Grades K-5), Maui Waena Intermediate School (Grades 6-8), and Maui High School (Grades 9-12). Existing facilities in the Wailuku area include Wailuku Elementary School (Grades K-5), Iao Intermediate School (Grades 6-8), and Baldwin High School (Grades 9-12).

Waihee School (Grades K-5), located approximately 0.3 mile to the north of the project site, would serve the project's elementary school age children.

The Maui Community College, a branch of the University of Hawaii, serves as the Island's only community college.

D. INFRASTRUCTURE

1. Roadways

The Wailuku-Kahului region is served by a roadway network which includes arterial, collector and local roads. Major roadways include Kaahumanu Avenue, the principal linkage between Wailuku and Kahului, Lower Main/Kahului Beach Road, Hana Highway, and Puunene Avenue.

The project site is served by Kahekili Highway, a two-lane, two-way State facility with begins in Wailuku Town and extends north toward Kahakuloa. Beyond Waihee, this roadway becomes a substandard road which encircles the West Maui Mountains, ultimately connecting to the fully improved Honoapiilani Highway in the vicinity of Honolua. The speed limit along Kahekili Highway approaching the village of Waihee is 30 miles per hour. The speed limit decreases to 20 miles per hour through the village.

Bordering a portion of the project site along its northern boundary is Halewaiu Road. This local roadway extends from Kahekili Highway to provide access to the County's Waiehu Golf Course.

2. Wastewater

Domestic wastewater generated in the Wailuku-Kahului region is conveyed to the County's Wailuku-Kahului Wastewater Reclamation Facility located one-half mile south of Kahului Harbor. The design capacity of the facility is 7.9 million gallons per day (MGD); current use is approximately 5.5 MGD.

The project site is currently vacant and generates no wastewater flow. There is no existing sewer system within the subject parcel.

3. ***Water***

Domestic water for the Wailuku-Kahului region is provided by the Department of Water Supply's Central Maui System. The major source of water for this system is the Iao Aquifer, while additional flow is provided by the Waihee Aquifer. The sustainable yield of the Iao Aquifer is 20 MGD. Effective July 2003, the State of Hawaii, Commission on Water Resource Management designated the Iao Aquifer as a groundwater management area.

There is an existing County 12-inch and 8-inch waterline along Kahekili Highway. There is no existing water system within the subject parcel.

4. ***Drainage***

The existing onsite storm runoff rate from the Phase 4 project site is approximately 48 cubic feet per second (cfs). The majority of the onsite storm runoff sheet flows in an easterly (makai) direction and eventually discharges into a gulch located along the eastern boundary of the subject parcel. There are no active underground drainage systems on the project site. An existing culvert is located along Kahekili Highway and the southwest corner of Waiehu Kou residence lots, Phase 3 Subdivision, which is located adjacent to the subject property.

Offsite storm runoff generated from the adjacent (mauka) macadamia nut orchards is contained along the mauka side of Kahekili Highway and routes through a natural waterway. This

runoff is then intercepted by an existing culvert under Kahekili Highway and into the existing gulch located along the eastern boundary of the subject parcel. This existing 10-foot by 10-foot culvert, constructed in the early 1980's, is sized to accommodate a 50 year, 1 hour storm.

5. ***Electrical and Telephone Services***

Electrical, telephone and cable television services for the project would be provided by Maui Electric Company, Ltd., Sandwich Isles Communications, Inc. and Hawaiian Cablevision, respectively.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. PHYSICAL ENVIRONMENT

1. Surrounding Uses

The proposed single-family subdivision is located between the village of Waihee and single-family residential areas created by Waiehu Kou Phases 1, 2 and 3. As the final phase of DHHL's Waiehu Kou projects, the proposed action will establish a contiguous residential community with Waihee. The proposed action is considered compatible with the surrounding environs and is not anticipated to result in adverse land use impacts.

2. Flora and Fauna

There are no known significant habitats or rare, endangered or threatened species of flora and fauna located within the project site. The proposed project is therefore not anticipated to have an adverse impact upon these environmental features.

3. Air Quality and Noise

Air quality impacts attributed to the project will include dust generated by short-term construction-related activities. Dust control measures, such as regular watering and sprinkling, will be implemented, as necessary, to minimize wind-blown emissions.

Ambient noise conditions will also be temporarily impacted by construction activities. Construction equipment would be the dominant source of noise during the construction period. All construction activities will be limited to normal daylight working hours.

Once the project is completed, the project is not expected to impact air quality or noise parameters in the general vicinity.

4. ***Archaeological Resources***

As earlier noted, the project site was the subject of archaeological investigations in connection with the Waihee Oceanfront Golf Course project. Although there are no sites located within the Waiehu Kou Phase 4 project limits, the initial inventory survey done in 1989 revealed 88 sites, including four (4) that were previously identified (and listed on the State Inventory of Historic Places (SIHP)) within the entire 270-acre Waihee Oceanfront Golf Course property. Of the 88 sites, 31 were assessed as requiring no further archaeological data recovery, 28 were recommended for further data collection, 10 were recommended for further data collection and interpretative development, 8 were recommended for further data recovery and preservation as is, and 11 were provisionally recommended for preservation, pending the identification of human interments. The sites were both historic and pre-historic in nature, including agricultural and habitation features, industrial/farm structures, as well as cemeteries and burials.

In response to a condition by the State Land Use Commission (LUC) for a district boundary amendment, an additional inventory survey was performed at five (5) sites in 1992. The additional field work resulted in a revised significance assessment for one (1) site.

Additional subsurface testing of a sand dune and related areas was required by a separate condition by the LUC. The objective of the study was to determine the presence/absence and general distribution of human remains. Two (2) reports were submitted for

review, one (1) on burial findings and one (1) on non-burial findings.

Based on the findings of the inventory survey work, input from the Department of Land and Natural Resources' State Historic Preservation Division (SHPD) and in compliance with the LUC conditions, a detailed archaeological mitigation plan was prepared (PHRI, 1992).

As recommended by the SHPD, in its November 19, 2003 letter, archaeological monitoring will be undertaken for the proposed project during ground altering activities. See Chapter X. An archaeological monitoring plan will be prepared for review and approval by SHPD.

5. *Cultural Impact Considerations*

a. *Geopolitical Division*

Prior to Western contact in Hawaii, land was divided into units called *ahupua'a*. Ideally, each *ahupua'a* was self-sufficient, running from *mauka*, the mountain, to *makai*, the ocean (MacKenzie). These divisions served as both cultural and settlement systems as traditional Hawaiian life was tied intimately to the land. Hunting, gathering, cultivation, and habitation took place within three (3) zones which characterized the *ahupua'a*: the *Mauka* Zone, the Agricultural Zone, and the Coastal Zone. The *Mauka* Zone provided access to a variety of trees, plants, and herbs for various needs, customs and practices. Planting of yams, sweet potato, sugar cane, taro, and other foods took place in the Agricultural Zone where gradual slopes of land

allowed terraces to be constructed for more efficient irrigation. The Coastal Zone and low-lying areas were where most of the *kauhale*, group of houses, were found, as well as temples, fishing shrines, and fishponds (Minerbi).

Western contact brought changes to the Hawaiian land system along with the introduction of private ownership of land, a concept foreign to the native Hawaiians. A Board of Land Commissioners was established in 1845 to uphold or reject all private land claims of both foreigners and Hawaiians. The Commission adopted rules pertaining to the proof of claims, right of tenants, and commutation to the government in attempts to achieve the goal of totally partitioning undivided lands. All lands not claimed by February of 1848 were to be forfeited to the government (MacKenzie).

Following the enactment of these rules, the *Mahele* division of 1848 divided all lands of Hawaii between the king and chiefs. Two (2) years later the *Kuleana* act completed the *Mahele* process by authorizing the Land Commission to award fee simple titles to native tenants for their land. These *kuleana* parcels, also known as Land Commission Awards (LCA), were generally among the richest and most fertile in the islands and came from king, government, or chief's land. All claims and awards were numbered and recorded in the *Mahele* Book (MacKenzie). In addition, government lands were sold as "Royal Patent Grants" or "Grants" in order to meet the increasing costs of government. These grants differed from LCAs, as it was not

necessary for the recipients to obtain an award for their land from the Land Commission (Chinen).

Prior to the *Mahele*, the division called Na Wai Eha, meaning "The Four Streams," covered the four (4) great valleys of the West Maui Mountains which drained eastward into Central Maui. Waihee is the northern most of "The Four Streams," (Speakman).

b. ***Traditional and Customary Rights***

Hawaiian customs and practices are recognized as "Hawaiian usage" if it can be shown to have been exercised prior to November 25, 1892, which was when the Hawaiian Kingdom Legislature adopted British common law into the Hawaiian legal system (Minerbi). The traditional and customary rights of native Hawaiians can be broken down into access rights, gathering rights, burial rights, and religious rights.

Access

Native Hawaiians generally share the same access rights as the general public. However, they have the unique access rights to *kuleana* parcels and between *ahupua'a*. Access to *kuleana* parcels may involve access along ancient trails or expanded access not limited to any route. Additionally, the *Kuleana* Act granted unobstructed access within the *ahupua'a* to obtain items necessary to make the *kuleana* parcel productive. Access rights between *ahupua'a* involve access along ancient or well established trails (MacKenzie).

Gathering

In terms of gathering rights, the Hawaii Supreme Court has upheld gathering rights within an *ahupua'a* for firewood, house-timber, *aho* cord, thatch, and *ki*-leaf under three (3) conditions. The tenant must physically reside within the *ahupua'a*, the right to gather can only be exercised upon undeveloped lands within the *ahupua'a*, and the right must be exercised only for the purpose of practicing native Hawaiian customs and traditions (MacKenzie).

Burial

According to traditional Hawaiian burial beliefs, following death, the *'uhane*, or spirit, must remain near the *na iwi*, or bones. Burial sites are chosen by Hawaiians for symbolic purposes in places for safekeeping. Often bones were hidden in caves, cliffs, sand dunes, or deposited in the ocean. Today, federal and state laws protect both unmarked and marked burial sites. Island burial Councils assist the State Historic Preservation Division with inventory and identification of unmarked Hawaiian burial sites and determine the preservation or relocation of native Hawaiian burial sites (MacKenzie).

Religious

Hawaiian religion and beliefs were intimately tied to the land. While some practices and traditions were lost over the years, basic Hawaiian religious concepts remain. The terms *"aloha 'aina,"* love the land and *"malama 'aina,"* care for and protect the land, convey the unity of humans, nature, and the gods in Hawaiian philosophy (Minerbi). Furthermore,

Hawaiians honored and worshiped *aumakua*, deities, and *akua*, gods. There were numerous *akua* of farming, fishing, tapa making, dancing, sports, and any other activity of Hawaiian life. The concept of *mana* or sacred attachment to places, people, or things also remains as a significant aspect of Hawaiian religion (MacKenzie).

The First Amendment of the U.S. Constitution guarantees the freedom to practice religion. To the native Hawaiians, freedom to practice religion includes a freedom to practice a way of life which acknowledges the sacredness of places, animals, and natural forces (MacKenzie). However, Hawaii case law has established stringent constitutional tests regarding the infringement on a religious practice. In 1982, the Hawaii Supreme Court ruled that in order to find an act an unconstitutional infringement on religious practice, the following factors must be considered: (1) the legitimacy and sincerity of the practice, (2) whether or not the practice is burdened, (3) the extent of the impact on religious practices, and (4) whether or not the state had a compelling interest that justified the burden (Minerbi).

c. ***Waihee's Settlement and Historical Context***

It has been estimated that the lower coastal valleys of West Maui were settled early as an agriculturally oriented society, sustaining an expanding population into the late prehistoric period. Population growth led to the establishment of agricultural complexes in the upper valleys of West Maui. These population centers, located in either coastal or upland regions, were characterized by extensive terrace and

pondfield agriculture and dispersed residential structures on the outskirts of the agricultural complexes. Religious structures and fishponds in coastal areas were significant components of the population centers (Titchenal).

In ancient times, Waihee was the largest continuous area of wet taro cultivation in Hawaii. Terraces ran almost continuously in a belt between the sand dunes and the present irrigation ditch. The area was almost completely taken over by sugar cane, with the exception of *kuleana* parcels still held by Hawaiians who have preserved the old terraces. In the late 1970s, the northern and southern slopes and the mouth of Waihee Valley were well cultivated with about a third of the old patches being used as commercial plantations (Speakman).

A more site-specific settlement description for the Waihee coastal area is documented by PHRI. In particular, PHRI states:

> The coastal Waihee area has been described by Kirch (1985:87,142) as an area with high potential for early Hawaiian settlement. This potential is due to the fact that most of the earliest identified habitation sites in Hawaii are in windward environments along the coast where sand dunes and surface water are available.

Historical context is further clarified by PHRI, as follows:

> Given the favorable environment, relatively dense population, and apparent large number (and high rank) of chiefly residents in pre-

contact Waihee, Donham has suggested that social hierarchies here would be under a higher degree of stress than would be expected in area of less concentrated political power and population density. Indeed, two Waihee legends involving local personae deal with uprisings. One of these, which culminated in the Battle of Kalaeiliili, involved chiefs from beyond the community, even though it was apparently started over one soldiers objections to the chief's food rationing procedure.

d. ***<u>Cultural Impact</u>***

In order to obtain personal perspectives on cultural issues surrounding the subject property, as well as to gather first-hand knowledge of the vicinity, interviews were sought with individuals having intimate knowledge of the area. Synopses of relevant interviews appear below.

<u>Clayton Suzuki</u>

Mr. Clayton Suzuki was interviewed on December 3, 2003. Mr. Suzuki moved to Maui in 1975 and has worked for Wailuku Sugar Company, now Wailuku Agribusiness Co., Inc. since 1978, currently employed by them as a Land Manager. In his recollection, Wailuku Sugar had farmed the area with sugar cane and then, in 1983, turned to macadamia nut cultivation. In 1989, the property was part of a larger parcel sold to the Japanese company Sokan for a proposed golf course and luxury home project. Wailuku Agribusiness maintains ownership of some lands—approximately 113 acres—near to the subject property, which are currently vacant and not leased to anyone.

In the near vicinity of the property is the old Waihee Mill site. This site has been abandoned for some time and Mr. Suzuki believes that there are no remnants of the mill remaining. The Maui Coastal Land Trust is acquiring the Waihee Dairy parcel for open space preservation. This, it should be noted, is a separate parcel and not part of the subject

property. Mr. Suzuki also references the first three (3) phases of the Waiehu Kou development, immediately adjacent to the subject property.

Mr. Suzuki knows of no *kuleana* water rights tied to the property nor of any use of the property for traditional cultural practices or beach access.

Several interviews were also carried out as part of the Environmental Assessment process for the previous phase of the Waiehu Kou development. Both synopsis and a transcript can be found in the Waiehu Kou Phase 3 Final Environmental Assessment prepared by Townscape, Inc., March 2002. What follows is a summary of those interviews as the two (2) subject areas are immediately adjacent and information drawn from the Waiehu Kou Phase 3 project is considered pertinent to the Phase 4 project.

David La'i

Mr. David La'i and his sister, Diannah La'i Goo, were interviewed (Final Environmental Assessment, Waiehu Kou Phase 3, Appendix "C", p.43-5; 61-74). Mr. La'i, who was 75 years old at the time of the interview, is from the Waiehu area and had worked there continuously for the Wailuku Sugar Company, except for service in the Army, until he retired at the age of 62. The area had been transformed into agricultural plantation for as long as he or his sister could recall, covered first in sugar cane and, later, in macadamia nut trees. They could think of no traditional cultural practices occurring in the vicinity of the project.

Rene Sylva

The second informant was Mr. Rene Sylva of Paia, who was in his early 70's at the time of interview (Final Environmental Assessment, Waiehu Kou Phase 3, Appendix "C", pages 45-47). Mr. Sylva has a particular familiarity with the Waihee

Dunes area, in the vicinity of the project site. He had no knowledge of any traditional cultural practitioners using the area as a place to gather native Hawaiian plants nor of any rare or endangered native plants there. As far as he was aware, sugar cane had been planted there for over 100 years.

Based on the historical review of the Waiehu area, the results of the archaeological inventory survey, and informant interviews, the proposed project is not anticipated to adversely affect traditional cultural beliefs, practices, resources, or gatherings rights. Should any archaeological features or human burials be inadvertently located during construction activities, appropriate stop-work, coordination, and mitigation measures will be carried out with a qualified archaeologist to insure that proper protocol is followed, including required consultation with the State Historic Preservation Division and the Maui/Lanai islands Burial Council.

6. *Visual Resources*

The project site is located on lands formerly used for sugar cane, macadamia nut cultivation and nursery use. The parcel is contiguous to single-family residential uses and will create a visual character compatible and consistent with adjacent uses. The subject property is not part of a significant scenic corridor and will not affect views to and along shoreline and mountain areas.

B. *SOCIO-ECONOMIC ENVIRONMENT*

1. *Population and Local Economy*

On a short-term basis, the proposed project will support construction and construction-related employment.

From a long-term perspective, the proposed house lots will meet the demand for housing by qualified beneficiaries and will advance the mission of the DHHL. In so doing, the proposed action is anticipated to improve the overall housing inventory for island residents by allowing existing housing (occupied by qualified beneficiaries) to be utilized by others.

2. ***Police, Fire, and Medical Services***

Medical, police and fire protection services are not expected to be adversely impacted by the proposed project. The proposed project will not extend existing service area limits for emergency services.

3. ***School Facilities***

The State Department of Education (DOE) has indicated that the proposed project could add approximately 26 students to Waihe'e Elementary School, 13 students to Iao Intermediate School, and 14 students to Baldwin High School. The DHHL will coordinate with the DOE to address school facility assessment requirements attributed to the proposed subdivision.

4. ***Solid Waste***

On a short-term basis, demolition and construction activities will require the disposal of construction-related solid waste. The project developer will work with the contractor to minimize the amount of solid waste generated during the implementation of the project. As appropriate, a private construction waste disposal facility will be utilized by the contractor for the disposal of construction waste materials.

Single-family residential collection services provided by the County of Maui will be used for the completed subdivision. Adverse impacts to landfill capacity conditions are not anticipated as a result of the proposed action.

C. INFRASTRUCTURE

1. Roadways

A traffic impact analysis report was prepared for the proposed project by Austin, Tsutsumi, & Associates in November 2003. See Appendix "B".

The analysis uses the existing AM and PM peak hour traffic volumes and operating traffic conditions in the intersections surrounding the proposed project. These are assessed using Level of Service (LOS) ratings as determined by the Highway Capacity Manual—HCM 2000 methodology. This is a qualitative measurement "A" through "F" in which LOS A represents ideal or free-flowing traffic operating conditions and LOS F represents unacceptable or potentially congested traffic operating conditions. To assess traffic conditions and impacts, manual turning count surveys were performed at the following intersections:

Kahekili Highway/Waiehu Beach Road: Kahekili Highway is a two-lane, two-way, State highway that fronts the project site and provides the main access to it and is the only link between Wailuku Town and the communities of Waihee and Kahakuloa to the north. Waiehu Beach Road, to the south of the project site, is a two-lane, two-way State collector that intersects Kahekili Highway at its northern terminus.

Kahekili Highway/Kohomua Street: Kohomua Street is a two-lane, two-way residential road that provides access to the Waiehu Kou Phase I subdivision.

Kahekili Highway/Akakuu Street: Akakuu Street is a two-lane, two-way residential road that also provides access to the Waiehu Kou Phase I subdivision, south of Kohomua Street.

Kahekili Highway/Halewaiu Road: Halewaiu Road is a two-lane, two-way County road to the north of the project site that serves existing residences and provides access to Waihee Beach Park and Waiehu Municipal Golf Course.

The weekday peak traffic hours at these intersections were determined to be 6:45 AM to 7:45 AM (AM peak) and 4:15 PM to 5:15 PM (PM peak). The analysis of existing traffic conditions indicates that traffic movements at all intersections operate at LOS C or better during both peak periods, except at the Kahekili Highway/Waiehu Beach Road intersection. Westbound, left- and right-turning traffic on Waiehu Beach Road operates at LOS E during the AM peak, due to a shared turning lane for both left- and right-turns and a high traffic count at this unsignalized intersection. In all other cases, southbound, left-turning traffic movements operate at LOS A for both peak periods. Westbound, left- and right-turning movements operate at LOS C during the AM peak and LOS B during the PM peak.

The analysis further projects traffic conditions into the year 2006, the anticipated buildout year for the proposed project. Traffic figures are projected both with and without the project. An annual vehicular growth rate of two (2) percent per year is projected for Kahekili Highway, based on the information contained in the Maui Long-Range Land Transportation Plan (MLRLTP) of 1997. This anticipated growth rates serves to account for other developments within the project vicinity.

Without the proposed project, traffic conditions for the year 2006 will generally conform to existing conditions. The exception is the westbound, left- and right-turning traffic movements from Waiehu Beach Road to Kahekili Highway, which is anticipated to deteriorate slightly from LOS E during the AM peak to LOS F and from LOS B during the PM peak to LOS C. Waiehu Kou Phase 3 will also see the construction of an access road into that site from Kahekili Highway. This new intersection is anticipated to see LOS A or B during both peak periods, except for westbound, left-turning traffic which is anticipated to function at LOS D during the AM peak.

With the proposed project, traffic conditions for the year 2006 are also anticipated to conform generally to existing conditions. Westbound traffic on Waiehu Beach Road onto Kahekili Highway could see a further deterioration during the PM peak from existing LOS B and projected LOS C without the project to LOS D. The traffic analysis report notes that it is not uncommon for left-turns from a low-volume side street, such as Waiehu Beach Road, onto a major regional facility, such as Kahekili Highway, to experience long delays.

The project also proposes the construction of two (2) access points: a Primary Access Road intersecting Kahekili Highway approximately 1,000 feet south of Halewaiu Road and a Secondary Access Road intersecting Halewaiu Road approximately 800 feet east of Kahekili Highway. A proposed 14-lot agricultural subdivision located across Kahekili Highway intends to construct an access road directly opposite of the Waiehu Kou Phase 4 Primary Access Road. Should this be developed, it would impact traffic movements and these have, therefore, been calculated as potential

impacts. Traffic movements at these new intersections are anticipated to operate at LOS A during both peak periods. During the AM peak, westbound, right-turning traffic movements are anticipated to operate at LOS B, while westbound, left-turning and through traffic is anticipated to operate at LOS D. During the PM peak, those westbound, left-turning and through traffic movements are anticipated to operate at LOS B.

The proposed project will generate an anticipated 77 total trips during the AM peak and 103 total trips during the PM peak. All intersections have adequate capacity to meet these projected traffic demands. Anticipated left-turn demands both for entering and exiting the project site do not warrant an exclusive left-turn lane or left-turn median storage/auxiliary lane on Kahekili Highway. However, these additions would improve operating conditions, facilitate traffic movements, and provide consistency with the other intersections fronting Waiehu Kou Phases 1 and 3. In the same vein, the westbound approach of the Primary Access Road to Kahekili Highway should be provided with a shared left-turn/through lane and a separate right-turn lane. Conversely, shared lane approaches to the Halewaiu Road/Secondary Access Road intersection should be sufficient to meet traffic demands in that location. Other recommendations proposed in the TIAR are regional in nature, rather than project specific and are not part of the proposed action.

2. ***Wastewater***

Based upon the Department of Public Works and Environmental Management's guidelines, the proposed subdivision is anticipated to generate an average, daily wastewater flow of approximately

36,000 gallons. The design capacity of the County's Wailuku-Kahului Wastewater Reclamation Facility is 7.9 million gallons per day (MGD). The facility serves the Kahului, Wailuku, Paia, Kuau and Spreckelsville areas. Wastewater from the project site will gravity flow through the subdivision and into the wastewater pump station facility located at Waiehu Kou Residence Lots, Phase 3. From this pump station, the wastewater will be pumped via a force main to the pump station at Waiehu Kou Residence Lots, Phase 2. The pump station in Phase 2 will be upgraded. A new 8-inch diameter force main will also be installed offsite to accommodate the additional flows. This force main, approximately 5,200 lineal feet in length, will be installed along Kahekili Highway from the entrance to Waiehu Kou Phase 2 to the discharge sewer manhole at Waiehu Beach Road. See Appendix "C".

3. ***Water***

Water for the project site is furnished by the County's domestic water system servicing the area. Water service to the project site will be provided by an existing 12-inch waterline on Kahekili Highway. Refer to Appendix "C". Onsite mains within the proposed subdivision roads will provide water and fire protection to the residential lots. The Department of Water Supply has commented that based on per acre standard guidelines, anticipated consumption for the project would be approximately 107,000 gallons per day.

4. ***Drainage***

The Rational Method, as described in the "Rules for the Design of Storm Drainage Facilities in the County of Maui" was used in

calculating the storm runoff. These calculations are based on a 50-year, 1-hour storm recurrence interval. Refer to Appendix "C".

The existing onsite storm runoff rate from the Phase 4 project site is approximately 48 cubic feet per second (cfs). A runoff rate of approximately 88.43 cfs is calculated for the developed Phase 4 site. The majority of the onsite runoff will be collected by an underground drainage system and routed into a proposed onsite retention basin. The remaining onsite runoff will be collected by a separate underground drainage system and routed into the existing gulch located along the eastern boundary of the project. The onsite retention basin will be designed to retain the increase in runoff for a 50-year, 1-hour storm generated by the subject project. The basin will be fenced-in for safety reasons.

The existing culvert located along the southeast corner of the project parcel will be lengthened to accommodate the widening of Kahekili Highway. The existing culvert is designed to intercept runoff for a 50-year, 1-hour storm runoff, as required by the Department of Transportation. The existing natural waterway will not be altered or affected by the proposed drainage plan.

The drainage system described above will be designed according to the County of Maui's "Rules for the Design of Storm Drainage Facilities in the County of Maui" (Title MC-15, Chapter 4) and the Department of Transportation, State of Hawaii. Construction plans and a drainage report will be submitted to the County of Maui and the Department of Transportation, State of Hawaii for approval.

5. ***Electrical and Telephone Systems***

Electrical power and telephone systems will not be adversely impacted by the proposed project.

D. *CUMULATIVE IMPACTS*

Cumulative impacts are defined as the impact on the environment which results from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

This cumulative impact analysis examines present and reasonably foreseeable future projects in the area that have the potential to contribute to cumulative effects. The analysis uses the best available information at the present time to assess these projects and their potential impacts. Depending on the status of a particular project, each of the projects included in this cumulative impact analysis is supported by different levels of information. Public documents, conceptual plans and documents or applications prepared for environmental reviews or regulatory approvals were the primary sources of information. When adequate data on specific aspects of other projects was unavailable and could not be obtained through reasonable efforts, professional judgement was used to estimate impacts.

1. ***Projects Included in the Cumulative Impacts Analysis***

The following criteria were considered in identifying past, present and reasonable foreseeable future projects that could result in cumulative impacts to the region's resources.

a. Projects that are of a similar nature could affect similar resources or are located in geographic proximity to the proposed project.

b. Projects that have the potential to generate environmental impacts and when addressed collectively with the proposed project, could result in cumulative impacts to the environment.

c. Projects that are proposed for development that have received or are pending environmental and/or regulatory reviews or approvals and are expected to be implemented.

In the foregoing context, the Waiehu Kou 4 Subdivision project will be assessed together with the three (3) previous phases of Waiehu Kou projects, which will provide a total of 263 single-family units; the Hale Mua Affordable Subdivision, providing 464 single-family units; and Wailuku Country Estates Subdivision, providing 189 lots.

2. ***Assessment of Cumulative Impacts***

In considering the impacts of the various projects, the following resource parameters were examined: (1) topography, (2) plant and animal life; (3) noise and air quality; (4) visual resources; (5) cultural resources; (6) water quality; (7) housing and land use; (8) public services; and (9) infrastructure. The assessment presented herein is intended to identify potential issues, concerns and mitigative measures based on best available planning-level information. Cumulative impact issues relating to each of these resource parameters are described below.

a. Topography

Due to strict regulatory controls and cost considerations, each project seeks to minimize cut and fill quantities, thereby minimizing alterations to topographic features. The need to respect existing landforms is required to ensure that visual impacts are minimized, drainage patterns are

maintained and infrastructure design criteria are met. When taken collectively, therefore, the cumulative impacts of these projects upon regional topography are not anticipated to be adverse.

b. ***Plant and Animal Life***

Each of the projects has studied the flora and fauna resources affected by their respective actions. For the most part, the proposed actions will affect lands formerly used for sugar or macadamia nut cultivation activities. Any impacts to flora and fauna parameters have been or will be mitigated through proper land planning measures, utilizing to the maximum extent practicable, previously disturbed lands for proposed new development.

c. ***Noise and Air Quality***

Construction-related noise is expected for each project. All projects shall comply with Department of Health noise regulations and are expected to employ best management practices to minimize construction-related noise. In the long term, development of areas previously utilized for agricultural purposes will result in changes in noise characteristics in the vicinity of each project area. Whereas agricultural equipment and cultivation activities were the primary source of noise, once projects are completed, noise generation will be primarily attributed to traffic utilizing residential roadways. There are no point sources of noise identified in any of the projects which may result in adverse impacts to surrounding communities.

As with noise, air quality will be temporarily affected during construction. Best Management Practices (BMPs) are required to ensure compliance with Department of Health and County grading requirements. There are no new point sources of air emissions associated with any of the projects. In the long term, automobile traffic is expected to be the primary source of air emissions. As projects are implemented, air impacts formerly associated with agricultural lands will be replaced by automobile-related emissions. From a cumulative standpoint, however, the projects cited are not anticipated to have an adverse impact upon regional ambient air quality conditions.

d. ***Visual Resources***

The projects considered are located on lands formerly used for sugar cane and macadamia nut cultivation. They are contiguous or in near proximity to other, single-family residential uses and will create a visual character compatible and consistent with nearby uses. The properties are not part of significant, scenic corridors and will not affect views to or along the shoreline and mountain areas.

e. ***Cultural Resources***

Projects of the size and scale noted considered effects of their individual actions on cultural resources. Based on archaeological studies conducted for each project, appropriate mitigative measures will be utilized to address archaeological resource issues. Collectively, the projects are not anticipated to affect cultural resources and practices as archaeological and cultural assessments for the projects

have had similar results. No items of continuing significance were identified in the archaeological survey that would be impacted by the various developments.

f. ***Water Quality***

Surface runoff and other non-point source pollutants can affect water quality if unmitigated. Construction activities for each project are subject to the NPDES permitting process and implementation of Best Management Practices (BMPs) to control erosion and sediment loss. It is expected that all projects will comply with applicable regulatory requirements to minimize impacts to downstream water bodies. On a long-term basis, each project will be required to comply with County of Maui drainage regulations to provide required mitigation, including drainage storage areas to ensure that runoff velocities are controlled and water quality effects minimized. From a regional water quality standpoint, compliance with State and local regulatory requirements will help to mitigate adverse impacts to water quality.

g. ***Housing and Land Use***

The availability of affordable housing is an island-wide concern. Cumulatively, the proposed project together with the other projects will increase the availability of housing for the island of Maui. The Waiehu Kou projects have provided and will continue to provide affordable housing opportunities for Native Hawaiian beneficiaries.

h. ***Public Services***

Educational assessments may be required for most of the projects considered as they meet the criteria of 50 units or more. The applicants would work with the Department of Education (DOE) to discuss the educational impact fees. The Department of Hawaiian Home Lands is exempted from this assessment, but will coordinate with DOE to address student population impacts. Should impact fees be assessed and collected, they are assumed to be earmarked for area schools such as Waihee Elementary, Wailuku Elementary, Iao Intermediate or Baldwin High School. Therefore, it is anticipated that these funds will assist in the upgrade and improvement to schools in the Wailuku area.

The projects considered here do not significantly extend the area to be covered by police and fire services. The new housing units and residents will, however, increase the scope of necessary police and fire services. This extended scope should be off-set in part by the increase in tax revenues from new property taxes resulting from the subdivisions which can be used to fund the increased need for services.

Each of the considered projects will address the required recreation impacts individually, as may be applicable and in accordance with Maui County Code 18.16.320.

i. ***Infrastructure***

All the projects considered will implement infrastructure improvements. Wastewater improvements will include the installation of pump stations and force mains. The projects

will create retention basins for runoff and culverts and other methods of controlling and directing the flow into the basins. Water will come from County domestic sources with system improvements provided to serve the respective projects. The Waiehu Kou projects have or will provide road frontage and intersection improvements along Kahekili Highway, while the Hale Mua project will design and construct the Imi Kala Street Extension from the Millyard subdivision to Kahekili Highway.

Collectively, the various projects have taken into account the required infrastructure improvements needed to adequately service each project.

E. SECONDARY IMPACTS

Secondary impacts are impacts that have the potential to occur later in time or are farther in distance but are still reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of the project.

Secondary impacts from highway projects can occur, for example, because they can induce development by removing one of the impediments to growth - transportation access.

Related to the Waiehu Kou 4 Subdivision project, secondary impacts include new population which will be accommodated in the long term through the building of new residences. Such growth may translate to the need for new public services.

Chapter IV

Relationship to Governmental Plans, Policies and Controls

IV. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

A. REGULATORY CONTEXT

The Hawaiian Homes Commission Act of 1920, as amended (the Act), notes that the policy of the Act is to enable native Hawaiians to return to their lands in order to fully support self-sufficiency for native Hawaiians and the self-determination of native Hawaiians in the administration of the Act, as well as the preservation of the values, traditions, and culture of native Hawaiians. In addition, the principal purposes of the Act include but are not limited to:

1. Establishing a permanent land base for the benefit and use of native Hawaiians, upon which they may live, farm, ranch, and otherwise engage in commercial or industrial or any other activities as authorized by the Act;
2. Placing native Hawaiians on the lands set aside under the Act in a prompt and efficient manner and assuring long-term tenancy to beneficiaries of the Act and their successors;
3. Preventing alienation of the fee title to the lands set aside under the Act so that these lands will always be held in trust for continued use by native Hawaiians in perpetuity;
4. Providing adequate amounts of water and supporting infrastructure, so that homestead lands will always be usable and accessible; and
5. Providing financial support and technical assistance to native Hawaiian beneficiaries of this Act so that by pursuing strategies to enhance economic self-sufficiency and promote community-based development, the traditions, culture and quality of life of native Hawaiians shall forever be self-sustaining.

Upon the passage of the Act, applicable lands immediately assumed the status of Hawaiian home lands and became under the control of the Department of Hawaiian Home Lands (DHHL) to be used and disposed of in accordance with the provisions of the Act. As provided for by the Act, Hawaiian home lands used and disposed under the Act are not subject to State statutes, County ordinances, and County charter

provisions regarding land use, including County zoning, planning and subdivision regulations.

The lands underlying the proposed subdivisions are designated "Urban" by the State Land Use Commission and "Agriculture" by the Wailuku-Kahului Community Plan. See Figure 17 and Figure 18. In addition, these lands are zoned "Interim" by the County of Maui.

With the exception of certain exemptions specified in Appendix "A", the proposed project will be implemented in accordance with applicable County standards. As previously noted, the Hawaiian Homes Commission Act of 1920, as amended, places Hawaiian home lands under the control of the DHHL. As provided for by the Act, Hawaiian home lands used and disposed of for the purposes of the Act are exempt from State and County land use regulations.

The proposed action advances the use of Hawaiian home lands for settlement by native Hawaiians and is in accordance with the provisions promulgated by the Act. While the proposed action will result in changes in land use density, the overall residential character of the project is not considered inconsistent with surrounding uses. Although the Community Plan designation is "Agricultural", the project site is not in active agricultural production and is vacant; it is also immediately adjacent to other residential developments (the earlier phases of Waiehu Kou). In all, the site of the proposed action represents a minor portion of the agricultural lands on the island of Maui.

B. *CHAPTER 226, HRS, HAWAII STATE PLAN*

Chapter 226, HRS, also known as the Hawaii State Plan, is a long-range comprehensive plan which serves as a guide for the future long-term

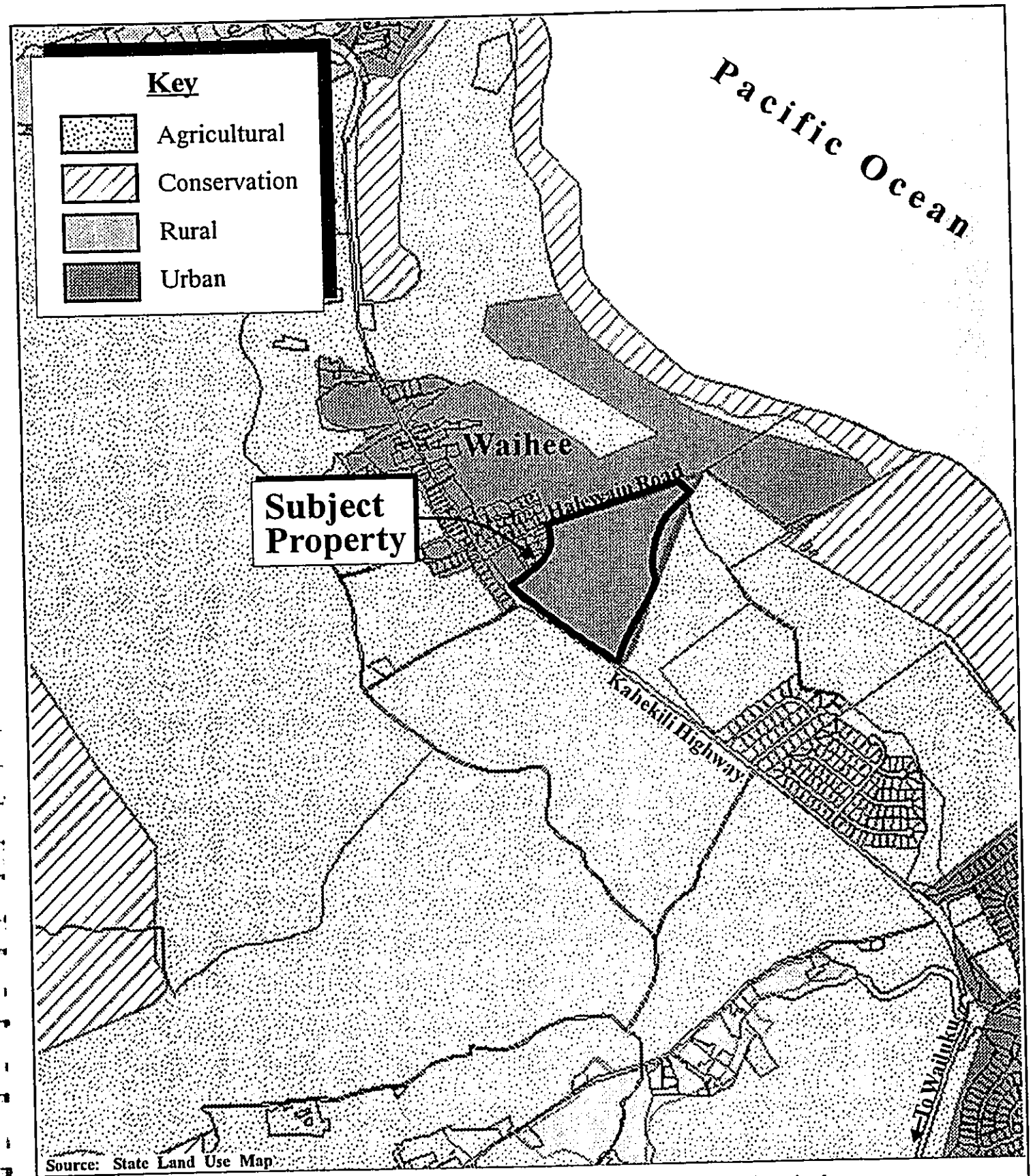


Figure 17 Proposed Waiehu Kou 4 Subdivision

State Land Use Designations

0 500 1000 2000 Feet

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

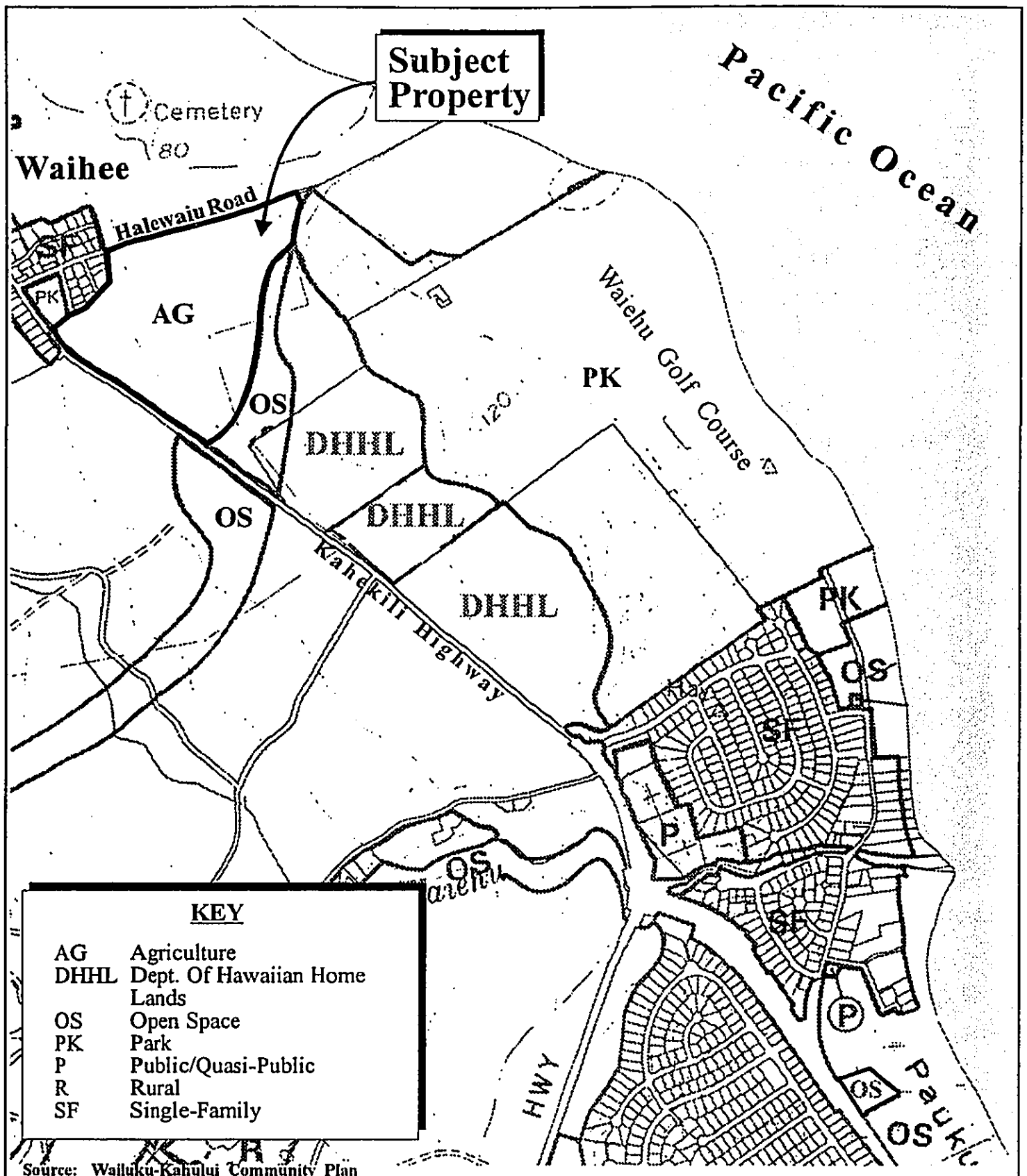


Figure 18 Proposed Waiehu Kou 4 Subdivision

Land Use Map

0 250 500 1000 Feet

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

MUNEKIYO & HIRAGA, INC.

development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. The proposed Waiehu Kou Phase 4 Subdivision, as a DHHL project, is not subject to State statutes regarding land use. Nevertheless, the proposed project has been analyzed in relation to Chapter 226, HRS, and is in concert with the following goals of the Hawaii State Plan:

- A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawaii's present and future generations.

- A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

- Physical, social, and economic well-being, for individuals and families in Hawaii, that nourishes a sense of community responsibility, of caring, and of participation in community life.

The proposed project also advances the following objectives and policies of the Hawaii State Plan.

Chapter 226-5,HRS, Objectives and Policies for Population

Chapter 226-5(a), HRS

It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic, and social objectives contained in this chapter.

Chapter 226-5(b)(1), HRS:

Manage population growth statewide in a manner that provides increased opportunities for Hawaii's people to pursue their physical, social, and economic aspirations while recognizing the unique needs of each county.

Chapter 226-5(b)(3), HRS:

Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the islands.

Chapter 226-6, HRS, Objectives and Policies for the Economy—in General

Chapter 226-6(b)(6), HRS:

Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.

Chapter 226-11, HRS, Objectives and Policies for the Physical Environment—Land-based, Shoreline, and Marine Resources

Chapter 226-11(b)(3), HRS:

Take into account the physical attributes of areas when planning and designing activities and facilities.

Chapter 226-11(b)(8), HRS:

Pursue compatible relationships among activities, facilities, and natural resources.

Chapter 226-12, HRS, Objective and Policies for the Physical Environment—Scenic, Natural Beauty, and Historic Resources

Chapter 226-12 (b)(5), HRS:

Encourage the design of developments and activities that compliment the natural beauty of the islands.

Chapter 226-13, HRS, Objectives and Policies for the Physical Environment—Land, Air, and Water Quality

Chapter 226-13(b)(2), HRS:

Promote the proper management of Hawaii's land and water resources.

Chapter 226-13(b)(6), HRS:

Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.

Chapter 226-13(b)(7), HRS:

Encourage urban developments in close proximity to existing services and facilities.

Chapter 226-19, HRS, Objectives and Policies for Socio-Cultural Advancement—Housing

Chapter 226-19(a)(1), HRS:

Greater opportunities for Hawaii's people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more affordable housing is made available to very low-, low- and moderate-income segments of Hawaii's population.

Chapter 226-19(a)(2), HRS:

The orderly development of residential areas sensitive to community needs and other land uses.

Chapter 226-19(b)(1), HRS:

Effectively accommodate the housing needs of Hawaii's people.

Chapter 226-19(b)(3), HRS:

Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.

Chapter 226-19(b)(5), HRS:

Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and

services, and other concerns of existing communities and surrounding areas.

Chapter 226-19(b)(7), HRS:

Foster a variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods that reflect the culture and values of the community.

C. *MAUI COUNTY GENERAL PLAN*

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter:

> *The general plan shall indicate desired population and physical development patterns for each island and region within the county; shall address the unique problems and needs of each island and region; shall explain the opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies, and implementing actions to be pursued with respect to population density, land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development.*

The proposed Waiehu Kou Phase 4 Subdivision, as a DHHL project, is not subject to County ordinances regarding land use. Nevertheless, the proposed project has been analyzed in relation to the General Plan and is in concert with the following objectives and policies:

POPULATION

Objective:

1. To plan the growth of resident and visitor population through a directed and managed growth plan so as to avoid social, economic, and environmental disruptions.

Policy:

a. Manage population growth so that the County's economic growth will be stable and the development of public and private infrastructures will not expand beyond growth limits specified in the appropriate community plans or negatively impact our natural resources.

LAND USE

Objective:

1. To preserve for present and future generations existing geographic, cultural, and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County.

Policy:

b. Provide and maintain a range of land use districts sufficient to meet the social, physical, environmental, and economic needs of the community.

Objective:

2. To use the land within the County for the social and economic benefit of all the County's residents.

Policy:

d. Support the Department of Hawaiian Home Lands' development of homestead lands.

HOUSING

Objective:

1. To provide a choice of attractive, sanitary, and affordable homes for all our residents.

Policy:

b. Encourage the construction of housing in a variety of price ranges and geographic locations.

URBAN DESIGN

Objective:

2. To encourage development that reflects the character and culture of Maui County's people.

Policy:

b. Encourage community design that establishes a cohesive identity.

D. WAILUKU-KAHULUI COMMUNITY PLAN

Within Maui County there are nine (9) community plan regions. From a General Plan implementation standpoint, each region is governed by a community plan which sets forth desired land use patterns, as well as goals, objectives, policies, and implementing actions for a number of functional areas including infrastructure-related parameters. The subject property is located with the Wailuku-Kahului Community Plan region. The proposed Waiehu Kou Phase 4 Subdivision, as a DHHL project, is not subject to County ordinances regarding land use. Nevertheless, the proposed project has been analyzed in relation to the Community Plan and is in concert with the following objectives and policies:

Goal:

A sufficient supply and choice of attractive, sanitary and affordable housing accommodations for the broad cross section of residents, including the elderly.

Objectives and Policies:

- Provide sufficient land areas for new residential growth which relax constraints on the housing market and afford variety in type, price, and location of units. Opportunities for the provision of housing are presently constrained by a lack of expansion areas. This condition should be relieved by a choice of housing in a variety of locations, both rural and urban in character.

- Seek alternative residential growth areas within the planning region, with high priority given to the Wailuku and Kahului areas. This action should recognize that crucial issues of maintaining important agricultural lands, achieving efficient patterns of growth, and providing adequate housing supply and choice of price and location must be addressed and resolved.

E. *COASTAL ZONE MANAGEMENT*

The Hawaii Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, establishes objectives and policies for the preservation, protection, and restoration of natural resources of Hawaii's coastal zone.

As set forth in Chapter 205A, HRS, this section addresses the project's relationship to applicable coastal zone management considerations.

(1) Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

(A) Improve coordination and funding of coastal recreational planning and management; and

(B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;

(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(v) Ensuring public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county planning commissions; and crediting such dedication against the requirements of Section 46-6, HRS.

Response: The project itself is not anticipated to adversely impact demands on regional recreational facilities. In addition, the project is not anticipated to adversely impact coastal recreational opportunities and resources.

(2) ***Historic Resources***

Objective:

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.

Policies:

(A) Identify and analyze significant archeological resources;
(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and
(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Response: In its letter dated November 19, 2003, the SHPD confirmed that there are no archaeological sites within the limits of the subject property. Refer to Chapter X. In accordance with the SHPD's recommendations, archaeological monitoring will be undertaken during ground altering activities. An archaeological monitoring plan will be prepared for review and approval by the SHPD.

(3) ***Scenic and Open Space Resources***

Objectives:

Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

(A) Identify valued scenic resources in the coastal zone management area;

(B) 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;

(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and

(D) Encourage those developments which are not coastal dependent to locate in inland areas.

Response: The subject property is not located within a scenic corridor or view plane. There are single-family residence that will establish a visual context compatible with surrounding lands at the village of Waihee and the Waiehu Kou Phases 1 to 3 projects. No adverse impacts to and along shoreline areas will occur as a result of project implementation.

(4) ***Coastal Ecosystems***

Objective:

Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

(A) Improve the technical basis for natural resource management;

(B) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

(C) 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; and

(D) Promote water quantity and quality planning and management practices which reflect the tolerance of

fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Response: Best Management Practices will be used during the construction of subdivision improvements to ensure that stormwater runoff generated during the construction phase of work does not affect coastal waters. Similarly, in the long term, the proposed drainage mitigation measures for the subdivision will mitigate adverse impacts to coastal waters.

(5) ***Economic Uses***

Objectives:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

(A) Concentrate coastal dependent development in appropriate areas;

(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

(i) Use of presently designated locations is not feasible;

(ii) Adverse environmental effects are minimized; and

(iii) The development is important to the State's economy.

Response: The proposed project is not coastal dependent. Its location adjacent to the existing village of Waihee is considered appropriate in terms of infrastructure and public service availability, as well as environmental impact considerations.

(6) ***Coastal Hazards***

Objectives:

Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies:

(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;
(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;
(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program;
(D) Prevent coastal flooding from inland projects; and
(E) Develop a coastal point and nonpoint source pollution control program.

Response: The project site is not subject to tsunami, storm waves, local flooding or erosion and subsidence. The construction of subdivision improvements and subsequent building of homes will occur within areas of minimal flooding (Zone C) and will not adversely affect coastal hazard parameters at or around the project site.

(7) ***Managing Development***

Objectives:

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

(A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

(B) Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and

(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Response: While the proposed action is being implemented in accordance with Hawaiian Homes Commission Act of 1920, opportunity for public review is being provided via the Chapter 343, HRS provisions relating to the preparation and processing of a project environmental assessment.

(8) ***Public Participation***

Objectives:

Stimulate public awareness, education, and participation in coastal management.

Policies:

(A) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;

(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and

(C) Organize workshops, policy dialogues, and site-specific medications to respond to coastal issues and conflicts.

Response: As previously noted, project disclosure is being addressed through the Chapter 343, HRS process. In addition,

DHHL met with various potential beneficiaries of the project in order to inform them of the proposed action.

(9) ***Beach Protection***

Objectives:

Protect beaches for public use and recreation.

Policies:

(A) Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;
(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: The project site is not located in proximity to beach areas and will not affect beach processes or uses.

(10) ***Marine Resources***

Objectives:

Implement the State's ocean resources management plan.

Policies:

(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
(B) Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
(C) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;

(D) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

(E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

(F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: *The proposed action is not anticipated to adversely* impact marine resources. The project site is situated approximately one-half mile away from the shoreline.

Chapter V

Summary of Adverse Environmental Effects Which Cannot Be Avoided

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The proposed project will result in some construction-related impacts as described in Chapter III, Potential Impacts and Mitigation Measures.

Potential effects include noise generated impacts occurring from construction activities. In addition, there may be temporary air quality impacts associated with dust generated from construction activities, and exhaust emissions discharged by construction equipment. Best Management Practices (BMPs) will be implemented to minimize temporary construction impacts.

The proposed project is not anticipated to create any long-term adverse environmental effects.

Chapter VI

Alternatives to the Proposed Action

VI. ALTERNATIVES TO THE PROPOSED ACTION

The proposed action represents the preferred alternative. In keeping with the mission of the DHHL, the "no action" alternative was not considered applicable.

In terms of site design alternatives, DHHL and WK3, LLC considered criteria which provided for the optimum yield of house lots while maintaining sound engineering principles. The location of the drainage retention basin was governed by site conditions. In addition, access via Kahekili Highway was deemed appropriate in terms of minimizing traffic impacts to existing village residents. These parameters guided the development of the subdivision's plat configuration.

Alternate locations were considered. The subject property was acquired by DHHL through the Request for Proposals (RFP) process. Of the several responses to the RFP with properties located on Maui, the offer to sell and develop the subject property was determined to be the strongest in meeting the intent of the RFP.

Chapter VII

Irreversible and Irretrievable Commitments of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed action would involve a commitment of fuel, labor, funding and material resources.

Development of the proposed project will involve the commitment of physical assets such as the land for the 96 house lots. This commitment of physical assets, however, is consistent and compatible with existing land uses in and around the project area.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSION

The proposed project involves the construction of the Waiehu Kou 4 subdivision which will encompass approximately 35.6 acres. Since DHHL land funds are being utilized to construct this project, an Environmental Assessment has been prepared pursuant to Chapter 343, Hawaii Revised Statues, and Chapter 200 of Title 11, Administrative Rules of the State Department of Health.

The "Significance Criteria," Section 12 of the Administrative Rules, Title 11 Chapter 200, "Environmental Impact Statement Rules", were reviewed and analyzed to determine whether the proposed project will have significant impacts to the environment. The following analysis is provided:

1. ***No Irrevocable Commitment to Loss of Destruction of any Natural or Cultural Resource Would Occur as a Result of the Proposed Project***

   The proposed action will not result in any adverse environmental impacts. There are no known, rare threatened or endangered species of flora, fauna, avifauna or important habitats located within the project sites.

   As previously noted, there are no archaeological sites on the property. Archaeological monitoring will be implemented pursuant to an archaeological monitoring plan approved by the SHPD.

2. ***The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment***

   The proposed action and the commitment of land resources would not curtail the range of beneficial uses of the environment.

3. ***The Proposed Action Does Not Conflict with the State's Long-term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, Hawaii Revised Statutes***

The State's Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statues. The proposed action is in consonance with the policies and guidelines.

4. ***The Economic or Social Welfare of the Community or State Would Not Be Substantially Affected***

The proposed action would have a direct beneficial effect on the local economy during construction. In the long term, the proposed project will support the local economy through the resident purchases of goods and services from local merchants and service providers.

5. ***The Proposed Action Does Not Affect Public Health***

Adverse impacts to the public's health and welfare are not anticipated as a result of the proposed action.

6. ***No Substantial Secondary Impacts, Such as Population Changes or Effects on Public Facilities are Anticipated***

The proposed 96 house-lots will meet a portion of the current waitlist demand by qualified beneficiaries. No significant population changes are anticipated as a result of the proposed action.

The proposed action is not expected to adversely impact existing water and wastewater systems and facilities. Water source requirements will be coordinated with the Department of Water Supply. Best Management Practices (BMP's) and appropriate erosion control measures will be utilized during the construction period. Drainage system improvements will be constructed in accordance with applicable regulatory design standards to ensure that surface runoff will not have an adverse effect on adjacent

or downstream properties. The proposed action is not expected to significantly impact public services such as police, fire, and emergency medical operations.

7. ***No Substantial Degradation of Environmental Quality is Anticipated***

During the construction phase of the project, there will be short-term air quality and noise impacts as a result of the project. In the long term, effects upon air quality and ambient noise levels should be minimal. The proposed action is not anticipated to significantly affect the open space and scenic character of the area.

No substantial degradation of environmental quality resulting form the action is anticipated.

8. ***The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Impacts to the Environment***

The proposed action is the final phase of Waiehu Kou projects planned for the area. In total, the Waiehu Kou Phases 1 through 4 will provide 359 single-family houselots and homes for native Hawaiian beneficiaries. Coordination has been or is being undertaken with State and County agencies to ensure that effects on public services and infrastructure are addressed.

9. ***No Rare, Threatened or Endangered Species or Their Habitats Would Be Adversely Affected by the Proposed Action***

There are no rare, threatened or endangered species of flora, fauna, avifauna or important habitats within the project site.

10. ***Air Quality, Water Quality, or Ambient Noise Levels Would Not be Detrimentally Affected by the Proposed Project***

Construction activities will result in short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling, will be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from construction-related activities. It is anticipated that construction will be limited to daylight working hours. Water quality is not expected to be affected.

In the long term, the proposed action is not anticipated to have a significant impact on air and water quality or ambient noise levels.

11. ***The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such As Flood Plains, Tsunami Zones, Erosion-Prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters***

The project sites are not located within and would not affect environmentally sensitive areas. The project sites are not subject to flooding or tsunami inundation. Soils of the project sites are not erosion-prone. There are no geologically hazardous lands, estuaries or coastal waters within or adjacent to the project sites.

12. ***The Proposed Project Does Not Substantially Affect Scenic Vistas and Viewplanes Identified in County or State Plans or Studies***

The project sites are not identified as a scenic vista or viewplane. The proposed action will not affect scenic corridors and coastal scenic and open space resources.

13. ***The Proposed Project Does Not Require Substantial Energy Consumption***

The proposed action will involve the short-term commitment of fuel for equipment, vehicles, and machinery during construction activities. However, this use is not anticipated to result in a substantial consumption of energy resources. In the long term, the project will create an additional demand for electricity. However, this demand is not deemed substantial or excessive within the context of the region's overall energy consumption.

Based on the foregoing findings, it is anticipated that the proposed action will not result in any significant impacts.

Chapter IX

List of Permits and Approvals

IX. LIST OF PERMITS AND APPROVALS

The following permits and approvals may be required prior to the implementation of the project.

State of Hawaii

1. Community Noise Permit (as applicable)
2. NPDES Permit

County of Maui

1. Construction Permits (e.g., grubbing, grading, electrical, plumbing)

Chapter X

Agencies Consulted During The Preparation of the Draft Environmental Assessment; Letters Received and Responses to Substantive Comments

X. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

The following agencies were consulted during the preparation of the Draft Environmental Assessment. Agency comments and responses to substantive comments are also included in this section.

1. Neal Fujiwara, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, Hawaii 96793-2100

2. William Lennan
Chief, Regulatory Branch
U.S. Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, Hawaii 96858-5440

3. Robert P. Smith
Pacific Islands Manager
U. S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm. 3-122,
Box 50088
Honolulu, Hawaii 96813

4. Ted Liu, Director
State of Hawaii
Office of Planning
Department of Business, Economic Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

5. Patricia Hamamoto, Superintendent
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

6. Denis Lau, Chief
Clean Water Branch
State of Hawaii
Department of Health
919 Ala Moana Blvd., Room 300
Honolulu, Hawaii 96814

7. Herbert Matsubayashi
District Environmental Health Program Chief
State of Hawaii
Department of Health
54 High Street
Wailuku, Hawaii 96793

8. Peter Young
State of Hawaii
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

9. Holly McEldowney
State of Hawaii
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawaii 96707

10. Fred Cajigal, Maui District Engineer
State of Hawaii
Department of Transportation
Highways Division
650 Palapala Drive
Kahului, Hawaii 96732

11. Colin Kippen, Deputy Administrator
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

12. Carl Kaupalolo, Chief
County of Maui
Department of Fire Control
200 Dairy Road
Kahului, Hawaii 96732

13. Alice Lee, Director
County of Maui
Department of Housing and Human Concerns
200 South High Street
Wailuku, Hawaii 96793

14. Michael W. Foley, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

15. Glenn Correa, Director
County of Maui
Department of Parks and Recreation
700 Hali'a Nakoa Street, Unit 2
Wailuku, Hawaii 96793

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

17. Gilbert S. Coloma-Agaran, Director
County of Maui
Department of Public Works and Waste Management
200 South High Street
Wailuku, Hawaii 96793

18. George Tengan, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

19. **Maui Electric Company, Ltd.**
P. O. Box 398
Kahului, Hawaii 96732

[redacted]
LINDA LINGLE
GOVERNOR

OCT 27 2003

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF THE SUPERINTENDENT

October 20, 2003

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Mr. Munekiyo:

SUBJECT: Preliminary Comments on Waiehu Kou Phase 4
TMK: 3-2-12:01

The Department of Education (DOE) has reviewed your preliminary description of a 95-lot single-family subdivision in Waihe`e, Maui. The subdivision could become a fourth phase in the Department of Hawaiian Home Lands' (DHHL) Waiehu Kou community.

The DOE is concerned about the impact of an additional 95 families on the three public schools that serve the area: Waihe`e Elementary, Iao Intermediate, and Baldwin High. Each school is currently serving more students than its capacity. Some of the increases in enrollment are due to the students living in the 248 homes in the DHHL Waiehu Kou Phases 1-3 project. The proposed project could add approximately 26 students to Waihe`e Elementary, 13 students to Iao Intermediate, and 14 students to Baldwin High.

If the proposed community was not going to become part of the DHHL program, the DOE would ask the counties as a condition of zoning or other permitting to impose an education contribution. The estimated amount of that contribution would be $155,134. Such a contribution would be spent on Capital Improvements Program projects in one of the schools in the Baldwin High School Complex.

Since a DHHL community is not required to request zoning changes or other county approvals, the DOE will request that DHHL make a contribution for the schools serving the new community. The DOE requests that DHHL provide a portable classroom at Waihe`e Elementary. We estimate the cost to construct the portable to be approximately $150,000 including necessary site work.

Thank you for the opportunity to provide early input into your preparation of an environmental assessment.

If you have any questions, please call Ms. Rae M. Loui, Assistant Superintendent of the Office of Business Services, at 586-3444 or Mr. Raynor M. Minami, Director of the Facilities and Support Services Branch, at 733-4860.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:hy

cc: Rae M. Loui, OBS
Raynor M. Minami, FSSB

MUNEKIYO & HIRAGA, INC.

August 4, 2004

Patricia Hamamoto, Superintendent
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)

Dear Ms. Hamamoto:

Thank you for your letter of October 20, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note the following:

1. In a follow-up discussion with Department of Education (DOE) staff, it was clarified that if the project was not a part of the Department of Hawaiian Home Lands (DHHL) program, the assessment amount is estimated at $383,135.00 rather than the $155,134.00 amount cited in your letter.

2. Since the project is DHHL sponsored, the DOE has instead requested a portable classroom at Waihee School. The DHHL will work with the DOE to address facility requirements attributed to the proposed action.

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:tn
cc: Mei Lee Wong, WK4, LLC
wk4llc/waiehu/doeltr.001

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

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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DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

November 19, 2003

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 South High Street, Suite 104
Wailuku, Hawaii 96793

LOG NO: 2003.2389
DOC NO: 0311CD41

Dear Mr. Munekiyo,

SUBJECT: **REVISED Chapter 6E-8 Historic Preservation Review – Request for Comments on the Proposed Waiehu Kou Phase 4 Subdivision**
Waihe`e Ahupua`a, Wailuku District, Island of Maui
TMK: (2) 3-2-012:001

These are our revised comments pertaining to your Request for Comments on the Proposed Waiehu Kou Phase 4 Subdivision. Our previous comments stated that we believe that a mitigation program – including completion of the archaeological data recovery work at Site - 2461 is warranted (SHPD DOC NO.: 0310CD88/LOG NO.: 2003.2219).

You have recently provided us with a map clearly indicating that SIHP 2461 is not located within the proposed project area. Thusly, we rescind our comments requesting data recovery be conducted at this site.

However, given the findings of the inventory survey and the fact that a burial was identified during recent archaeological monitoring of an adjacent property (not within the current project area), we believe that it is possible that additional sites and/or site remnants may be present in the subsurface deposits of the proposed project area. These sites may be adversely affected by ground – altering activities. Consequently we believe on-site monitoring of all ground-disturbing activities – is warranted. Given the above information, we believe there will be "no historic properties affected with precautionary monitoring". Therefore, we recommend the following conditions be attached to any permitted actions pertaining to the subject property, should they be approved.

1) A qualified archaeological monitor shall be present during all ground-altering activities in order to document any historic properties which may be encountered during the proposed undertaking and to provide mitigation measures as necessary. An acceptable archaeological monitoring plan will need to be submitted to the State Historic Preservation Division for review, prior to the commencement of any ground-altering activities. An archaeological monitoring plan must contain the following nine specifications: (1) The kinds of remains that are anticipated and where in the

construction area the remains are likely to be found; (2) How the remains and deposits will be documented; (3) How the expected types of remains will be treated; (4) The archaeologist conducting the monitoring has the authority to halt the construction in the immediate area of the find in order to carry out the plan; (5) A coordination meeting between the archaeologist and construction crew is scheduled, so that the construction team is aware of the plan; (6) What laboratory work will be done on remains that are collected; (7) A schedule of report preparation; (8) Details concerning the archiving of any collections that are made; and (9) An acceptable report documenting the findings of the monitoring activities shall be submitted to the State Historic Preservation Division for review upon 180 days following the completion of the proposed undertaking.

2) The State Historic Preservation Division (Maui and O`ahu offices) shall be notified via facsimile upon the on-set and completion of the proposed undertaking.

If you have any questions, please call Cathleen Dagher at (808) 692-8023).

Aloha,

P. Holly McEldowney

P. Holly McEldowney, Acting Administrator
State Historic Preservation Division

CD:jen

c: Michael Foley, Director, Dept of Planning, 250 South High Street, Wailuku, HI 96793
Cultural Resources Commission, Planning Dept, 250 S. High Street, Wailuku, HI 96793
Chair, Maui/Lana`i Islands Burial Council
Kana`i Kapeliela, Burial Sites Program

MUNEKIYO & HIRAGA, INC.

August 4, 2004

P. Holly McEldowney, Administrator
State of Hawaii
Department of Land
and Natural Resources
Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Ms. McEldowney:

Thank you for your letter of November 19, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we acknowledge the comments regarding the need for an archeological monitor and monitoring plan. The State Historic Preservation Division shall be notified upon the on-set and completion of the proposed project.

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:yp
cc: Mei Lee Wong, WK4, LLC
wk4llcwaikapuishpd.res

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

OCT 27 2003

LD-NAV

October 23, 2003
WAIEHUDHHL.RCM

Mr. Michael T. Munekiyo, A.I.C.P.
Munekiyo and Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Applicant: Department of Hawaiian Home Lands
Proposed: Wailehu Kou Phase 4 Single-Family Residential Subdivision
Location: Waihee, Island of Maui, Hawaii - TMK: (2) 3-2-12: 001

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

A copy of the your letter (summary) and maps pertaining to the subject matter was distributed to the following Department of Land and Natural Resources' Divisions for their review and comment:

- Division of Forestry and Wildlife
- Division of State Parks
- Engineering Division
- Office of Conservation and Coastal Lands
- Land-Maui District Land Office

Attached is a copy of the Commission on Water Resource Management and Engineering Branch comment. Based on the attached responses the Department of Land and Natural Resources has no other comment to offer on the subject matter. Should 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: MDLO

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GOVERNOR OF HAWAII

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DIVISION OF
STATE PARKS
OCT 10 4 29 PM '03

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 8, 2003

TO:
___ADMINISTRATOR
___ASST ADMIN
___DEV BR
___PLAN BR
___RES ASST BR
___CLERICAL
___ADMIN ASST
___INTERP BR
___
___CIRC/POST/STAFF RM
___COMMENTS & REC
___DRAFT REPLY
___FILE
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___INFO
___RUN COPIES_____
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BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

LD/NAV
Ref.: WAIEHUDHHL.COM

~~Suspense~~ Date: 10/17/03

MEMORANDUM:

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

RECEIVED
LAND DIVISION
2003 OCT 15 P 3:33

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Proposed: Wailehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
TMK: (2) 3-2-12: 001
Applicant: Department of Hawaiian Home Lands
Consultant: Munekiyo & Hiraga, Inc. (808 244-8729)

Please review the attached letter (Summary) and location map pertaining to the subject matter and submit your comments if any on Division letterhead (signed and dated) by the suspense date. Should you need more time to review the document, please contact Nick 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.

Signed:

Date: 10/14/03

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

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 8, 2003

LD/NAV
Ref.: WAIEHUDHHL.COM

Suspense Date: 10/17/03

RECEIVED
LAND DIVISION
2003 OCT 20 P 4:20

MEMORANDUM:

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

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Proposed: Wailehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
TMK: (2) 3-2-12: 001
Applicant: Department of Hawaiian Home Lands
Consultant: Munekiyo & Hiraga, Inc. (808 244-8729)

Please review the attached letter (Summary) and location map pertaining to the subject matter and submit your comments if any on Division letterhead (signed and dated) by the suspense date. Should you need more time to review the document, please contact Nick 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.

Signed:

Date: MICHAEL G. BUCK, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE
OCT 15 2003

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
03 OCT 10 A10:11
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

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

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

October 8, 2003

LD/NAV
Ref.: WAIEHUDHHL.COM

Suspense Date: 10/17/03

MEMORANDUM:

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

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Proposed: Wailehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
TMK: (2) 3-2-12: 001
Applicant: Department of Hawaiian Home Lands
Consultant: Munekiyo & Hiraga, Inc. (808 244-8729)

Please review the attached letter (Summary) and location map pertaining to the subject matter and submit your comments if any on Division letterhead (signed and dated) by the suspense date. Should you need more time to review the document, please contact Nick 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.

Signed:

Date: OCT 17 2003

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

RECEIVED
LAND DIVISION

2003 OCT 17 P 12:08

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

OCT 17 2003

Ref: WAIEHUDHHL.COM

TO: Dierdre Mamiya, Administrator
Land Division

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

SUBJECT: Wailehu Kou Phase 4 Single-Family Residential Subdivision TMK 3-2-12:001

FILE NO.: WAIEHUDHHL.COM

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.

[ ] 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.

[X] OTHER: Based on the October 3, 2003 letter by Munekiyo & Hiraga, Inc, the project will not alter the bed or banks of streams, therefore a stream channel alteration permit will not be required.

If there are any questions, please contact David Higa at 587-0249.

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION
2003 OCT 13 P 2:51
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

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

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

October 8, 2003

LD/NAV
Ref.: WAIEHUDHHL.COM

Suspense Date: 10/17/03

MEMORANDUM:

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

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Pre-Assessment Consultation for Preparation of an Environmental Assessment
Proposed: Wailehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
TMK: (2) 3-2-12: 001
Applicant: Department of Hawaiian Home Lands
Consultant: Munekiyo & Hiraga, Inc. (808 244-8729)

Please review the attached letter (Summary) and location map pertaining to the subject matter and submit your comments if any on Division letterhead (signed and dated) by the suspense date. Should you need more time to review the document, please contact Nick 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.

Signed: [signature]

Date: 10/13/03

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/NAV
Ref: WAIEHUDHHL.COM

COMMENTS

( ) We confirm that the project site according to the Flood Insurance Rate Map (FIRM) is located in Zone ___.

(X) Please note that the project site according to the Flood Insurance Rate Map (FIRM) is located in Zone X.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is _____.

( ) Please note that the project must comply with the 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 building permit and/or water meter.

(X) The applicant should provide the water demands and calculations to the Engineering Division so that it can be included in the State Water Projects Plan Update.

( ) Additional Comments: _____

_____

( ) Other: _____

_____

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

Signed: _____
ERIC T. HIRANO, CHIEF ENGINEER

Date: 10/13/23

MUNEKIYO & HIRAGA, INC.

August 4, 2004

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

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA) (WAIEHUDHHL.RCM)

Dear Ms. Mamiya:

Thank you for your letter of October 23, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note the following:

1. Water demand estimates will be included in the Draft EA for review by the Engineering Division.

Thank you again for providing your input to the proposed subdivision action.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:tn
cc: Mei Lee Wong, WK4, LLC
wk4llc/waiehu/dlnrland.ltr

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

environment
planning
government

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

OCT 31 2003

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR

MARY LOU KOBAYASHI
PLANNING PROGRAM ADMINISTRATOR
OFFICE OF PLANNING

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-10254

October 31, 2003

Mr. Michael T. Munekiyo, A.I.C.P.
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Department of Hawaiian Home Lands (DHHL) Single Family Subdivision, TMK: 3-2-12:01, Waihee, Wailuku, Maui

The Office of Planning has reviewed the descriptive material on DHHL's proposed acquisition of the above referenced property consisting of 35.6 acres in the State Urban District to develop a 95-lot single-family residential subdivision for native Hawaiians.

We note that the subject property lies on the makai side of Kahekili Highway, bounded on the west by an existing residential subdivision, on the east and south by lands in the State Agricultural District, and on the north by the County of Maui's Waiehu Golf Course and club house. Surrounding lands on either side of Kahekili Highway have been subdivided into similar sized residential lots, including two existing DHHL residential subdivisions on the Wailuku side of the subject parcel.

An increase in the number of DHHL residential homesteads on Maui would assist the State of Hawaii in fulfilling its commitment to carry out the Hawaiian Home Lands Act of 1921 as confirmed in the Statehood Admission Act. Therefore, we are supportive of this project's concept.

If any of the surrounding lands remain in cultivation when a DHHL homestead community is realized, lessees should be required to acknowledge that the Hawaii Right-to-Farm Act, Chapter 165, limits the agricultural activities that can be deemed nuisances.

If a Draft Environmental Assessment is done, an analysis of the impact of additional students on the existing schools serving the area would be essential.

The proposed homestead community would be generally downwind of the County's golf course and care should be exercised in the application of turf chemicals to limit children's exposure due to known negative health effects of herbicides and pesticides.

Since the subject property is already in the State Urban District, it is up to Maui County to determine the timing, density and sequence of urban development for the site.

Thank you for the opportunity to provide preliminary comments. If you have any questions, please call Mary Alice Evans at (808) 587-2892.

Sincerely,

Theodore E. Liu for
Director
Office of Planning

c: Peter Young, DLNR
Micah Kane, DHHL

MUNEKIYO & HIRAGA, INC.

August 4, 2004

Theodore E. Liu, Director
State of Hawaii,
Department of Business, Economic Development & Tourism
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Mr. Liu:

Thank you for your letter of October 31, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note the following:

1. The proposed project will comply with the Hawaii Right-to-Farm Act (Chpater 165, HRS), as applicable.

2. School facility impacts will be addressed in the Draft EA.

3. Your comment regarding golf course use of turf chemicals is acknowledged. The golf course is located approximately 0.4 mile to the southeast of the project site. Prevailing trade winds are not anticipated to cross over the golf course and through the project site. Separately, early consultation coordination has been initiated with the County of Maui's Department of Parks and Recreation, the agency responsible for the operation and maintenance of the Waiehu Golf Course.

4. Early consultation coordination has also been initiated with the County Planning Department to ensure that community planning issues are addressed.

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

environment
planning
government

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:tn
cc: Mei Lee Wong, WK4, LLC
wk4llc/waiehu/dbedtltr.001

LINDA LINGLE
GOVERNOR

NOV 17 2003

RODNEY K. HARAGA
DIRECTOR

DEPUTY DIRECTOR
BRUCE Y. MATSUI

IN REPLY FERER TO:
HWY-M 2.558-03

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732-2321

November 13, 2003

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Proposed Waiehu Kou Phase 4 Subdivision
ME 03-85

We appreciated the opportunity to meet with representatives of the Department of Hawaiian Home Lands (DHHL) and WK4, LLC as part of the early consultation process for the Waiehu Kou Phase 4 Subdivision's Environmental Assessment.

Based upon our discussions, we understand that additional information regarding other DHHL projects in the vicinity of the proposed subdivision will be provided for our review as well.

We look forward to continued coordination with the DHHL and WK4, LLC, and will provide more specific comments following the review of the Draft Environmental Assessment.

Very truly yours,

FERDINAND CAJIGAL
District Engineer, Maui

/pmc

MUNEKIYO & HIRAGA, INC.

August 4, 2004

Ferdinand Cajigal, District Engineer
State of Hawaii
Department of Transportation
Highways Division, Maui District
650 Palapala Drive
Kahului, Hawaii 96732

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Mr. Cajigal:

Thank you for your letter of November 13, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note that additional information will be provided for your review.

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:yp
cc: Mei Lee Wong, WK4, LLC
wk4llc\waikapu\dot.res

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

ALAN M. ARAKAWA
Mayor

GILBERT S. COLOMA-AGARAN
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

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

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

TRACY TAKAMINE, P.E.
Wastewater Reclamation Division

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

BRIAN HASHIRO, P.E.
Highways Division

JOHN D. HARDER
Solid Waste Division

November 18, 2003

Mr. Michael Munekiyo, Project Manager
MUNEKIYO & HIRAGA, INC.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: EARLY CONSULTATION
WAIEHU KOU PHASE 4 SUBDIVISION
TMK: (2) 3-2-012:001

We reviewed the subject request and have the following comments:

1. Submit a solid waste management plan for the disposal and composting of cleared and grubbed material and the disposal and recycling of construction waste.

2. Although wastewater capacity is available as of October 24, 2003, the developer should be informed that wastewater capacity cannot be ensured until the issuance of the building permit.

3. The developer shall pay assessment fees for treatment plant expansion costs and is required to fund any necessary off-site improvements to collection system and wastewater pump stations.

4. Wastewater contribution calculations are required before a building permit is issued. Indicate on the plans the ownership of each easement (in favor of each party). The County will not accept sewer easements which traverse private property. Plans should

show the installation of a service lateral and advanced riser for each lot.

5. Non-contact cooling water and condensate cannot drain to the wastewater system.

6. Pump station(s) needed to accommodate flows from Waiehu Kou Phase IV shall not be dedicated to the County.

7. Connect Pakaku Place and Kaihamu Place to the adjacent proposed roadways.

8. All drainage systems are to be kept under private ownership and maintenance.

9. All pavement markings and striping are to be a thermoplastic extrusion.

10. The architect and owner are advised that the project is subject to possible tsunami and flood inundation. As such, said project must conform to Ordinance No. 1145, pertaining to flood hazard districts.

11. A road-widening lot shall be provided for the adjoining half of Halewaiu Road to provide for future 56 foot wide right-of-way and improved to County standards, to include, but not be limited to pavement widening, construction of curb, gutter and sidewalk, street lights and relocation of utilities underground. Said lot shall be dedicated to the County upon completion of the improvements.

12. All structures, such as walls, trees, etc., shall be removed or relocated from the road-widening strip. The rear boundaries of the road-widening strip shall be clearly marked to determine if said structures have been properly removed and relocated.

13. A 30 foot radius shall be provided at the intersection of the proposed subdivision road/driveway and the adjoining subdivision roads and State roads.

14. The existing Halewaiu Road does not meet County standards based on roads located in urban zoning. Therefore, it shall be improved to County standards.

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

16. The existing natural waterway between Waiehu Kou Phase 4 and Phase 3 shall be improved as approved by the County.

17. The existing drainage crossing on Kahekili Highway between Phase 4 and Phase 3 shall be redesigned to provide a 100-year flood design at no cost to the County or the State.

18. A site plan and a sight distance report to determine required sight distance and available sight distance at existing and proposed street intersections for each lot shall be provided for our review and approval.

19. The 100-year flood inundation limits shall be shown on the project site plans. Lot geometrics cannot be approved until such data is submitted and reviewed.

20. Traffic-calming devices as approved by the County shall be constructed on all roads within the subdivision.

21. The infrastructure, grading, etc. requirements will need to be addressed during the subdivision review/approval process.

If you have any questions regarding this letter, please call Milton Arakawa at 270-7845.

Very truly yours,

for GILBERT S. COLOMA-AGARAN
Director

GSCA:MA:msc
S:\LUCA\CZM\waiehukou4_32012001_msc.03.wpd

MUNEKIYO & HIRAGA, INC.

August 4, 2004

Gilbert Coloma-Agaran, Director
County of Maui
Department of Public Works
and Environmental Management
200 South High Street
Kahului, Hawaii 96732

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Mr. Coloma-Agaran:

Thank you for your letter of November 18, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note the following:

1. We acknowledge the recommendation to submit a solid waste management plan for the disposal and composting of cleared and grubbed material and the disposal and recycling of construction waste.

2. We acknowledge that wastewater capacity cannot be ensured until the issuance of building permits.

3. We understand that assessment fees for treatment plant expansion costs and are required to fund necessary off-site improvements to the collection system and wastewater pump systems.

4. Wastewater contribution calculations will be performed by a licensed civil engineer and will be submitted with the building permit application. The plans will indicate the ownership of each easement and the easements will not traverse private property. The plans will show the installation of a service lateral and advanced riser for each lot.

5. We confirm that non-contact cooling water and condensate will not drain to the wastewater system.

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

6. Pump station(s) needed to accommodate flows from Waiehu Kou Phase IV shall not be dedicated to the County.

7. The subdivisions plans have been revised to reduce the length of the cul-de-sacs that would formerly, have abutted Pakaku Place and Kaihamu Place in order to provide an additional lot in each area. Therefore no roadway access can be provided. As an alternative, the applicant proposes a 10-foot pedestrian access from the Pakaku Place cul-de-sac to the park.

8. The applicant proposes to dedicate roadways to the County of Maui, thus eliminating the possibility for drainage systems to be kept under private ownership. The applicant will maintain a detention basin similar to that of the previous phases of the Waiehu Kou project.

9. We acknowledge that pavement markings and striping are to be a thermoplastic extrusion.

10. We acknowledge that the project will conform to Ordinance No. 1145 in regards to flood hazard districts.

11. The applicant proposes a road-widening lot providing for 44-foot right-of-way for the adjoining half of Halewaiu Road and improvements to County standards on that half of roadway fronting the subdivision. The applicant will be seeking a waiver to place electrical and telephone lines overhead rather than underground.

12. We acknowledge the need to mark the boundaries of the road-widening strip and remove all structures from it.

13. We acknowledge the recommendation to provide a 30-foot radius at the intersection of the proposed subdivision road/driveway and the adjoining subdivision roads and State roads.

14. The proposed project does not abut the section of Halewaiu Road that fails to conform to County standards. As discussed with the Engineering Division, existing pavement width is 24-feet wide and thus adequate to accommodate Waiehu Kou Phase 4's secondary access. No improvements to the non-abutting sections of Halewaiu Road are anticipated.

15. The grading plans shall be submitted with a detailed and final drainage report and a Best Management Practices (BMP) Plan.

16. Since the project does not involve construction within the natural drainage way, no improvements are deemed necessary. In the event that any construction activity does occur within the natural drainage way, it will be restored to the pre-construction condition.

17. The natural waterway providing drainage that crosses Kahekili Highway between Phases 3 and 4 is an existing condition that would only be subject to pass-through flows. SDOT Maui has no records of the Kahekili Highway culvert overtopping and this should thus be adequate to accommodate the off-site flows. There will be no increase in flows from the project to the natural drainage way and all increase in storm water runoff will be retained on-site. In addition, the property on the mauka side of Kahekili Highway is not part of the project. Since the existing culvert is designed to accommodate 50-year, 1-hour storms and there are no indications that the flows passing through exceed a 50-year storm event, improving the existing culvert may have an adverse effect on downgrade areas.

18. A site plan and a sight distance report shall be provided for review.

19. We acknowledge the 100-year inundation limits should be shown on the project site plans.

20. We acknowledge the suggestion that traffic-calming devices as approved by the County be constructed on roads within the subdivision.

21. Finally, the requirements for infrastructure, grading, etc. will be addressed during the subdivision approval/review process.

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:yp
cc: Mei Lee Wong, WK4, LLC
wk4\lcwa\ehu\dpwem2.res

OCT 04 2004

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

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DONOHUE M. FUJII, P.E.
STANLEY T. WATANABE
TERRANCE S. ARASHIRO, P.E.

#04-539.2

September 28, 2004

Mr. Cary Yamashita
Acting Chief Engineer
Maui County
Department of Public Works and Waste Management
Division of Engineering
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Yamashita:

Subject: Waiehu Kou Phase 4 Subdivision
Division of Engineering and Waste Management Division
Early Consultation Comments

Thank you for meeting with Mr. Brian Ige of WK3, LLC, Ms. Adrienne Wong and myself on Wednesday, September 18, 2004, to discuss and clarify Division of Engineering early consultation comments for the subject project.

This letter is to confirm and summarize the discussions of our meeting on September 21, and earlier meetings, relative to comment numbers 7, 8, 11, 14, 16 & 17 as noted on Department of Public Works and Waste Management review comments letter dated November 18, 2003.

The following is our understanding of the specific items discussed:

Item No. 7 Connect Pakaku Place and Kaihamu Place to adjacent proposed roadways.

Discussion: Since two (2) vehicular accesses is proposed, a primary access via Kahekili Highway and a secondary access via Halewaiu Road and the subdivision has been revised to add additional lots, no improvements to Pakaku Place and Kaihamu Place is required. At a minimum, a 6-ft. wide concrete walkway for pedestrian access to the park and beach will be required from the proposed subdivision to Pakaku Place and Halewaiu Road.

Item No. 8 All drainage systems are to be kept under private ownership and maintenance.

Discussion: The drainage basin will be under private ownership and maintenance. The drainage system within the roadways will be maintained by the respective County or State agency.

Item No. 11 A road-widening lot shall be provided for the adjoining half of Halewaiu Road to provide for future 56-ft. R/W and improved to County Standards, to include, but not limited to pavement widening, construction of curb, gutter and sidewalk, street lights and relocation of utilities underground. Said lot shall be dedicated to the county upon completion of the improvements.

REPLY TO:
501 SUMNER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE (808) 533-3646 • FAX (808) 526-1267 • EMAIL: atahnl@atahawaii.com

OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII

Mr. Cary Yamashita
Acting Chief Engineer
Department of Public Works and Waste Management
Division of Engineering

September 28, 2004

Discussion: Since the section of Halewaiu Road adjoining the project site is within an existing access easement situated on "conservation zoned lands", future development of the area is not foreseen therefore, DHHL could request a waiver to be exempt from construction of the roadway improvements. A minimum 20-ft. wide pavement will be provided within the existing 23-ft. wide access easement.

(Note: Existing pavement within the access easement varies for 18-ft. to 20-ft. in width.)

Discussion: Since the entire Waiehu area has overhead utilities, DHHL could request a waiver from the requirements to install the existing utilities underground.

Item No. 14 Existing Halewaiu Road does not meet county standards based on roads located in urban zoning. Therefore, it shall be improved to County Standards.

Discussion: The existing Halewaiu Road is a 24-ft. wide, two-lane road, within an existing 40-ft. right-of-way. Since the project is not adjoining this section of Halewaiu Road, the ROW cannot be increased to urban zoning standards of 56-ft. wide ROW. The existing 24-ft. pavement width is adequate to accommodate the traffic volume anticipated by the secondary access to the project site, therefore, no improvements to this section of road is required.

Item No. 16 The Existing natural drainage way between Waiehu Kou Phase 4 and Phase 3 shall be improved as *approved* by the County.

Discussion: Since the project will have limited construction within the natural drainage way, no improvements are deemed necessary. Any construction activity that occurs within the natural drainage way, the natural drainage way will be restored to the pre-construction condition.

Item No. 17 The existing drainage crossing Kahekili Highway between Phase 4 and Phase 3 shall be redesigned to provide a 100-year flood design at no cost to the County or the State.

Discussion: Improvements to the natural drainage way is not required for the following reasons:

- The natural waterway is an existing condition and storm water flows will be pass-through flows only.
- There will be no increase in flows from the Project to the natural drainage way. Any increase in flows will be retained on-site within the proposed retention basin.

Mr. Cary Yamashita
Acting Chief Engineer
Department of Public Works and Waste Management
Division of Engineering

September 28, 2004

- Property on the Mauka side of Kahekili Highway is not part of the Project, therefore, the Project cannot utilize the area for any improvements.

- Pursuant with our meeting with SDOT-Maui district engineers on February 11, 2004, SDOT standards for culvert design flow is a 50-year, 1-hour storm event in accordance with SDOT Design Criteria for Highway *Drainage dated January 2001, hydrologic design, recurrence interval for* culverts on Freeway and Arterial Highways.

- Per SDOT Maui, SDOT has no records of the existing Kahekili Highway Culvert over topping. Therefore the culvert should be adequate to accommodate the off-site flows. Preliminary hydraulic calculations confirm that the existing culvert has the capacity to carry the 50-year storm.

- Since the existing Kahekili culvert is designed to accommodate a 50-year, 1-hour storm and there are no indications that the flows passing through the Kahekili Highway culvert exceeds a 50-year storm event, improving the existing culvert to pass the runoff from a 100-year storm may have an adverse effect on downgrade areas. Any constrictions at the Kahekili Highway Culverts will detain a portion of the 100-year storm and thus minimize the adverse effect to downgrade area.

Therefore no improvements within the natural drainage way and the existing culvert crossings at Kahekili Highway and the county golf course access road is required. The 100-year and 50-year Storm inundation limits will be indicated on the construction plans and supported by the drainage report. Additionally a letter confirming SDOT's culvert design flow is a 50-year, 1-hour storm will be included as part of the project drainage report.

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

September 28, 2004

Mr. Cary Yamashita
Acting Chief Engineer
Department of Public Works and Waste Management
Division of Engineering

The foregoing is our understanding of discussions of our meeting. If there are any corrections or misunderstanding on any part of the above please advise me. A response with your concurrence or correction by October 15, 2004 will be greatly appreciated.

Sincerely,

AUSTIN, TSUTSUMI & ASSOCIATES, INC.

By
STANLEY T. WATANABE
Assistant Vice President & Senior Designer

STW:mt

cc: Mr. Brian Ige - WK3, LLC
Ms. Adrienne Wong – Austin, Tsutsumi & Associates, Inc.-Maui
Mr. Matt Slepin - Munekiyo & Haraga, Inc.

Z:\2004\04-539.2\Waiehu Kou Phase 4\Correspondence\Maui DPWEM-Consult Comments 092804.doc

JAN 20 2004

ALAN M. ARAKAWA
Mayor

GEORGE Y. TENGAN
Director

JEFFREY T. PEARSON, P.E.
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

January 13, 2004

Munekiyo & Hiraga, Inc.
Attention: Michael Munekiyo
305 High Street, Suite 104
Wailuku HI 96793

Dear Mr. Munekiyo:

SUBJECT: Proposed Waiehu Kou Phase 4 Subdivision -develop 95-lot single family residential subdivision and related improvements on TMK (2) 3-2-012:001

Thank you for the opportunity to comment on this project proposal.

Source Availability and Consumption

The project area is served by the Central Maui System. The main sources of water for this system are the Iao and Waihee aquifers, the Iao tunnel and the Iao-Waikapu Ditch. As of July 21, 2003, Iao aquifer has been designated by the Commission on Water Resource Management (CWRM) as Groundwater Management Area, and the Waihee aquifer will be designated if water levels at the Kanoa test hole drop below 6 feet above mean sea level on an annual moving average basis. As a result, DWS has stopped issuing advance water meter reservations until new sources are brought on-line. Although the Department continues to issue meters for those ready to receive service at this time, it may also become necessary to stop issuing new meters altogether. However, this Hawaiian Homelands project has reservation and will receive priority.

The department is taking steps to protect the long term viability and sustainability of these aquifers by developing new sources, groundwater protection, watershed protection as well as water conservation awareness through the distribution of low flow fixtures and requiring low flow fixtures for new developments, to name a few. The department also asks Central Maui residents to voluntarily conserve water.

The EA should include the sources and expected potable and non-potable water usage. Based on per acre standard guidelines, anticipated consumption for this project would be approximately 107,000 GPD. Existing storage may not be adequate to meet this demand.

System Infrastructure

The applicant should be required to comply with DWS Rules and Regulations for Subdivisions as well as provide domestic, fire and irrigation services in accordance with system standards. A 12-inch waterline borders the south side of the property. Four fire hydrants are situated on the southern and western portion of the project site. Fire, domestic, and irrigation calculations will be required during the building permit process. Actual fire demand for structures is determined by fire flow calculations prepared, signed and stamped by a certified engineer or architect. The approved fire flow calculation methods for use include Guidance for Determination of Fire Flow- Insurance Service Office, 1974 and Fire Flow- Hawaii Insurance Bureau, 1991. The applicant should contact our Engineering Division at 270-7835 to discuss water system improvements.

Conservation

We encourage the applicant to consider the following water conservation measures and convey them to future homeowners, where applicable:

Use brackish and /or reclaimed water sources for dust control during construction, if such alternative is available.

Eliminate Single-Pass Cooling: Single-pass, water-cooled systems should be eliminated per Maui County Code Subsection 14.21.20. Although prohibited by code, single-pass water cooling is still manufactured into some models of air conditioners, freezers, and commercial refrigerators.

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20A.680 requires the use of low-flow water fixtures and devices in faucets, showerheads, urinals, water closets, and hose bibs. Water conserving washing machines, ice-makers and other units are also available.

Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout, "*The Costly Drip*".

Use Climate -adapted Plants: The project is located in the Maui County Planting Plan - Plant Zone 3. In the event of any landscape renovation, we encourage the applicant to utilize appropriate native and non invasive species and avoid the use of potentially invasive plants. Native plants adapted to the area, conserve water and protect the watershed from degradation due to invasive alien species. Attached is a list of appropriate plants for the zone as well as potentially invasive plants to avoid.

Look for Opportunities to Conserve Water: A few examples of these are as follows: When clearing *driveways, etc. of* debris, use a broom instead of a hose. When washing cars, use a hand-operated spray nozzle instead of an open hose. Additionally, check for leaks in faucets and toilet tanks.

Pollution Prevention

The project overlies the Iao aquifer which has a sustainable yield of 20MGD. In order to protect surface and *groundwater resources*, we encourage the applicant to adopt Best Management Practices (BMPs) designed to minimize infiltration and runoff from construction and vehicle operations. We have attached sample BMPs for reference. Additional information can be obtained from the State Department of Health.

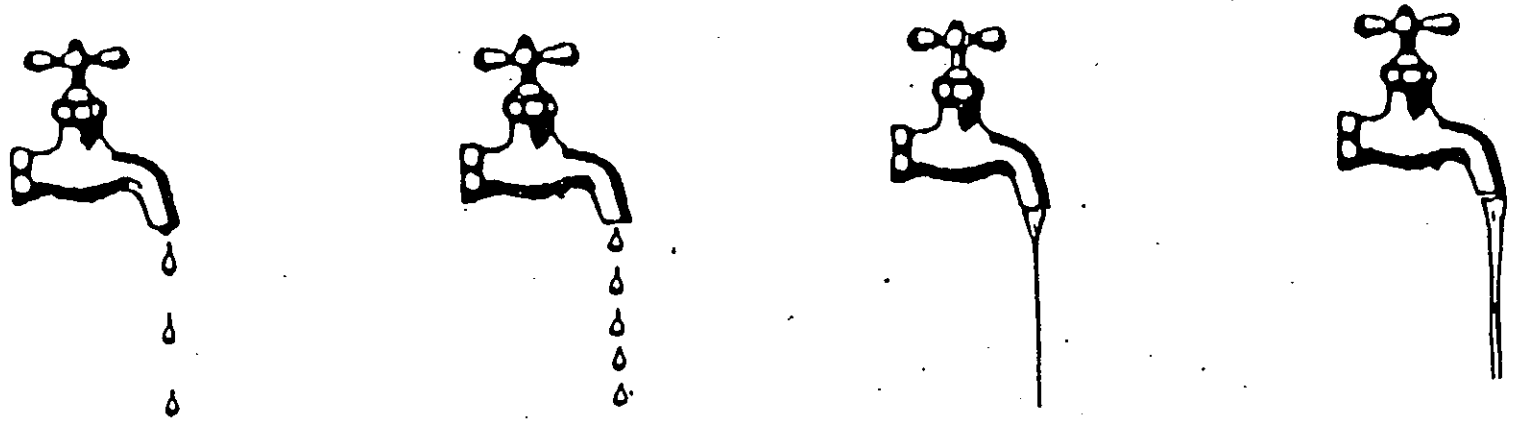
Should you have any questions regarding system infrastructure and requirements, please call our Engineering Division at 270-7835 and for questions on conservation and resource matters, please contact our Water Resources and Planning Division at 270-7199.

Sincerely,

George Y. Tengan
Director

eam
c: engineering division
applicant, with attachments
The Costly Drip
Maui County Planting Plan - Plant Zone 4 - Saving Water in the Yard - What and How to Plant in your Area
Ordinance No. 2106 - A Bill for an Ordinance Amending Chapter 16.20 of the Maui County Code, Pertaining to the Plumbing Code
Selected BMP's from "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters"-EPA
A Checklist of Water Conservation Ideas for Home and Yard

"THE COSTLY DRIP"



Slowly Dripping Spigot Wastes 15 Gallons a day.

1/32" Leak Wastes 25 Gallons a day.

1/16" Stream Wastes 100 Gallons a Day.

1/8" Stream Wastes 400 Gallons a day.

Turn your garden into a

Native Plant Haven!

You can start by visiting some of these places to get ideas about how to landscape your home or business.

And remember kids.... make sure there are no coqui frogs on the plants you buy!

The following places sell and/or display native Hawaiian plants. Some of the nurseries propagate native Hawaiian plants from seeds and/or cuttings for the purpose of protecting and preserving these native plants. Please call them before going to view the sites. They can provide valuable information and referral to other sources!

⌘ Sells native plants
⌘ Offers discounts with this flyer

⌘ Aloha o ka Aina
2040 Pi'iholo Rd, Makawao
572-9440

⌘ Ho'olawa Farms
PO Box 731, Haiku 96708
575-5099

⌘ Kahanu Gardens
National Tropical Botanical Garden
Alau Place, Hana, 96713
248-8912
No plant sales, discount on admittance fee

Kahului Library Courtyard
20 School Street, Kahului
873-3097

⌘ Kihei Garden & Landscape
Waiko Rd, Wailuku
244-3804

Kula Botanical Gardens
RR 4, Box 228, Kula, 96790
878-1715

Kula Forest Reserve
Access road at the end of Waipoli Road
984-8100 Maui District Forester, they have maps of Maui's recreation areas

⌘ Maui Nui Botanical Gardens
Kanaloa Ave. across from stadium
249-2798

⌘ Native Hawaiian Tree Source
Makawao
572-6180

Wailea Point
Private condominium residence
4000 Wailea Alanui
Public access points at Four Seasons Resort or Polo Beach
875-9557

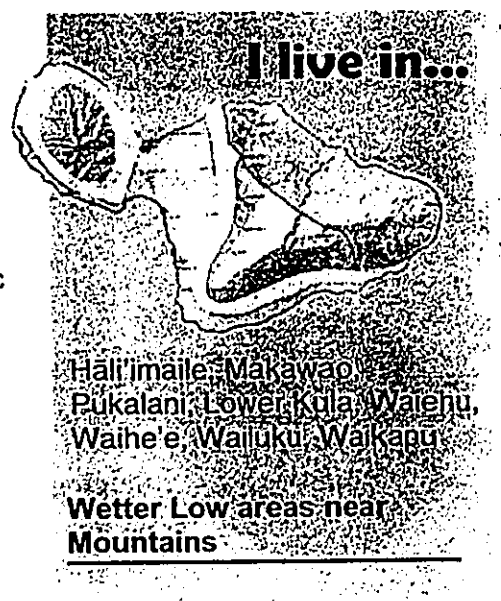
MISC

Brought to you by the East Maui Watershed Partnership, Maui Invasive Species Committee and the County Dept. of Water Supply.

Save water by planting natives!

Did you know that Maui has been in a drought for the last four years? You can help save water by planting native trees and shrubs that are adapted to the climate in which you live. Take pride in your garden and make a difference on our island!

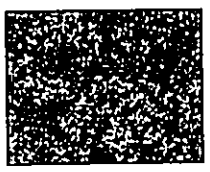
These plants adapt well to the wet and warm climatic zone on Maui. For a complete list of native plants by climatic zone, contact the Dept. of Water Supply at 270-7199.



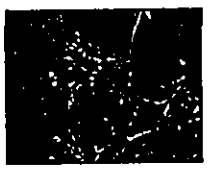
Elevation ranges from 1,000 to 3,000 ft. Because these areas are near mountains, rainfall is higher than the central zone, but temperatures are warmer than the upper leeward zone.

'ŪLEI
The lacy subdivided leaves of this ground cover plant give it a fern-like appearance.

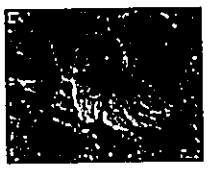
'UKI 'UKI
The juice of this Hawaiian lily was traditionally used as a kapa cloth dye.



NEHE
Low growing (up to 2' tall) with abundant flowers, nehe needs little watering.



'A'ALI'I
This wind tolerant round bush has soft leaves and bright red seed capsules.



MA'O HAU HELE
This hibiscus is the Hawaiian state flower. It can grow as tall as 15'.

HALAPEPE
A unique looking tree that can grow up to 20' tall.

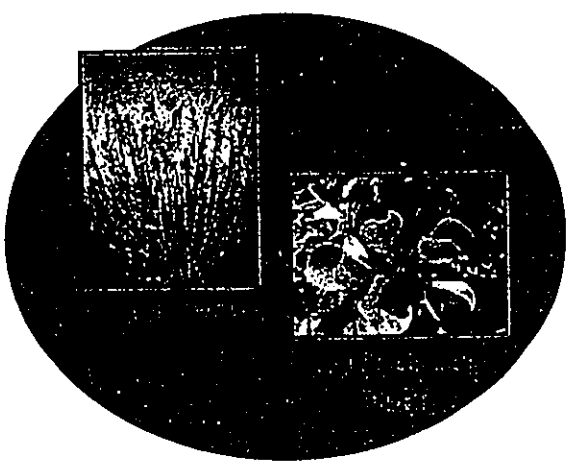
Bring this flyer to participating nurseries to get a discount on native plants. See the back side for details.

Don't plant...

GIANT REED. This sugar-cane like grass from India forms continuous root masses, clogs flood paths, and chokes streams. It has many flowers on 2-foot long, dense plume-like branches, and grows quickly to over 20 feet tall.

AUTOGRAPH TREE. This salt, wind, and drought- tolerant tree from Florida can germinate and spread to other areas, choking host plants with its roots. The tree grows to 33 feet tall.

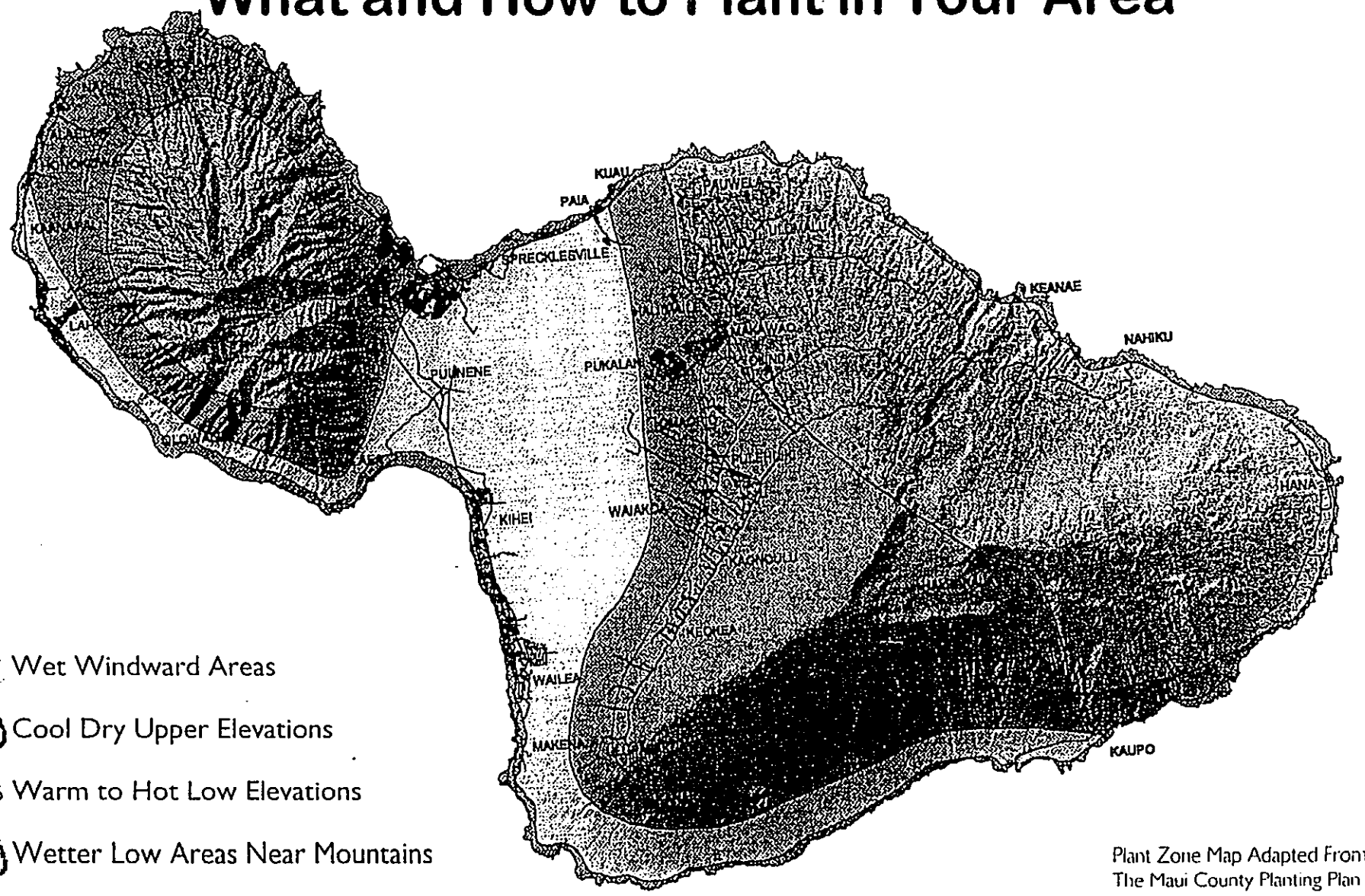
For a complete list of the worst horticultural plants in Hawaii, visit the Department of Land and Natural Resources website at http://www.state.hi.us/dlnr/dofaw/hortweeds/specieslist.htm.



Brought to you by the East Maui Watershed Partnership 573-6999, Maui Invasive Species Committee 573-MISC (6472) and the County Dept. of Water Supply 270-7199.

Saving Water in The Yard

What and How to Plant in Your Area



1 Wet Windward Areas

2 Cool Dry Upper Elevations

3 Warm to Hot Low Elevations

4 Wetter Low Areas Near Mountains

5 Windward Coastal Salt Spray Zones

Plant Zone Map Adapted From
The Maui County Planting Plan

Tips From The Maui County Department of Water Supply

By Water All Things Find Life

Blue

Zone 4

Zone-specific Native and Polynesian plants for Maui County

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

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
F	Sadleria cyatheoides	'ama'u, ama'uma'u				
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis monticola	kalamalo	1'	2'	sea to 3,000'	Dry to Medium
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Ipomoea tuboides	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Peperomia leptostachya	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	Plumbago zeylanica	'ilie'e	1'			
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta rockii	nehe	2'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia arecina	lo'ulu, hawane	40'	10'	1,000' to 3,000'	Dry to Wet
P	Pritchardia forbesiana	lo'ulu	15'			
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Artemisia australis	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium

Blue

Zone 4

Zone-specific Native and Polynesian plants for Maui County

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Artemisia mauiensis var. diffusa	Maui wormwood, 'ahinahina	2'	3'	1,000' to higher	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Bidens menziesii ssp. menziesii	ko'oko'olau	1'	3'		
Sh	Bidens micrantha ssp. micrantha	ko'oko'olau	1'	3'		
Sh	Cordyline fruticosa	ti, ki	6			
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Styphelia tameiameiae	pukiawe	6'	6'	1,000' to higher	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	Nototrichium sandwicense	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Acacia koa	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Canthium odoratum	Alahe'e, 'ohe'e, walahe'e	12'	8'	sea to 3,000'	Dry to Medium
Tr	Charpentiera obovata		15'			
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Diospyros sandwicensis	lama	12'	15'	sea to 3,000'	Dry to Medium
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet
Tr	Morinda citrifolia	Indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet

Blue

Zone 4

Zone-specific Native and Polynesian plants for Maui County

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Tr	Nestegis sandwicensis	olopua	15'	15'	1,000' to 3,000'	Dry to Medium
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Pleomele auwahiensis	halapepe	20'			
Tr	Rauvolfia sandwicensis	hao	20'	15'	sea to 3,000'	Dry to Medium
Tr	Santalum ellipticum	coastal sandalwood, 'ili-ahi	8'	8'	sea to 3,000'	Dry to Medium
Tr	Sophora chrysophylla	mamane	15'	15'	1,000' to 3,000'	Medium
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet
V	Alyxia oliviformis	maile	Vine		sea to 6,000'	Medium to Wet

DO NOT PLANT THESE PLANTS !!!

Common name	Scientific name	Plant family
black wattle	Acacia mearnsii	Mimosaceae
blackberry	Rubus argutus	Rosaceae
blue gum	Eucalyptus globulus	Myrtaceae
bocconia	Bocconia frutescens	Papaveraceae
broad-leaved cordia	Cordia glabra	Boraginaceae
broomsedge, yellow bluestem	Andropogon virginicus	Poaceae
buffelgrass	Cenchrus ciliaris	Poaceae
butterfly bush, smoke bush	Buddleja madagascariensis	Buddlejaceae
cats claw, Mysore thorn, wait-a-bit	Caesalpinia decapetala	Caesalpiniaceae
common ironwood	Casuarina equisetifolia	Casuarinaceae
common velvet grass, Yorkshire fog	Holcus lanatus	Poaceae
fiddlewood	Citharexylum spinosum	Verbenaceae
fire tree, faya tree	Myrica faya	Myricaceae
glorybower	Clerodendrum laponicum	Verbenaceae
hairy cat's ear, gosmore	Hypochoeris radicata	Asteraceae
haole koa	Leucaena leucocephala	Fabaceae
ivy gourd, scarlet-fruited gourd	Coccinia grandis	Cucurbitaceae
juniper berry	Citharexylum caudatum	Verbenaceae
kahili flower	Grevillea banksii	Proteaceae
klu, popinac	Acacia farnesiana	Mimosaceae
logwood, bloodwood tree	Haematoxylon campechianum	Caesalpiniaceae
loquat	Eriobotrya japonica	Rosaceae
meadow ricegrass	Ehrharta stipoides	Poaceae
melaleuca	Melaleuca quinquenervia	Myrtaceae
miconia, velvet leaf	Miconia calvescens	Melastomataceae
narrow-leaved carpetgrass	Axonopus fissifolius	Poaceae
oleaster	Elaeagnus umbellata	Elaeagnaceae
oriental mangrove	Bruguiera gymnorrhiza	Rhizophoraceae
padang cassia	Cinnamomum burmanii	Lauraceae
palmgrass	Setaria palmifolia	Poaceae
pearl flower	Heterocentron subtriplinervium	Melastomataceae
quinine tree	Cinchona pubesens	Rubiaceae
satin leaf, caimitillo	Chrysophyllum oliviforme	Sapotaceae
silkwood, Queensland maple	Flindersia brayleyana	Rutaceae
silky oak, silver oak	Grevillea robusta	Proteaceae
strawberry guava	Psidium cattleianum	Myrtaceae
swamp oak, saltmarsh, longleaf ironwood	Casuarina glauca	Casuarinaceae
sweet vernalgrass	Anthoxanthum odoratum	Poaceae
tree of heaven	Ailanthus altissima	Simaroubaceae
trumpet tree, guarumo	Cecropia obtusifolia	Cecropiaceae
white ginger	Hedychium coronarium	Zingiberaceae
white moho	Heliocarpus popayanensis	Tiliaceae
yellow ginger	Hedychium flavescens	Zingiberaceae

DO NOT PLANT THESE PLANTS !!!

Common name	Scientific name	Plant family
	Jasminum fluminense	Oleaceae
	Arthrostema ciliatum	Melastomataceae
	Dissolis rotundifolia	Melastomataceae
	Erigeron karvinskianus	Asteraceae
	Eucalyptus robusta	Myrtaceae
	Hedychium gardnerianum	Zingiberaceae
	Juncus planifolius	Juncaceae
	Lophostemon confertus	Myrtaceae
	Medinilla cumingii	Melastomataceae
	Medinilla magnifica	Melastomataceae
	Medinilla venosa	Melastomataceae
	Melastoma candidum	Melastomataceae
	Melinis minutiflora	Poaceae
	Olea europaea	
	Oxyspora paniculata	Melastomataceae
	Panicum maximum	Poaceae
	Paspalum urvillei	Poaceae
	Passiflora edulis	Passifloraceae
	Phormium tenax	Agavaceae
	Pinus taeda	Pinaceae
	Prosopis pallida	Fabaceae
	Pterolepis glomerata	Melastomataceae
	Rhodomyrtus tomentosa	Myrtaceae
	Schefflera actinophylla	Araliaceae
	Syzygium jambos	Myrtaceae
Australian blackwood	Acacia melanoxylon	Mimosaceae
Australian tree fern	Cyathea cooperi	Cyatheaceae
Australian tree fern	Sphaeropteris cooperi	Cyatheaceae
Beggar's tick, Spanish needle	Bidens pilosa	Asteraceae
California grass	Brachiaria mutica	Poaceae
Chinese banyon, Maylayan banyon	Ficus mirocarpa	Moraceae
Chinese violet	Asystasia gangetica	Acanthaceae
Christmasberry, Brazilian pepper	Schinus terebinthifolius	Anacardiaceae
Formosan koa	Acacia confusa	Mimosaceae
German ivy	Senecio mikanioides	Asteraceae
Japanese honeysuckle	Lonicera japonica	Caprifoliaceae
Koster's curse	Clidemia hirta	Melastomataceae
Lantana	Lantana camara	Verbenaceae
Mauritius hemp	Furcraea foetida	Agavaceae
Mexican ash, tropical ash	Fraxinus uhdei	Oleaceae
Mexican tulip poppy	Hunnemannia fumariifolia	Papaveraceae
Mules foot, Madagascar tree fern	Angiopteris evecta	Marattiaceae
New Zealand laurel, karakaranut	Corynocarpus laevigatus	Corynocarpaceae
New Zealand tea	Leptospermum scoparium	Myrtaceae
Pampas grass	Cortaderia jubata	Poaceae
Panama rubber tree, Mexican rubber tree	Castilloa elastica	Moraceae
Shoebutton ardisia	Ardisia elliptica	Myrsinaceae
banana poka	Passiflora mollissima	Passifloraceae

Selection

As a general rule, it is best to select the largest and healthiest specimens. However, be sure to note that they are not pot-bound. Smaller, younger plants may result in a low rate of plant survival.[1] When selecting native species, consider the site they are to be planted in, and the space that you have to plant. For example: Mountain species such as koa and maile will not grow well in hot coastal areas exposed to strong ocean breezes. Lowland and coastal species such as wiliwili and Kou require abundant sunshine and porus soil. They will not grow well with frequent cloud cover, high rainfall and heavy soil.

Consider too, the size that the species will grow to be. It is not wise to plant trees that will grow too large.[2] Overplanting tends to be a big problem in the landscape due to the underestimation of a species' height, width or spread.

A large, dense canopied tree such as the kukui is a good shade tree for a lawn. However, it's canopy size and density of shade will limit what can be planted in the surrounding area. Shade cast by a koa and ohia lehua is relatively light and will not inhibit growth beneath it.

Keep seasons in mind when you are selecting your plants. Not all plants look good year round, some plants such as ilima will look scraggly after they have flowered and formed seeds. Avoid planting large areas with only one native plant. Mixing plants which naturally grow together will ensure the garden will look good all year round.[3] Looking at natural habitats helps to show how plants grow naturally in the landscape.

When planting an area with a mixed-ecosystem, keep in mind the size and ecological requirements of each plant. Start with the hardiest and most easily grown species, but allow space for fragile ones in subsequent plantings.

Acquiring natives

Plants in their wild habitat must be protected and maintained. It is best and easiest to get your plants from nurseries (see list), or friend's gardens. Obtain proper permits from landowners and make sure you follow a few common sense rules:

- collect sparingly from each plant or area.
- some plants are on the state or Federal Endangered Species list. Make sure you get permits (see app. A,B)

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[1] K. Nagata, P.6

[2] K. Nagata, P.9

[3] Nagata, P.9

Soil

Once you have selected your site and the plants you wish to establish there, you must look at the soil conditions on the site. Proper soil is necessary for the successful growth of most native plants, which preform poorly in hard pan, clay or adobe soils. If natives are to be planted in these types of soil, it would be wise to dig planting holes several times the size of the rootball and backfill with 50-75% compost.[4] A large planting hole ensures the development of a strong root system. The plant will have a headstart before the roots penetrate the surrounding poor soil.[5]

It is recommended that native plants not be planted in ground that is more dense than potting soil. If there is no alternative, dig a hole in a mound of soil mixed with volcanic cinder which encourages maximum root development. Fill the hole with water, if the water tends to puddle or drain too slowly, dig a deeper hole until the water does not puddle longer than 1 or 2 minutes.[6] Well-drained soil is one of the most important things when planting natives as you will see in the next section.

Irrigation

Most natives do very poorly in waterlogged conditions. Do not water if the soil is damp. Water when the soil is dry and the plants are wilting. Once established, a good soaking twice a week should suffice. Deep soaking encourages the development of stronger, and deeper root systems. This is better than frequent and shallow watering which encourage weaker, more shallow root systems.

The following is a watering schedule from Kenneth Nagata's Booklet, *How To Plant A Native Hawaiian Garden*:

WATER REQUIREMENT	WATERING FREQUENCY
Heavy	3x / week
Moderate	2x / week
Light	1x / week

Red clay soils hold more water for a longer period of time than sandy soils do. If your area is very sunny or near a beach, things will dry out faster. Even in the area of one garden, there are parts that will need more or less water. Soils can vary and amount of shade and wind differ. After plants are established (a month or two for most plants, up to a year for some trees), you can back off watering.

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[4] Nagata, p. 6

[5] Nagata, p. 8

[6] Nagata, p. 8

Automatic sprinkler systems are expensive to install and must be checked and adjusted regularly. Above-ground systems allow you to monitor how much water is being put out, but you lose a lot due to malfunctioning of sprinkler heads and wind. The most efficient way to save water and make sure your plants get enough water, is to hand-water. This way you are getting our precious water to the right places in the right amounts.[7]

Fertilizer

An all-purpose fertilizer 10-10-10 is adequate for most species. They should be applied at planting time, 3 months later, and 6 months thereafter. Use half the dosage recommended for ornamentals and pay special attention to native ferns which are sensitive to strong fertilizers. Use of organic composts and aged animal manures is suggested instead of chemical fertilizers. In addition, use of cinders for providing trace minerals is strongly recommended.[8]

Natives are plants which were here hundreds of years before the polynesians inhabited the Hawaiian Islands. They were brought here by birds, or survived the harsh ocean conditions to float here. They are well-adapted to Hawaii's varying soil and environmental conditions. This is why they make prime specimens for a xeriscape garden. However, natives will not thrive on their own, especially under harsh conditions. On the other hand, like any other plant, if you over-water and over-fertilize them, they will die. Follow the instructions given to you by the nursery you buy the plant from, or from this booklet. Better yet, buy a book (suggested readings can be found in the bibliography in the back of this pamphlet), read it, and learn more about native plants. I guarantee that you will be pleased with the results.

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[7] Bornhorst, p. 19-20

[8] Nagata, p. 6

Propagation

There are many ways to propagate and plant-out native Hawaiian species. One of the most thourough and helpful book is Heidi Bornhorst's book, *Growing Native Hawaiian Plants.* The easiest, and best way to obtain natives for the novice gardener is to get them from a reputable nursery (see appendix c). That way all you will have to do is know how to transplant (if necessary) and plant-out when you are ready. These are the two methods I have listed here.

Transplanting

1. Use pots that are one size bigger than the potted plant is in
2. Get your potting medium ready

Good potting medium is a ½, ½ mixture of peat moss and perlite. If the plant is from a dry or coastal area, add chunks of cinder or extra perlite. If it is a wet forest species, add more peat moss or compost. Be aware that peat moss is very acidic and certain plants react severely to acidity.

If the plant is to eventually be planted into the ground, make a mix of equal parts peat moss, perlite, and soil from the area in which the plant is to be planted. Slow-release fertilizer can be mixed into the potting medium.

3. Once pots, potting medium, fertilizer and water are ready, you can begin re-potting. Keep the plant stem at the same depth it was in the original pot. Avoid putting the plant in too large a pot, as the plant may not be able to soak up all the water in the soil and the roots may drown and rot.

Mix potting medium and add slow-release fertilizer at this time. Pre-wet the medium to keep dust down and lessen shock to the plant. Put medium in bottom of pot. Measure for the correct depth in the new pot. Make sure there is from ½ to 2 inches from the top of the pot so the plant can get adequate water. Try to stand the plant upright and center the stem in the middle of the pot.

Water the plant thoroughly after transplanting. A vitamin B-1 transplanting solution can help to lessen the transplant shock. Keep the plant in the same type of environment as it was before, sun or shade. If roots were broken, trimm off some of the leaves to compensate for the loss.[9]

Planting out

1. Plant most native Hawaiian plants in a sunny location in soil that is well-drained.
2. Make the planting hole twice as wide as the root ball or present pot, and just as deep.

If the soil is clay-like, and drains slowly, mix in some coarse red or bland cinder, coarse perlite or

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[9] Bornhorst, p.20-21

coarse compost. Place some slow-release fertilizer at the bottom of the hole.

3. Carefully remove the plant from the container and place it in the hole.

The top of the soil should be at the same level as the top of the hole, if it is too high or too low, adjust the soil level so that the plant is at the right depth.

4. Water thoroughly after you transplant.

Mulch

Most natives cannot compete with weeds, and therefore must be weeded around constantly in order to thrive. Mulch is a practical alternative, which discourages and prevents weeds from growing.

Hawaii's hot, humid climate leads to the breaking down of organic mulches. Thick organic mulches such as wood chips and leaves, may also be hiding places for pests.

Stone mulches are attractive, permanent and can help to improve soil quality. Red or black cinder, blue rock chips, smooth river rocks and coral chips are some natural choices.[10] Macadamia nut hulls are also easy to find and can make a nice mulch.[11]

Never pile up mulch right next to the stem or trunk of a plant, keep it a few inches away.

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[10] Bornhorst, p. 24

[11] Nagata, p. 7

ZONES

The Maui County Planting Plan has compiled a system of 5 zones of plant growth for Maui County. The descriptions of zones and maps for these zones are as follows:

Zone 1:
Wet areas on the windward side of the island. More than 40 inches of rain per year. Higher than 3,000 feet.

Zone 2:
Cool, dry areas in higher elevations (above 1,000 feet). 20 to 40 inches of rain per year.

Zone 3:
Low, drier areas, warm to hot. Less than 20 inches of rain per year. Sea level to 1,000 feet.

Zone 4:
Lower elevations which are wetter due to proximity of mountains. 1,000 to 3,000 feet.

Zone 5:
Salt spray zones in coastal areas on the windward side.

These zones are to be used as a general guide to planting for Maui County. In addition to looking at the maps, read the descriptions of the zones and decide which zone best fits your area. Plants can be listed in more than one zone and can be planted in a variety of conditions. For best results, take notes on the rainfall, wind, sun and salt conditions of your site. Use the zones as a general guide for selection and read about the plants to decide which best fits your needs as far as care and or function.

PLACES TO SEE NATIVES ON:

The following places propagate native Hawaiian plants from seeds and/or cuttings. Their purpose is to protect and preserve these native plants. Please contact them before going to view the sites, they can provide valuable information and referral to other sources.

Maui:

1. Hoolawa Farms, P.O. Box 731, Haiku, Hawaii, 96708	572-4835
2. The Hawaiian Collection, 1127 Manu St., Kula, Hawaii, 96790	878-1701
3. Kula Botanical Gardens, RR 4, Box 228, Kula, Hawaii, 96790	878-1715
4. Maui Botanical Gardens, Kanaloa Avenue across from stadium	243-7337
5. Kula Forest Reserve, access road at the end of Waipouli Rd. Call the Maui District Forester	984-8100
6. Wailea Point, Private Condominium residence, 4000 Wailea Alanui, public access points at Four Seasons Resort or Polo Beach	875-9557
7. Kahanu Gardens, National Tropical Botanical Garden, Alau Pl, Hana, Hawaii, 96713	248-8912
9. Kahului Library Courtyard, 20 School Street, Kahului, Hawaii	873-3097

ORDINANCE NO. 2108

BILL NO. 6 (1992)

Draft 1

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

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

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

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

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

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

(c) Effective December 31, 1992, only plumbing fixtures and devices specified in this section shall be offered for sale or installed in the County of Maui, unless otherwise indicated in this section. All plumbing fixtures and devices which were installed before December 31, 1992, shall be allowed to be used, repaired or replaced after December 31, 1992.

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

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

pressure.

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

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

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

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

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

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

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

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

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

(f) Any person violating this section shall be fined $250 for each violation and shall correct all instances of non-compliance for which a citation is issued. Violation of this section shall constitute a violation as defined in section 701-107 Hawaii Revised Statutes and shall be enforceable by employees of the department of public works. The foregoing fine may also be imposed in a civil, administrative proceeding pursuant to Rules and Regulations adopted by the department of public works in accordance with chapter 91 Hawaii Revised Statutes."

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

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

APPROVED AS TO FORM
AND LEGALITY:

HOWARD M. FUKUSHIMA
Deputy Corporation Counsel
County of Maui
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'E HEREBY CERTIFY that the foregoing BILL NO. 6 (19 92), Draft 1

1. Passed FINAL READING at the meeting of the Council of the County of Maui, State of Hawaii, held on the 1st day of May , 1992 , by the following votes:

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

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

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

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

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

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

LINDA CROCKETT LINGLE, MAYOR
County of Maui

I HEREBY CERTIFY that upon approval of the foregoing BILL by the Mayor of the County of Maui, the said BILL was designated as ORDINANCE NO. 2108 of the County of Maui, State of Hawaii.

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

Passed First Reading on January 17, 1992.
Effective date of Ordinance May 5, 1992.

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

Dated at Wailuku, Hawaii, on

County Clerk, County of Maui

United States
Environmental Protection
Agency

Office of Water
Washington, DC 20460

840-B-92-002
January 1993

EPA

Guidance Specifying Management Measures For Sources Of Nonpoint Pollution In Coastal Waters

Issued Under the Authority of
Section 6217(g) of the Coastal Zone Act
Reauthorization Amendments of 1990

III. CONSTRUCTION ACTIVITIES

A. Construction Site Erosion and Sediment Control Management Measure

(1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and

(2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

1. Applicability

This management measure is intended to be applied by States to all construction activities on sites less than 5 acres in areas that do not have an NPDES permit[3] in order to control erosion and sediment loss from those sites. This management measure does not apply to: (1) construction of a detached single family home on a site of 1/2 acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. (NOTE: All construction activities, including clearing, grading, and excavation, that result in the disturbance of areas greater than or equal to 5 acres or are a part of a larger development plan are covered by the NPDES regulations and are thus excluded from these requirements.) Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

The goal of this management measure is to reduce the sediment loadings from construction sites in coastal areas that enter surface waterbodies. This measure requires that coastal States establish new or enhance existing State erosion and sediment control (ESC) programs and/or require ESC programs at the local level. It is intended to be part of a comprehensive land use or watershed management program, as previously detailed in the Watershed and Site Development Management Measures. It is expected that State and local programs will establish criteria determined by local conditions (e.g., soil types, climate, meteorology) that reduce erosion and sediment transport from construction sites.

Runoff from construction sites is by far the largest source of sediment in urban areas under development (York County Soil and Water Conservation District, 1990). Soil erosion removes over 90 percent of sediment by tonnage in urbanizing areas where most construction activities occur (Canning, 1988). Table 4-14 illustrates some of the

[3] On May 27, 1992, the United States Court of Appeals for the Ninth Circuit invalidated EPA's exemption of construction sites smaller than 5 acres from the storm water permit program in *Natural Resources Defense Council* v. *EPA*, 965 F.2d 759 (9th Cir. 1992). EPA is conducting further rulemaking proceedings on this issue and will not require permit applications for construction activities under 5 acres until further rulemaking has been completed.

measured sediment loading rates associated with construction activities found across the United States. As seen in Table 4-14, erosion rates from natural areas such as undisturbed forested lands are typically less than one ton/acre/year, while erosion from construction sites ranges from 7.2 to over 1,000 tons/acre/year.

Table 4-14. Erosion and Sediment Problems Associated With Construction

Location	Problem	Reference
United States	Sediment loading rates vary from 36.5 to 1,000 ton/ac/yr. These are 5 to 500 times greater than those from undeveloped land. Approximately 600 million tons of soil erodes from developed sites each year. Construction site sediment in runoff can be 10 to 20 times greater than that from agricultural lands.	York County Soil and Water Conservation District, 1990
Franklin County, FL	Sediment yield (ton/ac/yr): forest < 0.5 rangeland < 0.5 tilled 1.4 construction site 30 established urban < 0.5	Franklin County, FL
Wisconsin	Erosion rates range from 30 to 200 ton/ac/yr (10 to 20 times those of cropland).	Wisconsin Legislative Council, 1991
Washington, DC	Erosion rates range from 35 to 45 ton/ac/yr (10 to 100 times greater than agriculture and stabilized urban land uses).	MWCOG, 1987
Anacostia River Basin, VA, MD, DC	Sediment yields from portions of the Anacostia Basin have been estimated at 75,000 to 132,000 ton/yr.	U.S. Army Corps of Engineers, 1990
Washington	Erosion rates range from 50 to 500 ton/ac/yr. Natural erosion rates from forests or well-sodded prairies are 0.01 to 1.0 ton/ac/yr.	Washington Department of Ecology, 1989
Anacostia River Basin, VA, MD, DC	Erosion rates range from 7.2 to 100.8 ton/ac/yr.	USGS, 1978
Alabama	1.4 million tons eroded per year.	Woodward-Clyde, 1991
North Carolina	6.7 million tons eroded per year.	
Louisiana	5.1 million tons eroded per year.	
Oklahoma	4.2 million tons eroded per year.	
Georgia	3.8 million tons eroded per year.	
Texas	3.5 million tons eroded per year.	
Tennessee	3.3 million tons eroded per year.	
Pennsylvania	3.1 million tons eroded per year.	
Ohio	3.0 million tons eroded per year.	
Kentucky	3.0 million tons eroded per year.	

roded sediment from construction sites creates many problems in coastal areas including adverse impacts on water uality, critical habitats, submerged aquatic vegetation (SAV) beds, recreational activities, and navigation (APWA, 991). For example, the Miami River in Florida has been severely affected by pollution associated with upland rosion. This watershed has undergone extensive urbanization, which has included the construction of many ommercial and residential buildings over the past 50 years. Sediment deposited in the Miami River channel ontributes to the severe water quality and navigation problems of this once-thriving waterway, as well as Biscayne Bay (SFWMD, 1988).

ESC plans are important for controlling the adverse impacts of construction and land development and have been equired by many State and local governments, as shown in Table 4-13 (in the Site Development section of this hapter). An ESC plan is a document that explains and illustrates the measures to be taken to control erosion and ediment problems on construction sites (Connecticut Council on Soil and Water Conservation, 1988). It is intended hat existing State and local erosion and sediment control plans may be used to fulfill the requirements of this nanagement measure. Where existing ESC plans do not meet the management measure criteria, inadequate plans nay be enhanced to meet the management measure guidelines.

Typically, an ESC plan is part of a larger site plan and includes the following elements:

- Description of predominant soil types;
- Details of site grading including existing and proposed contours;
- Design details and locations for structural controls;
- Provisions to preserve topsoil and limit disturbance;
- Details of temporary and permanent stabilization measures; and
- Description of the sequence of construction.

ESC plans ensure that provisions for control measures are incorporated into the site planning stage of development and provide for the reduction of erosion and sediment problems and accountability if a problem occurs (York County Soil and Water Conservation District, 1990). An effective plan for urban runoff management on construction sites will control erosion, retain sediments on site, to the extent practicable, and reduce the adverse effects of runoff. Climate, topography, soils, drainage patterns, and vegetation will affect how erosion and sediment should be controlled on a site (Washington State Department of Ecology, 1989). An effective ESC plan includes both structural and nonstructural controls. Nonstructural controls address erosion control by decreasing erosion potential, whereas structural controls are both preventive and mitigative because they control both erosion and sediment movement.

Typical nonstructural erosion controls include (APWA, 1991; York County Soil and Water Conservation District, 1990):

- Planning and designing the development within the natural constraints of the site;
- Minimizing the area of bare soil exposed at one time (phased grading);
- Providing for stream crossing areas for natural and man-made areas; and
- Stabilizing cut-and-fill slopes caused by construction activities.

Structural controls include:

- Perimeter controls;
- Mulching and seeding exposed areas;
- Sediment basins and traps; and
- Filter fabric, or silt fences.

Some erosion and soil loss are unavoidable during land-disturbing activities. While proper siting and design will help prevent areas prone to erosion from being developed, construction activities will invariably produce conditions where erosion may occur. To reduce the adverse impacts associated with construction, the construction management measure suggests a system of nonstructural and structural erosion and sediment controls for incorporation into an

ESC plan. Erosion controls have distinct advantages over sediment controls. Erosion controls reduce the amount of sediment transported off-site, thereby reducing the need for sediment controls. When erosion controls are used in conjunction with sediment controls, the size of the sediment control structures and associated maintenance may be reduced, decreasing the overall treatment costs (SWRPC, 1991).

3. Management Measure Selection

This management measure was selected to minimize sediment being transported outside the perimeter of a construction site through two broad performance goals: (1) **reduce** erosion and (2) **retain** sediment onsite, to the extent practicable. These performance goals were chosen to allow States and local governments flexibility in specifying practices appropriate for local conditions.

While several commentors responding to the draft (May 1991) guidance expressed the need to define "more measurable, enforceable ways" to control sediment loadings, other commentors stressed the need to draft management measures that do not conflict with existing State programs and allow States and local governments to determine appropriate practices and design standards for their communities. These management measures were selected because virtually all coastal States control construction activities to prevent erosion and sediment loss.

The measures were specifically written for the following reasons:

(1) Predevelopment loadings may vary greatly, and some sediment loss is usually inevitable;

(2) Current practice is built on the use of systems of practices selected based on site-specific conditions; and

(3) The combined effectiveness of erosion and sediment controls in systems is not easily quantified.

4. Erosion Control Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Erosion controls are used to reduce the amount of sediment that is detached during construction and to prevent sediment from entering runoff. Erosion control is based on two main concepts: (1) disturb the smallest area of land possible for the shortest period of time, and (2) stabilize disturbed soils to prevent erosion from occurring.

a. *Schedule projects so clearing and grading are done during the time of minimum erosion potential.*

Often a project can be scheduled during the time of year that the erosion potential of the site is relatively low. In many parts of the country, there is a certain period of the year when erosion potential is relatively low and construction scheduling could be very effective. For example, in the Pacific region if construction can be completed during the 6-month dry season (May 1 - October 31), temporary erosion and sediment controls may not be needed. In addition, in some parts of the country erosion potential is very high during certain parts of the year such as the spring thaw in northern areas. During this time of year, melting snowfall generates a constant runoff that can erode soil. In addition, construction vehicles can easily turn the soft, wet ground into mud, which is more easily washed offsite. Therefore, in the north, limitations should be placed on grading during the spring thaw (Goldman et al., 1986).

b. *Stage construction.*

id areawide clearance of construction sites. Plan and stage land disturbance activities so that only the area ently under construction is exposed. As soon as the grading and construction in an area are complete, the area ıld be stabilized.

clearing only those areas immediately essential for completing site construction, buffer zones are preserved and remains undisturbed until construction begins. Physical markers, such as tape, signs, or barriers, indicating the .ts of land disturbance, can ensure that equipment operators know the proposed limits of clearing. The area of watershed that is exposed to construction is important for determining the net amount of erosion. Reducing the ent of the disturbed area will ultimately reduce sediment loads to surface waters. Existing or newly planted etation that has been planted to stabilize disturbed areas should be protected by routing construction traffic around protecting natural vegetation with fencing, tree armoring, retaining walls, or tree wells.

c. *Clear only areas essential for construction.*

en areas of a construction site are unnecessarily cleared. Only those areas essential for completing construction .vities should be cleared, and other areas should remain undisturbed. Additionally, the proposed limits of land urbance should be physically marked off to ensure that only the required land area is cleared. Avoid disturbing ;etation on steep slopes or other critical areas.

d. *Locate potential nonpoint pollutant sources away from steep slopes, waterbodies, and critical areas.*

ıterial stockpiles, borrow areas, access roads, and other land-disturbing activities can often be located away from ;ical areas such as steep slopes, highly erodible soils, and areas that drain directly into sensitive waterbodies.

e. *Route construction traffic to avoid existing or newly planted vegetation.*

nere possible, construction traffic should travel over areas that must be disturbed for other construction activity. is practice will reduce the area that is cleared and susceptible to erosion.

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

ee armoring protects tree trunks from being damaged by construction equipment. Fencing can also protect tree nks, but should be placed at the tree's drip line so that construction equipment is kept away from the tree. The e drip line is the minimum area around a tree in which the tree's root system should not be disturbed by cut, fill, soil compaction caused by heavy equipment. When cutting or filling must be done near a tree, a retaining wall tree well should be used to minimize the cutting of the tree's roots or the quantity of fill placed over the tree's ots.

g. *Stockpile topsoil and reapply to revegetate site.*

ecause of the high organic content of topsoil, it cannot be used as fill material or under pavement. After a site is leared, the topsoil is typically removed. Since topsoil is essential to establish new vegetation, it should be :ockpiled and then reapplied to the site for revegetation, if appropriate. Although topsoil salvaged from the existing ite can often be used, it must meet certain standards and topsoil may need to be imported onto the site if the existing ɔpsoil is not adequate for establishing new vegetation.

h. *Cover or stabilize topsoil stockpiles.*

Unprotected stockpiles are very prone to erosion and therefore stockpiles must be protected. Small stockpiles can be covered with a tarp to prevent erosion. Large stockpiles should be stabilized by erosion blankets, seeding, and/or mulching.

i. *Use wind erosion controls.*

Wind erosion controls limit the movement of dust from disturbed soil surfaces and include many different practices. Wind barriers block air currents and are effective in controlling soil blowing. Many different materials can be used as wind barriers, including solid board fence, snow fences, and bales of hay. Sprinkling moistens the soil surface with water and must be repeated as needed to be effective for preventing wind erosion (Delaware DNREC, 1989); however, applications must be monitored to prevent excessive runoff and erosion.

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

Earth dikes, perimeter dikes or swales, or diversions can be used to intercept and convey runoff above disturbed areas. An earth dike is a temporary berm or ridge of compacted soil that channels water to a desired location. A perimeter dike/swale or diversion is a swale with a supporting ridge on the lower side that is constructed from the soil excavated from the adjoining swale (Delaware DNREC, 1989). These practices should be used to intercept flow from denuded areas or newly seeded areas to keep the disturbed areas from being eroded from the uphill runoff. The structures should be stabilized within 14 days of installation. A pipe slope drain, also known as a pipe drop structure, is a temporary pipe placed from the top of a slope to the bottom of the slope to convey concentrated runoff down the slope without causing erosion (Delaware DNREC, 1989).

k. *On long or steep, disturbed, or man-made slopes, construct benches, terraces, or ditches at regular intervals to intercept runoff.*

Benches, terraces, or ditches break up a slope by providing areas of low slope in the reverse direction. This keeps water from proceeding down the slope at increasing volume and velocity. Instead, the flow is directed to a suitable outlet, such as a sediment basin or trap. The frequency of benches, terraces, or ditches will depend on the erodibility of the soils, steepness and length of the slope, and rock outcrops. This practice should be used if there is a potential for erosion along the slope.

l. *Use retaining walls.*

Often retaining walls can be used to decrease the steepness of a slope. If the steepness of a slope is reduced, the runoff velocity is decreased and, therefore, the erosion potential is decreased.

m. *Provide linings for urban runoff conveyance channels.*

Often construction increases the velocity and volume of runoff, which causes erosion in newly constructed or existing urban runoff conveyance channels. If the runoff during or after construction will cause erosion in a channel, the channel should be lined or flow control BMPs installed. The first choice of lining should be grass or sod since this reduces runoff velocities and provides water quality benefits through filtration and infiltration. If the velocity in the channel would erode the grass or sod, then riprap, concrete, or gabions can be used.

n. *Use check dams.*

Check dams are small, temporary dams constructed across a swale or channel. They can be constructed using gravel or straw bales. They are used to reduce the velocity of concentrated flow and, therefore, to reduce the erosion in

ıvale or channel. Check dams should be used when a swale or channel will be used for a short time and therefore s not feasible or practical to line the channel or implement flow control BMPs (Delaware DNREC, 1989).

o. Seed and fertilize.

eding establishes a vegetative cover on disturbed areas. Seeding is very effective in controlling soil erosion once ıense vegetative cover has been established. However, often seeding and fertilizing do not produce as thick a getative cover as do seed and mulch or netting. Newly established vegetation does not have as extensive a root stem as existing vegetation and therefore is more prone to erosion, especially on steep slopes. Care should be cen when fertilizing to avoid untimely or excessive application. Since the practice of seeding and fertilizing does ıt provide any protection during the time of vegetative establishment, it should be used only on favorable soils in ry flat areas and not in sensitive areas.

p. Use seeding and mulch/mats.

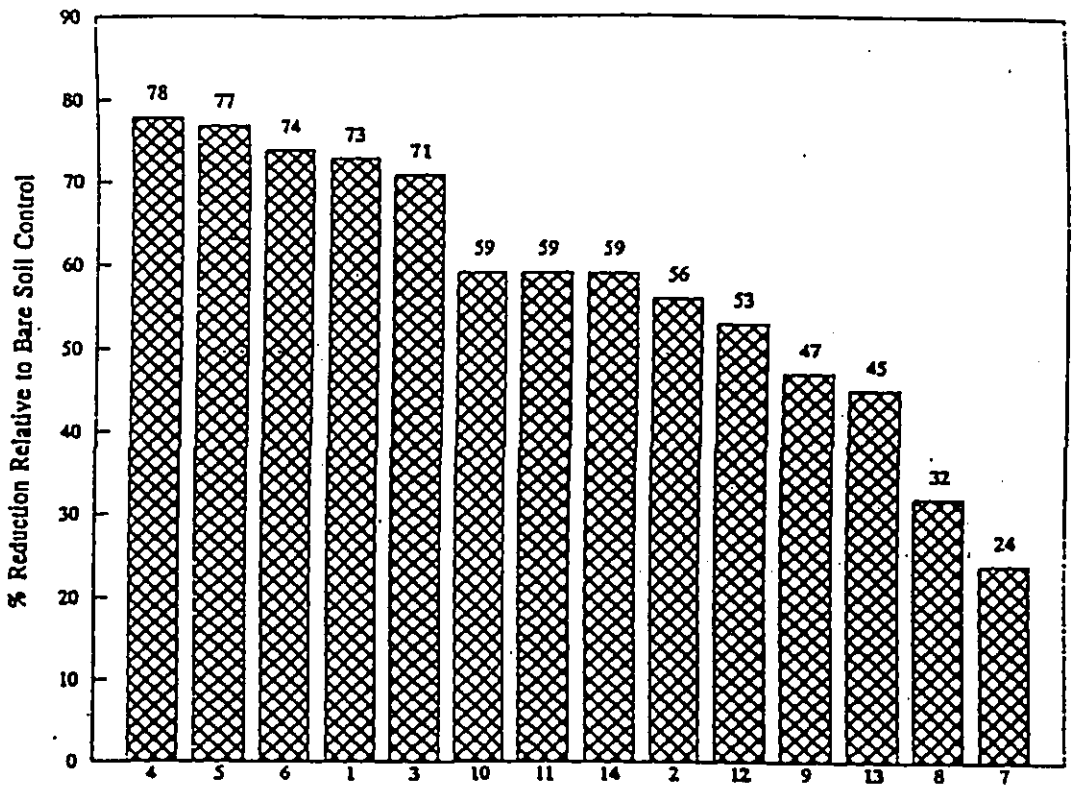
eding establishes a vegetative cover on disturbed areas. Seeding is very effective in controlling soil erosion once : vegetative cover has been established. The mulching/mats protect the disturbed area while the vegetation comes established.

ıe management of land by using ground cover reduces erosion by reducing the flow rate of runoff and the raindrop ıpact. Bare soils should be seeded or otherwise stabilized within 15 calendar days after final grading. Denuded eas that are inactive and will be exposed to rain for 30 days or more should also be temporarily stabilized, usually r planting seeds and establishing vegetation during favorable seasons in areas where vegetation can be established. very flat, non-sensitive areas with favorable soils, stabilization may involve simply seeding and fertilizing. ulching and/or sodding may be necessary as slopes become moderate to steep, as soils become more erosive, and areas become more sensitive.

q. Use mulch/mats.

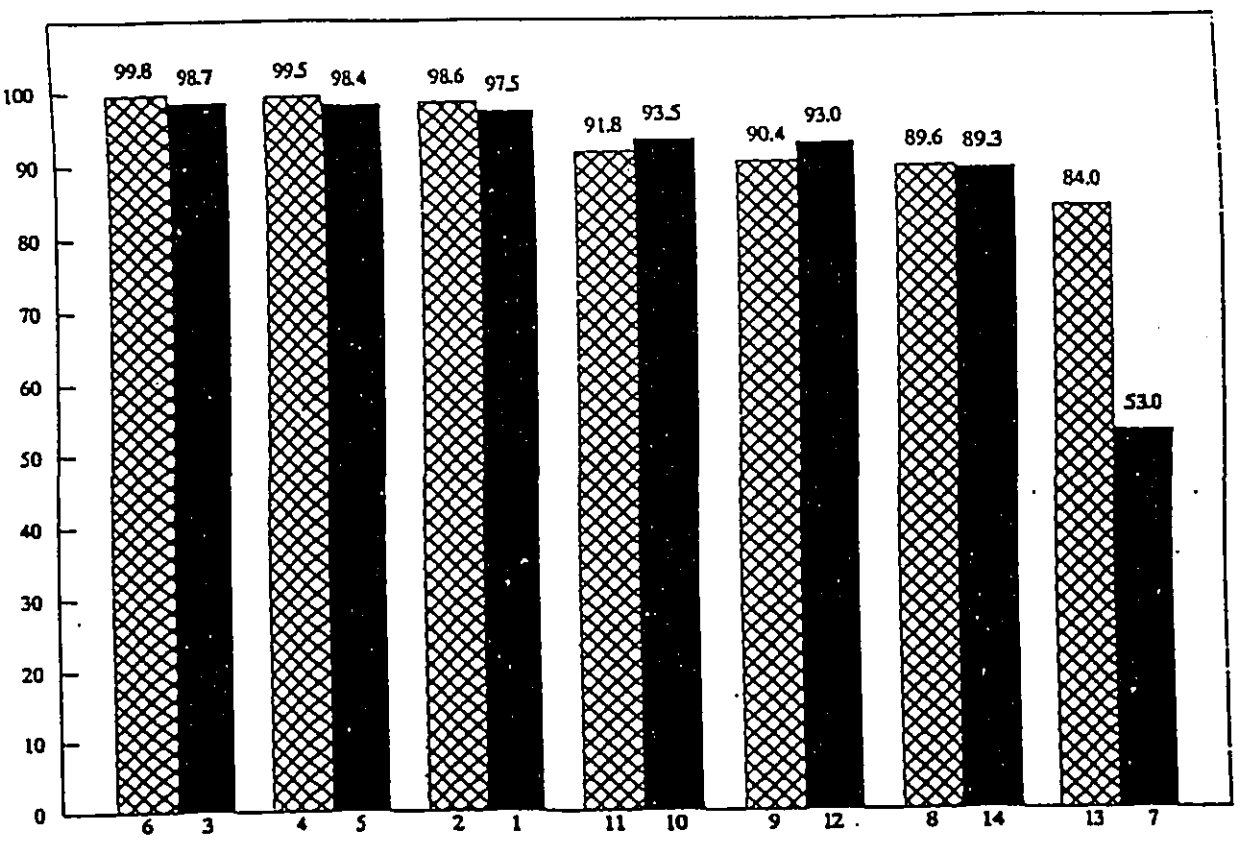
Mulching involves applying plant residues or other suitable materials on disturbed soil surfaces. Mulchs/mats used ıclude tacked straw, wood chips, and jute netting and are often covered by blankets or netting. Mulching alone ıould be used only for temporary protection of the soil surface or when permanent seeding is not feasible. The seful life of mulch varies with the material used and the amount of precipitation, but is approximately 2 to 6 ıonths. Figure 4-5 shows water velocity reductions that could be expected using various mulching techniques. imilarly, Figure 4-6 shows reductions in soil loss achievable using various mulching techniques. During times of ear when vegetation cannot be established, soil mulching should be applied to moderate slopes and soils that are ot highly erodible. On steep slopes or highly erodible soils, multiple mulching treatments should be used. On a igh-elevation or desert site where grasses cannot survive the harsh environment, native shrubs may be planted. ıterlocking ceramic materials, filter fabric, and netting are available for this purpose. Before stabilizing an area, . is important to have installed all sediment controls and diverted runoff away from the area to be planted. Runoff ıay be diverted away from denuded areas or newly planted areas using dikes, swales, or pipe slope drains to ıtercept runoff and convey it to a permanent channel or storm drain. Reserved topsoil may be used to revegetate site if the stockpile has been covered and stabilized.

Consideration should be given to maintenance when designing mulching and matting schemes. Plastic nets are often ısed to cover the mulch or mats; however, they can foul lawn mower blades if the area requires mowing.



Mulch Material	Characteristics
1	100% wheat straw/top net
2	100% wheat straw/two nets
3	70% wheat straw/30% coconut fiber
4	70% wheat straw/30% coconut fiber
5	100% coconut fiber
6	Nylon monofilament/two nets
7	Nylon monofilament/rigid/bonded
8	Vinyl monofilament/flexible/bonded
9	Curled wood fibers/top net
10	Curled wood fibers/two nets
11	Antiwash netting (jute)
12	Interwoven paper and thread
13	Uncrimped wheat straw – 2,242 kg/ha
14	Uncrimped wheat straw – 4,484 kg/ha

Figure 4-5. Water velocity reductions for different mulch treatments (adapted from Harding, 1990).



Mulch Material	Characteristics
1	100% wheat straw/top net
2	100% wheat straw/two nets
3	70% wheat straw/30% coconut fiber
4	70% wheat straw/30% coconut fiber
5	100% coconut fiber
6	Nylon monofilament/two nets
7	Nylon monofilament/rigid/bonded
8	Vinyl monofilament/flexible/bonded
9	Curled wood fibers/top net
10	Curled wood fibers/two nets
11	Antiwash netting (jute)
12	Interwoven paper and thread
13	Uncrimped wheat straw – 2,242 kg/ha
14	Uncrimped wheat straw – 4,484 kg/ha

Figure 4-6. Actual soil loss reductions for different mulch treatments (adapted from Harding, 1990).

r. Use sodding.

Sodding permanently stabilizes an area. Sodding provides immediate stabilization of an area and should be used in critical areas or where establishment of permanent vegetation by seeding and mulching would be difficult. Sodding is also a preferred option when there is a high erosion potential during the period of vegetative establishment from seeding.

s. Use wildflower cover.

Because of the hardy drought-resistant nature of wildflowers, they may be more beneficial as an erosion control practice than turf grass. While not as dense as turfgrass, wildflower thatches and associated grasses are expected to be as effective in erosion control and contaminant absorption. Because thatches of wildflowers do not need fertilizers, pesticides, or herbicides, and watering is minimal, implementation of this practice may result in a cost savings (Brash et al., undated). In 1987, Howard County, Maryland, spent $690.00 per acre to maintain turfgrass areas, compared to only $31.00 per acre for wildflower meadows (Wilson, 1990).

A wildflower stand requires several years to become established; maintenance requirements are minimal once the area is established (Brash et al., undated).

5. Sediment Control Practices[4]

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Sediment controls capture sediment that is transported in runoff. Filtration and detention (gravitational settling) are the main processes used to remove sediment from urban runoff.

a. Sediment Basins

Sediment basins, also known as silt basins, are engineered impoundment structures that allow sediment to settle out of the urban runoff. They are installed prior to full-scale grading and remain in place until the disturbed portions of the drainage area are fully stabilized. They are generally located at the low point of sites, away from construction traffic, where they will be able to trap sediment-laden runoff.

Sediment basins are typically used for drainage areas between 5 and 100 acres. They can be classified as either temporary or permanent structures, depending on the length of service of the structure. If they are designed to function for less than 36 months, they are classified as "temporary"; otherwise, they are considered permanent structures. Temporary sediment basins can also be converted into permanent urban runoff management ponds. When sediment basins are designed as permanent structures, they must meet all standards for wet ponds.

b. Sediment Trap

Sediment traps are small impoundments that allow sediment to settle out of runoff water. Sediment traps are typically installed in a drainageway or other point of discharge from a disturbed area. Temporary diversions can be

[4]Adapted from Goldman (1986).

used to direct runoff to the sediment trap. Sediment traps should not be used for drainage areas greater than 5 acres and typically have a useful life of approximately 18 to 24 months.

c. Filter Fabric Fence

Filter fabric fence is available from many manufacturers and in several mesh sizes. Sediment is filtered out as urban runoff flows through the fabric. Such fences should be used only where there is sheet flow (i.e., no concentrated flow), and the maximum drainage area to the fence should be 0.5 acre or less per 100 feet of fence. Filter fabric fences have a useful life of approximately 6 to 12 months.

d. Straw Bale Barrier

A straw bale barrier is a row of anchored straw bales that detain and filter urban runoff. Straw bales are less effective than filter fabric, which can usually be used in place of straw bales. However, straw bales have been effectively used as temporary check dams in channels. As with filter fabric fences, straw bale barriers should be used only where there is sheet flow. The maximum drainage area to the barrier should be 0.25 acre or less per 100 feet of barrier. The useful life of straw bales is approximately 3 months.

e. Inlet Protection

Inlet protection consists of a barrier placed around a storm drain drop inlet, which traps sediment before it enters the storm sewer system. Filter fabric, straw bales, gravel, or sand bags are often used for inlet protection.

f. Construction Entrance

A construction entrance is a pad of gravel over filter cloth located where traffic leaves a construction site. As vehicles drive over the gravel, mud, and sediment are collected from the vehicles' wheels and offsite transport of sediment is reduced.

g. Vegetated Filter Strips

Vegetated filter strips are low-gradient vegetated areas that filter overland sheet flow. Runoff must be evenly distributed across the filter strip. Channelized flows decrease the effectiveness of filter strips. Level spreading devices are often used to distribute the runoff evenly across the strip (Dillaha et al., 1989).

Vegetated filter strips should have relatively low slopes and adequate length and should be planted with erosion-resistant plant species. The main factors that influence the removal efficiency are the vegetation type, soil infiltration rate, and flow depth and travel time. These factors are dependent on the contributing drainage area, slope of strip, degree and type of vegetative cover, and strip length. Maintenance requirements for vegetated filter strips include sediment removal and inspections to ensure that dense, vigorous vegetation is established and concentrated flows do not occur. Maintenance of these structures is discussed in Section II.A of this chapter.

6. Effectiveness and Cost Information

a. Erosion Control Practices

The effectiveness of erosion control practices can vary based on land slope, the size of the disturbed area, rainfall frequency and intensity, wind conditions, soil type, use of heavy machinery, length of time soils are exposed and unprotected, and other factors. In general, a system of erosion and sediment control practices can more effectively reduce offsite sediment transport than can a single system. Numerous nonstructural measures such as protecting natural or newly planted vegetation, minimizing the disturbance of vegetation on steep slopes and other highly

erodible areas, maximizing the distance eroded material must travel before reaching the drainage system, and locating roads away from sensitive areas may be used to reduce erosion.

Table 4-15 contains the available cost and effectiveness data for some of the erosion controls listed above. Information on the effectiveness of individual nonstructural controls was not available. All reported effectiveness data assume that controls are properly designed, constructed, and maintained. Costs have been broken down into annual capital costs, annual maintenance costs, and total annual costs (including annualization of the capital costs).

b. Sediment Control Practices

Regular inspection and maintenance are needed for most erosion control practices to remain effective. The effectiveness of sediment controls will depend on the size of the construction site and the nature of the runoff flows. Sediment basins are most appropriate for drainage areas of 5 acres or greater. In smaller areas with concentrated flows, silt traps may suffice. Where concentrated flow leaves the site and the drainage area is less than 0.5 ac/100 ft of flow, filter fabric fences may be effective. In areas where sheet flow leaves the site and the drainage area is greater than 0.5 acre/100 ft of flow, perimeter dikes may be used to divert the flow to a sediment trap or sediment basin. Urban runoff inlets may be protected using straw bales or diversions to filter or route runoff away from the inlets.

Table 4-16 describes the general cost and effectiveness of some common sediment control practices.

c. Comparisons

Figure 4-7 illustrates the estimated TSS loading reductions from Maryland construction sites possible using a combination of erosion and sediment controls in contrast to using only sediment controls. Figure 4-8 shows a comparison of the cost and effectiveness of various erosion control practices. As can be seen in Figure 4-8, seeding or seeding and mulching provide the highest levels of control at the lowest cost.

Table 4-15. ESC Quantitative Effectiveness and Cost Summary

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Sod	Immediate erosion protection where there is high erosion potential during vegetative establishment.	Average: 99% Observed range: 98% - 99% References: Minnesota Pollution Control Agency, 1989; Pennsylvania, 1983 cited in USEPA, 1991	2	Average: $0.2 per ft^2 [$11,300 per acre] Range: $0.1 - $1.1 References: SWRPC, 1991; Schueler, 1987; Virginia, 1980	Average: 5% Range: 5% Reference: SWRPC, 1991	$0.20 per ft^2 $7,500 per acre
Seed	Establish vegetation on disturbed area.	After vegetation established- Average: 90% Observed range: 50% - 100% References: SCS, 1985 cited in EPA, 1991; Minnesota Pollution Control Agency, 1989; Oberts, 1984 cited in City of Austin, 1988; Delaware Department of Natural Resources, 1989	2	Average: $400 per acre Range: $200 - $1000 per acre References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1986; Virginia, 1980	Average: 20% Range: 15% - 25% References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991	$300 per acre
Seed and Mulch	Establish vegetation on disturbed area.	After vegetation established- Average: 90% Observed range: 50% - 100% References: SCS, 1985 cited in EPA, 1991; Minnesota Pollution Control Agency, 1989; Oberts, 1984 cited in City of Austin, 1988; Delaware Department of Natural Resources, 1989	2	Average: $1,500 per acre Range: $800 - $3,500 per acre References: Goldman, 1986; Washington DOT, 1990; NC State, 1990; Schueler, 1987; Virginia, 1980; SWRPC, 1991	Average: NA[b] Range: NA References: None	$1,100 per acre

Table 4-15. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Mulch	Temporary stabilization of disturbed area.	Observed range: sand: 20% slope / 50% slope wood fiber @ 1500 lb/ac: 50-60% / 0-20% wood fiber @ 3000 lb/ac: 50-85% / 50-70% straw @ 3000 lb/ac: 90-100% / 95% Silt-loam: 20% slope / 50% slope wood fiber @ 1500 lb/ac: 20-60% / 40-60% wood fiber @ 3000 lb/ac: 60-90% / 60-70% straw @ 3000 lb/ac: 80-95% / 70-90% Silt-clay-loam: 10-30% slope / 30-50% slope wood fiber @ 1500 lb/ac: 5% / -- wood fiber @ 3000 lb/ac: 40% / -- jute netting: 30-60% / 30% straw @ 3000 lb/ac: 40-70% / 20-40% wood chips @ 10,000 lb/ac: 60-80% / 50-60% mulch blanket: 60-80% / 50-60% excelsior blanket: 60-80% / 50-60% multiple treatment (straw and jute): 90% / 90% References: Minnesota Pollution Control Agency, 1989; Kay, 1983 cited in Goldman, 1986	Straw mulch: 0.25 Wood fiber mulch: 0.33 Jute netting: 0.33 Straw and jute: 0.33	Straw mulch: Average: $1,700 per acre Range: $500 - $5,000 per acre References: Wisconsin DOT cited in SWRPC, 1991; Washington DOT, 1990; Virginia, 1980 Wood fiber mulch: Average: $1,000 per acre Range: $100 - $2,300 per acre References: Washington DOT, 1990; Virginia, 1980 Jute netting: Average: $3,700 per acre Range: $3,500-$4,100 per acre References: Washington DOT, 1990; Virginia, 1980 Straw and jute: Average: $5,400 per acre Range: $4,000-$9,100 per acre References: Washington DOT, 1990; Virginia, 1980	Average: NA[b] Range: NA References: None	Straw mulch: $7,500 per acre Wood fiber mulch: $3,500 per acre Jute netting: $12,500 per acre Straw and jute: $18,000 per acre

Table 4-15. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Terraces	Break up long or steep slopes.	Observed range: Land Slope / Reduction in Erosion 1-12% / 70% 12-18% / 60% 18-24% / 55% Additionally, if the slope steepness is halved, while other factors are held constant, the soil loss potential decreases 2-1/2 times. If both the slope and length are halved, the soil loss potential is decreased 4 times. References: Goldman, 1986; Beasley, 1972	2	Average: $5 per lin ft Range: $1 - $12 References: SWRPC, 1991; Goldman, 1986; Virginia, 1991	Average: 20% Range: 20% Reference: SWRPC, 1991	$4 per lin ft
All Erosion Controls	Reduce amount of sediment entering runoff.	Average: 85% Observed range: 85% Reference: Schueler, 1990	--	Varies but typically low	Varies but typically low	Varies but typically low

NA - Not available.
[a] Useful life estimated as length of construction project (assumed to be 2 years).
[b] For Total Annual Cost, assume Annual Maintenance Cost = 2% of construction cost.

Table 4-16. ESC Quantitative Effectiveness and Cost Summary for Sediment Control Practices

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Sediment basin	Minimum drainage area = 5 acres, maximum drainage area = 100 acres	Average: 70% Observed range: 55% - 100% References: Schueler, 1990; Engle, BW and Jarrett, AR, 1990; Baumann, 1990	2	Less than 50,000 ft^3 storage Average: \$0.60 per ft^3 storage (\$1,100 per drainage acre[c]) Range: \$0.20 - \$1.30 per ft^3 Greater than 50,000 ft^3 storage Average: \$0.3 per ft^3 storage (\$550 per drainage acre[c]) Range: \$0.10 - \$0.40 per ft^3 References: SWRPC, 1991	Average: 25% Range: 25% References: Denver COG cited in SWRPC, 1991; SWRPC, 1991	Less than 50,000 ft^3 storage \$0.40 per ft^3 storage \$700 per drainage acre[b] Greater than 50,000 ft^3 storage \$0.20 per ft^3 storage \$900 per drainage acre[c]
Sediment trap	Maximum drainage area = 5 acres	Average: 60% Observed range: (-7%) - 100% References: Schueler, et al., 1990; Tahoe Regional Planning Agency, 1989; Baumann, 1990	1.5	Average: \$0.60 per ft^3 storage (\$1,100 per drainage acre[c]) Range: \$0.20 - \$2.00 per ft^3 References: Denver COG cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1986	Average: 20% Range: 20% References: Denver COG cited in SWRPC, 1991; SWRPC, 1991	\$0.70 per ft^3 storage \$1,300 per drainage acre[c]
Filter Fabric Fence	Maximum drainage area = 0.5 acre per 100 feet of fence. Not to be used in concentrated flow areas.	Average: 70% Observed range: 0% - 100% sand: 80% - 99% silt-loam: 50% - 80% silt-clay-loam: 0% - 20% References: Munson, 1991; Fisher et al., 1984; Minnesota Pollution Control Agency, 1989	0.5	Average: \$3 per lin ft (\$700 per drainage acre[c] Range: \$1 - \$8 per lin ft References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1986; Virginia, 1991; NC State, 1990	Average: 100% Range: 100% References: SWRPC, 1991	\$7 per lin ft \$850 per drainage acre[c]

Table 4-16. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Straw Bale Barrier	Maximum drainage area = 0.25 acre per 100 feet of barrier. Not to be used in concentrated flow areas.	Average: 70% Observed Range: 70% References: Virginia, 1980 cited in EPA, 1991	0.25	Average: $4 per lin ft ($1,600 per drainage acre[d] Range: $2 - $6 per lin ft References: Goldman, 1986; Virginia, 1991	Average: 100% Range: 100% References: SWRPC, 1991	$17 per lin ft $6,800 per drainage acre[d]
Inlet Protection	Protect storm drain inlet.	Average: NA Observed Range: NA References: None	1	Average: $100 per inlet Range: $50 - $150 References: SWRPC, 1991; Denver COG cited in SWRPC, 1991; Virginia, 1991; EPA cited in SWRPC, 1991	Average: 60% Range: 20% - 100% References: SWRPC, 1991; Denver COG cited in SWRPC, 1991	$150 per inlet
Construction Entrance	Removes sediment from vehicles wheels.	Average: NA Observed Range: NA References: None	2	Average: $2,000 each Range: $1,000 - $4,000 References: Goldman, 1986; NC State, 1990	Average: NA[e] Range: NA References: None	$1,500 each
				With washrack: Average: $3,000 each Range: $1,000 - $5,000 References: Virginia, 1991		$2,200 each

Table 4-16. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years)[a]	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Vegetative Filter Strip	Must have sheet flow.	Average: 70% Observed Range: 20% - 80% References: Hayes and Hairston, 1983 cited in Casman, 1990; Dillaha et al., 1989, cited in Glick et al., 1991; Virginia Department of Conservation, 1987; Nonpoint Source Control Task Force, 1983 cited in Minnesota PCA, 1989; Schueler, 1987	2	Established from existing vegetation- Average: $0 Range: $0 References: Schueler, 1987 Established from sod- Average: $11,300 per acre Range: $4,500 - $48,000 per acre References: Schueler, 1987; SWRPC, 1991	Average: NA Range: NA References: None	NA

NA - Not available.

[a] Useful life estimated as length of construction project (assumed to be 2 years)

[c] For Total Annual Cost, assume Annual Maintenance Cost=20% of construction cost.

[b] Assumes trap volume = 1800 cf/ac (0.5 inches runoff per acre).

[c] Assumes drainage area of 0.5 acre per 100 feet of fence (maximum allowed).

[d] Assumes drainage area of 0.25 acre per 100 feet of barrier (maximum allowed).

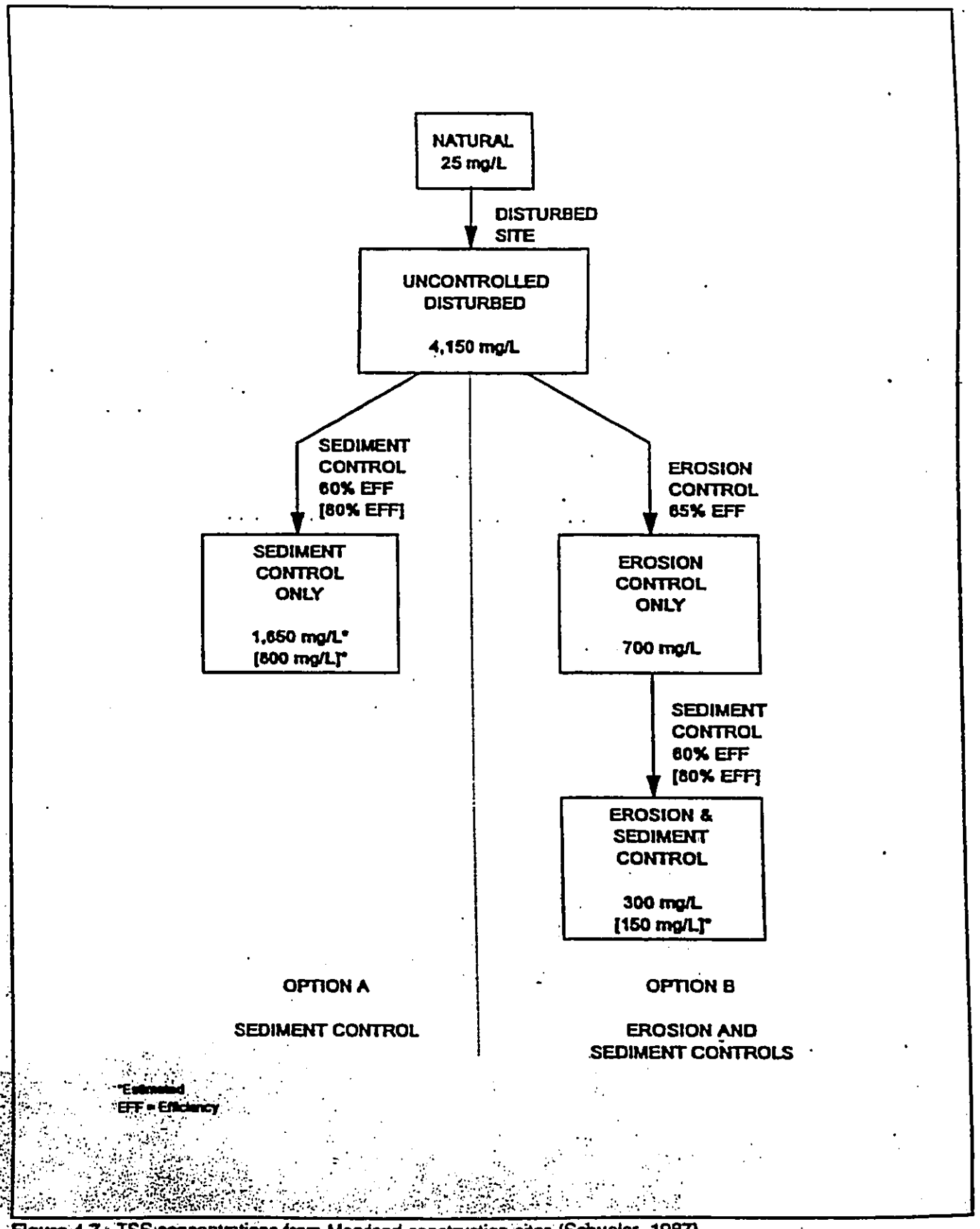


Figure 4-7. TSS concentrations from Maryland construction sites (Schueler, 1987).

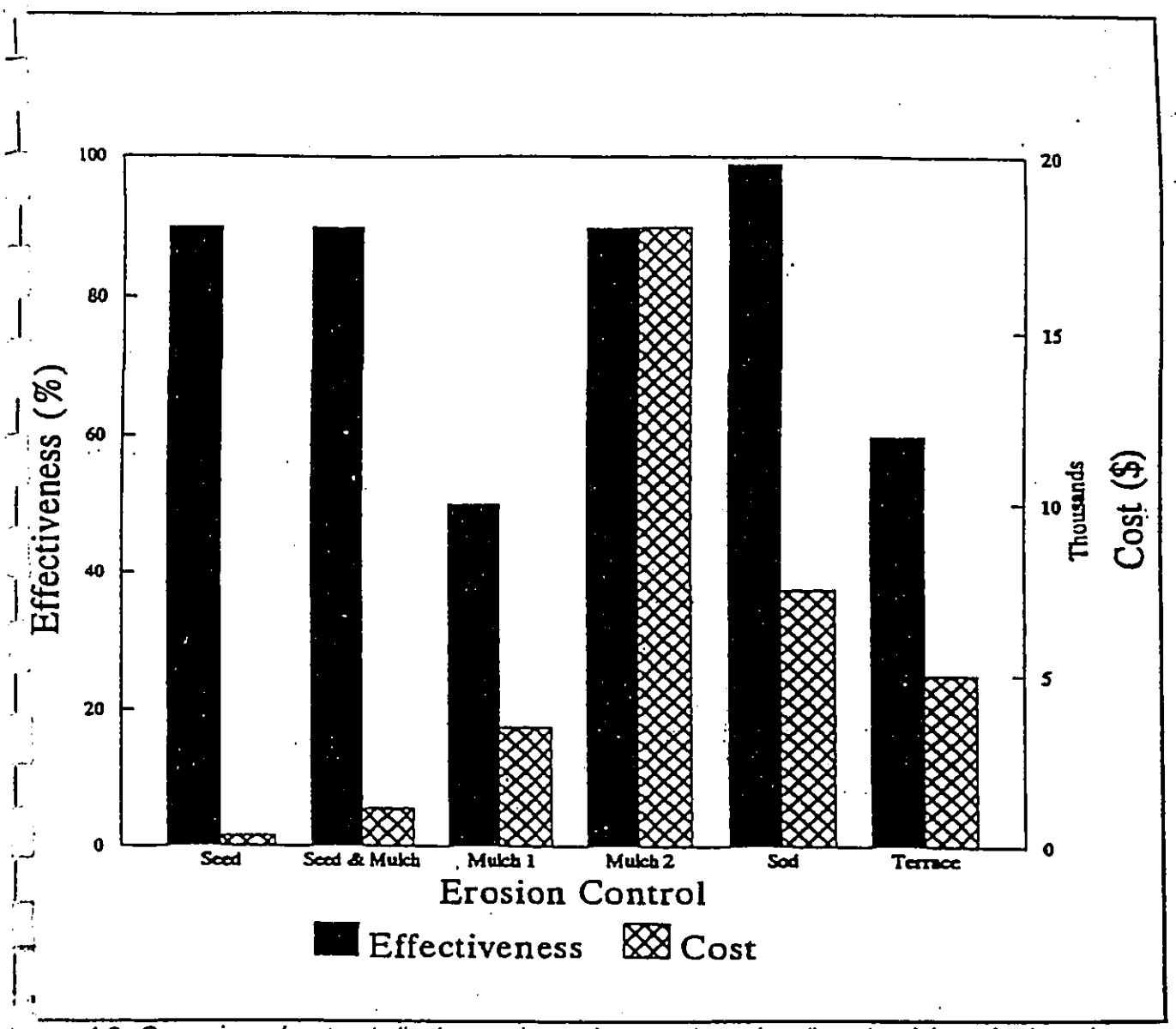


Figure 4-8. Comparison of cost and effectiveness for erosion control practices (based on information in Tables 4-15 and 4-16).

B. Construction Site Chemical Control Management Measure

(1) Limit application, generation, and migration of toxic substances;

(2) Ensure the proper storage and disposal of toxic materials; and

(3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

1. Applicability

This management measure is intended to be applied by States to all construction sites less than 5 acres in area and to new, resurfaced, restored, and reconstructed road, highway, and bridge construction projects. This management measure does not apply to: (1) construction of a detached single family home on a site of 1/2 acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. (NOTE: All construction activities, including clearing, grading, and excavation, that result in the disturbance of areas greater than or equal to 5 acres or are a part of a larger development plan are covered by the NPDES regulations and are thus excluded from these requirements.) Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformance with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

2. Description

The purpose of this management measure is to prevent the generation of nonpoint source pollution from construction sites due to improper handling and usage of nutrients and toxic substances, and to prevent the movement of toxic substances from the construction site.

Many potential pollutants other than sediment are associated with construction activities. These pollutants include pesticides (insecticides, fungicides, herbicides, and rodenticides); fertilizers used for vegetative stabilization; petrochemicals (oils, gasoline, and asphalt degreasers); construction chemicals such as concrete products, sealers, and paints; wash water associated with these products; paper; wood; garbage; and sanitary wastes (Washington State Department of Ecology, 1991).

The variety of pollutants present and the severity of their effects are dependent on a number of factors:

(1) **The nature of the construction activity.** For example, potential pollution associated with fertilizer usage may be greater along a highway or at a housing development than it would be at a shopping center development because highways and housing developments usually have greater landscaping requirements.

(2) **The physical characteristics of the construction site.** The majority of all pollutants generated at construction sites are carried to surface waters via runoff. Therefore, the factors affecting runoff volume,

such as the amount, intensity, and frequency of rainfall; soil infiltration rates; surface roughness; slope length and steepness; and area denuded, all contribute to pollutant loadings.

(3) **The proximity of surface waters to the nonpoint pollutant source.** As the distance separating pollutant-generating activities from surface waters decreases, the likelihood of water quality impacts increases.

a. Pesticides

Insecticides, rodenticides, and herbicides are used on construction sites to provide safe and healthy conditions, reduce maintenance and fire hazards, and curb weeds and woody plants. Rodenticides are also used to control rodents attracted to construction sites. Common insecticides employed include synthetic, relatively water-insoluble chlorinated hydrocarbons, organophosphates, carbamates, and pyrethrins.

b. Petroleum Products

Petroleum products used during construction include fuels and lubricants for vehicles, for power tools, and for general equipment maintenance. Specific petroleum pollutants include gasoline, diesel oil, kerosene, lubricating oils, and grease. Asphalt paving also can be particularly harmful since it releases various oils for a considerable time period after application. Asphalt overloads might be dumped and covered without inspection. However, many of these pollutants adhere to soil particles and other surfaces and can therefore be more easily controlled.

c. Nutrients

Fertilizers are used on construction sites when revegetating graded or disturbed areas. Fertilizers contain nitrogen and phosphorus, which in large doses can adversely affect surface waters, causing eutrophication.

d. Solid Wastes

Solid wastes on construction sites are generated from trees and shrubs removed during land clearing and structure installation. Other wastes include wood and paper from packaging and building materials, scrap metals, sanitary wastes, rubber, plastic and glass, and masonry and asphalt products. Food containers, cigarette packages, leftover food, and aluminum foil also contribute solid wastes to the construction site.

e. Construction Chemicals

Chemical pollutants, such as paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, soil additives used for stabilization, and concrete-curing compounds, may also be used on construction sites and carried in runoff.

f. Other Pollutants

Other pollutants, such as wash water from concrete mixers, acid and alkaline solutions from exposed soil or rock, and alkaline-forming natural elements, may also be present and contribute to nonpoint source pollution.

Revegetation of disturbed areas may require the use of fertilizers and pesticides, which, if not applied properly, may become nonpoint source pollutants. Many pesticides are restricted by Federal and/or State regulations.

Hydroseeding operations, in which seed, fertilizers, and lime are applied to the ground surface in a one-step operation, are more conducive to nutrient pollution than are the conventional seedbed-preparation operations, in which fertilizers and lime are tilled into the soil. Use of fertilizers containing little or no phosphorus may be required by

local authorities if the development is near sensitive waterbodies. The addition of lime can also affect the pH of sensitive waters, making them more alkaline.

Improper fueling and servicing of vehicles can lead to significant quantities of petroleum products being dumped onto the ground. These pollutants can then be washed off site in urban runoff, even when proper erosion and sediment controls are in place. Pollutants carried in solution in runoff water, or fixed with sediment crystalline structures, may not be adequately controlled by erosion and sediment control practices (Washington Department of Ecology, 1991). Oils, waxes, and water-insoluble pesticides can form surface films on water and solid particles. Oil films can also concentrate water-soluble insecticides. These pollutants can be nearly impossible to control once present in runoff other than by the use of very costly water-treatment facilities (Washington Department of Ecology, 1991).

After spill prevention, one of the best methods to control petroleum pollutants is to retain sediments containing oil on the construction site through use of erosion and sediment control practices. Improved maintenance and safe storage facilities will reduce the chance of contaminating a construction site. One of the greatest concerns related to use of petroleum products is the method for waste disposal. The dumping of petroleum product wastes into sewers and other drainage channels is illegal and could result in fines or job shutdown.

The primary control method for solid wastes is to provide adequate disposal facilities. Erosion and sediment control structures usually capture much of the solid waste from construction sites. Periodic removal of litter from these structures will reduce solid waste accumulations. Collected solid waste should be removed and disposed of at authorized disposal areas.

Improperly stored construction materials, such as pressure-treated lumber or solvents, may lead to leaching of toxics to surface water and ground water. Disposal of construction chemicals should follow all applicable State and local laws that may require disposal by a licensed waste management firm.

3. Management Measure Selection

This management measure was selected based on the potential for many construction activities to contribute to nutrient and toxic NPS pollution.

This management measure was selected because (1) construction activities have the potential to contribute to increased loadings of toxic substances and nutrients to waterbodies; (2) various States and local governments regulate the control of chemicals on construction sites through spill prevention plans, erosion and sediment control plans, or other administrative devices; (3) the practices described are commonly used and presented in a number of best management practice handbooks and guidance manuals for construction sites; and (4) the practices selected are the most economical and effective.

4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

a. *Properly store, handle, apply, and dispose of pesticides.*

Pesticide storage areas on construction sites should be protected from the elements. Warning signs should be placed in areas recently sprayed or treated. Persons mixing and applying these chemicals should wear suitable protective clothing, in accordance with the law.

Application rates should conform to registered label directions. Disposal of excess pesticides and pesticide-related wastes should conform to registered label directions for the disposal and storage of pesticides and pesticide containers set forth in applicable Federal, State, and local regulations that govern their usage, handling, storage, and disposal. Pesticides and herbicides should be used only in conjunction with Integrated Pest Management (IPM) (see Chapter 2). Pesticides should be the tool of last resort; methods that are the least disruptive to the environment and human health should be used first.

Pesticides should be disposed of through either a licensed waste management firm or a treatment, storage, and disposal (TSD) facility. Containers should be triple-rinsed before disposal, and rinse waters should be reused as product.

Other practices include setting aside a locked storage area, tightly closing lids, storing in a cool, dry place, checking containers periodically for leaks or deterioration, maintaining a list of products in storage, using plastic sheeting to line the storage area, and notifying neighboring property owners prior to spraying.

b. Properly store, handle, use, and dispose of petroleum products.

When storing petroleum products, follow these guidelines:

- Create a shelter around the area with cover and wind protection;
- Line the storage area with a double layer of plastic sheeting or similar material;
- Create an impervious berm around the perimeter with a capacity 110 percent greater than that of the largest container;
- Clearly label all products;
- Keep tanks off the ground; and
- Keep lids securely fastened.

Oil and oily wastes such as crankcase oil, cans, rags, and paper dropped into oils and lubricants should be disposed of in proper receptacles or recycled. Waste oil for recycling should not be mixed with degreasers, solvents, antifreeze, or brake fluid.

c. Establish fuel and vehicle maintenance staging areas located away from all drainage courses, and design these areas to control runoff.

Proper maintenance of equipment and installation of proper stream crossings will further reduce pollution of water by these sources. Stream crossings should be minimized through proper planning of access roads. Refer to Chapter 3 for additional information on stream crossings.

d. Provide sanitary facilities for constructions workers.

e. Store, cover, and isolate construction materials, including topsoil and chemicals, to prevent runoff of pollutants and contamination of ground water.

f. Develop and implement a spill prevention and control plan. Agencies, contractors, and other commercial entities that store, handle, or transport fuel, oil, or hazardous materials should develop a spill response plan.

Post spill procedure information and have persons trained in spill handling on site or on call at all times. Materials for cleaning up spills should be kept on site and easily available. Spills should be cleaned up immediately and the contaminated material properly disposed of. Spill control plan components should include:

- Stop the source of the spill.
- Contain any liquid.
- Cover the spill with absorbent material such as kitty litter or sawdust, but do not use straw. Dispose of the used absorbent properly.

g. Maintain and wash equipment and machinery in confined areas specifically designed to control runoff.

Thinners or solvents should not be discharged into sanitary or storm sewer systems when cleaning machinery. Use alternative methods for cleaning larger equipment parts, such as high-pressure, high-temperature water washes, or steam cleaning. Equipment-washing detergents can be used, and wash water may be discharged into sanitary sewers if solids are removed from the solution first. (This practice should be verified with the local sewer authority.) Small parts can be cleaned with degreasing solvents, which can then be reused or recycled. Do not discharge any solvents into sewers.

Washout from concrete trucks should be disposed of into:

- A designated area that will later be backfilled;
- An area where the concrete wash can harden, can be broken up, and then can be placed in a dumpster; or
- A location not subject to urban runoff and more than 50 feet away from a storm drain, open ditch, or surface water.

Never dump washout into a sanitary sewer or storm drain, or onto soil or pavement that carries urban runoff.

h. Develop and implement nutrient management plans.

Properly time applications, and work fertilizers and liming materials into the soil to depths of 4 to 6 inches. Using soil tests to determine specific nutrient needs at the site can greatly decrease the amount of nutrients applied.

i. Provide adequate disposal facilities for solid waste, including excess asphalt, produced during construction.

j. Educate construction workers about proper materials handling and spill response procedures. Distribute or post informational material regarding chemical control.

A Checklist of Conservation Ideas for the Yard

Limit Lawn Size

Most turf grasses require 30% to 50% more water than shrubs and ground covers. Limit the use of grass and lawns to active picnicking and play areas. Shade in these areas will reduce moisture loss and make a cool area for children to play. If you do have a lawn, mow at least once per week, and try to cut no more than ⅓ of the grass blade, or ½ to ¾ of an inch at a time. Adjust your lawn mower to a higher setting. Taller blades of grass actually hold up better in the heat, because that little bit of extra shade helps to more moisture in the soil. If you mow the grass too short, root shock will cause your grass to turn yellow despite your watering!

Designing for Irrigation Zones

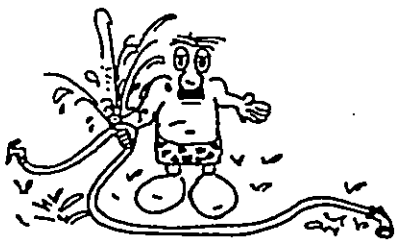
Avoid putting thirsty exotics with plants that do well in dry weather. Zone your plants so that each area has similar water needs. This will enable you to water more efficiently, and keep the plants healthier. Limit thirsty plants to small decorative borders around the house itself or in specific viewing areas or shady areas. While you're at it, call the Board of Water Supply at 270-7199 for more information.

Choosing Native Plants: A Hawaiian Sense of Place

An out-of-place, thirsty landscape can slurp up ¾ of your home's water use. Plant shrubs and trees that nature designed to look green and full here on Maui without a lot of water. Make sure they get regular watering in the first year or two, to help them establish good, deep roots. Then, once they are grown in, you can cut back or stop watering, depending upon your location. At worst, in our hot, low southern areas an occasional, slow, deep watering placed right at the roots should be enough to keep a climate adapted plant looking good even through the hot summer.

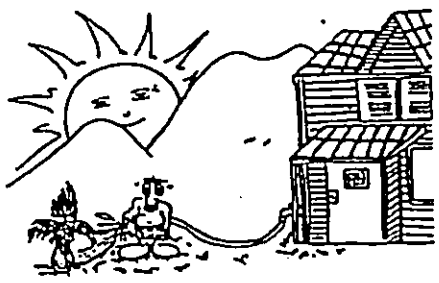
Find and Repair Leaks

Your garden hose and irrigation lines can carry thousands of gallons per day, so you can imagine a leak outdoors wastes a lot of water! Check and repair all of your outdoor fixtures regularly.



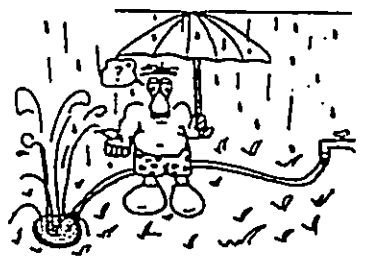
Irrigation Systems

Drip irrigation is designed to get water slowly and directly to the roots of plants. This not only saves water, but for some plants it helps to reduce the risk of diseases. Sprinklers with fine, high sprays lose a lot of water to evaporation. So, if you do use a sprinkler for certain plants, go for the sort with low, flat spay patterns and larger drops of water. Check timers on irrigation controllers and adjust them monthly to water appropriately for the season. For small grassy areas, watering by hand can actually reduce waste! But if you use a hose, set a kitchen timer or buy a timer attachment that hooks on between the faucet and hose. This will help remind you not to over-water one area. Use a soaker hose on slopes to reduce run-off.



Watering

If you do have a lawn, water only when it needs it. A good deep soaking is better than a light sprinkling. If you water too frequently and lightly, plants develop shallower roots and become less drought resistant! A good way to see if your lawn needs watering is to step on the grass. If it springs back up when you move, it doesn't need water. If it stays flat, it could use a bit. Avoid watering in the heat of the day. By 10 A.M., the sun is up and so is the heat. This will rob your lawn's moisture. In dry areas you can also choose evenings to water.



Watching the Weather...

As simple-minded as it sounds ....never water while it's raining! Many people forget to follow this simple rule. Install *rain-shutoffs or soil* moisture sensors on automated systems. Teach your family to turn off your irrigation in the rain. You also create "weather conditions" by how and where you plant. Sunny exposed areas and slopes need to be watered more frequently than shady areas. Place your plants appropriately.

Getting to the Root

Root feeder or water aerator probes around trees and bushes will help direct water where it is needed. Even for the biggest trees, you don't need to go any deeper than 18 inches. 8 to 12 inches is big enough for small trees and shrubs. You can also build a watering basin in the soil around the base of your plants to help the water to soak in deeply. Drip systems are good for this too.

Soils & Mulch

Soils are not all alike. Clay soils can typically take from ¼ to ½" of water per hour before water starts running off and is wasted. Sandy soils require more frequent, shorter watering. You can have your soils tested. Call the Ag Extension Service at MCC for advice (244-3242). Compost or other organic material will also help soils hold moisture and support heartier, more drought-tolerant plants. Try leaves, grass clippings, manure, aged sawdust, wood chips, or humic acid. Mulching is an excellent way to hold moisture, keep the ground from overheating and discourage weeds. You should also loosen the soil by rototilling or spading while you add the organic matter. Looser soil can make a healthier lawn.

A Checklist of Conservation Ideas for the Home

se Water Habits

Shaving & Brushing Teeth
If you leave the water running while you shave or brush your teeth, you are wasting a gallon a minute! Stopper the sink and fill the basin half way when you shave, and you use just ½ a gallon! Turn off the water while brushing your teeth!

Bathing & Showering
Which uses more water, a shower or a tub bath? That depends! A partially filled tub uses less water than a long shower, but a short shower with a low flow showerhead uses much less than a brimful tub! You can compare for yourself. Try plugging the tub while you shower and see how high the water gets. Make a habit of showering quickly or using a partially filled tub. Or try the "navy shower". Turn on the water to get wet, turn it off to soap up, and turn it back on to rinse off. It's a great conservation technique, especially in drought emergencies.

House plants & Fish Tanks
If you have a fish tank, you probably clean it regularly. Use the dirty water to water your House plants. It saves using the same water twice, and the plants love the water, which is rich in nitrogen and phosphorous!

Washing Smart
Some washing machines use 40 or more gallons whether you're washing a full load, or only a few pairs of socks. Use full washloads, especially for older machines. If your machine is adjustable, use the proper setting. You'll save electricity as well as water.

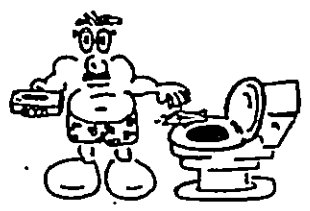
Food Prep
If you like to rinse off vegetables and fruits, stopper the sink instead of using running water. And when you're finished, turn on the garbage disposal as you pull the plug, rather than running water just for the disposal.

Doing Dishes
Which is more efficient, washing dishes in the sink or in a dishwasher? You can check by testing how much water your full sink basin holds compared with the 9.5 to 12 gallons dishwashers use during a regular cycle. Either way, it is more water efficient to wash full loads. If you do wash dishes by hand, stopper the sink and run the disposal as you pull the plug.

Washing the Car
Do you wash your car at home? Use a bucket, or a hose with a trigger nozzle to avoid wasting water. Wet the car thoroughly, and then turn off the hose while you wash the car! Swab the car with soapy water from a bucket. You can use the hose again for a final rinse. Better still, take your car to a car wash. Most of the car washes on Maui are fitted with recirculating water.

For a Cold Glass of Water
Keep a pitcher of cool water in the refrigerator. Running the water until it turns cool can waste a gallon for each glass. Letting the water sit in the fridge can also allow any chlorine to dissipate, and improve the taste.

Don't Use the Toilet for Trash!!
Some people toss and flush away tissues, cigarettes or bits of trash in the toilet. Use a wastebasket instead. If everyone in the U.S. flushed just once less per day, we could save a sea full of water a mile wide, a mile long and four feet deep, every day!



Water Saving Devices

Showerheads
Replacing your old showerhead with a low flow can save as much as 7.2 gallons per person per day. You can get showerheads and other low flow fixtures from the Maui County Board of Water Supply (270-7199), or the Public Works Department (270-7417).

Toilets
Installing A New Water Conserving Toilet can save as much as 17 gallons per person per day. Even a low cost installing a toilet flapper can save more than 5 gallons per person per day.

Faucets
Replacing your old faucets with more efficient models can save 4 gallons per person per day. Faucet aerators or spray taps can also help, by mixing air with water. This cuts the flow and reduces splashing, while leaving enough pressure to cut the soap and grease.

Washing Machines
A water-efficient washing machine can save up to 20 gallons per load. With the average household washing 6 loads per week, that's a lot of water! In fact, within 2 years, these can save as much water as the average person drinks in a lifetime! And that's not all. Statistics on energy savings potential indicate that highly efficient washing machines save from 35% to 65% on energy used for washing!

Maintenance

Check for Leaks!
Leaking faucets cost you money! Even a slow drip wastes 15 gallons per day. A $^{1}/_{8}$" stream can waste 400 gallons per day! Think about it. A single dripping faucet can waste more water in one day than a person needs for drinking for an entire week! Unfortunately, the average non-conserving home looses more than 10% of the water it pays for to leaks! Check for leaks regularly. Try putting 10 drops of food coloring in your toilet tank. Don't flush, just wait 15 minutes. If colored water shows up in the bowl, your tank is leaking. Check your water meter while no water is running in your house. If the meter is registering, you have a leak somewhere.

After toilets, most indoor leaks are caused by worn washers in faucets. Check your faucets twice a year. If any drip after you've turned them off firmly, turn off the supply line, take the faucet apart and replace the washer. And don't forget the faucets on the side of the house.

A Clean Sweep
Did you know that 5 minutes of unnecessary hosing will waste 25 gallons of water? Try sweeping sidewalks and driveways. This will get them clean without wasting water.

Pipes Break - Be Prepared
Do you know where your master shut-off valve is located? If a pipe breaks in your home, you could experience flooding and property damage as well as huge water waste unless you quickly shut your valve. Locate your valve and mark it for quick easy identification. Learn how to shut it properly, and teach your family to do so as well.

Cover Pools and Jacuzzis
They're fun, but they can waste a lot of water! An average sized pool loses about 1,000 gallons of water per month to evaporation. A pool cover can cut these losses by 90%!

MUNEKIYO & HIRAGA, INC.

August 4, 2004

George Y. Tengan, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Mr. Tengan:

Thank you for your letter of January 13, 2004, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note the following:

1. We acknowledge the comments regarding fire, domestic, and irrigation calculations, and will forward the comments to the project design committee to ensure appropriate coordination will be carried out during the building permit process.

2. We acknowledge and confirm that the environmental assessment report will include the estimated potable and non-potable water usage and sources.

3. We acknowledge the comments and the information provided regarding recommended water conservation measures and Best Management Practices (BMPs) to protect the integrity of surface and groundwater resources and will forward this information to the project design committee for further consideration.

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

environment
planning
government

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:yp
cc: Mei Lee Wong, WK4, LLC
wk4llcwaikapu\dws.res

ALAN M. ARAKAWA
Mayor

MICHAEL W. FOLEY
Director

WAYNE A. BOTEILHO
Deputy Director

DEC 0 4 2003

COUNTY OF MAUI
DEPARTMENT OF PLANNING

December 1, 2003

Mr. Michael Munekiyo, AICP
Munekiyo & Hiaraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

RE: Request for Comments on the Proposed Waiehu Kou Phase 4 Subdivision at Maui Tax Map Key 3-2-012:001, Waihee, Maui

The Maui Planning Department (Department) as reviewed the above referenced request and offers the following comments:

1. The subject property is designated Urban by the State Land Use Commission, identified as Project District 4 in the Wailuku-Kahului Community Plan Map, zoned Project District 4, and located within the Special Management Area as designated by Maui County.

2. The proposed project is logical, urban/residential in fill project between Waiehu and Waihee.

3. Pursuant to the State Attorney General Opinions issued in 1972 and 1987, lands under the jurisdiction of the Department of Hawaiian Home Lands are not subject to county zoning powers or provisions of the Special Management Areas set forth by chapter 205A, Hawaii Revised Statutes, and implemented by the respective counties as well as the State of Hawaii in the case of the Kakaako Redevelopment Area on the Island of Oahu.

4. Though the Department of Hawaiian Home Lands are not subject to the provisions of Special Management Area (SMA), the spirit and intent of the SMA provisions should be heeded as large tracts of lands comprising Project District 4 contain an intact native coastal dune ecosystem and other resources worth of protection. Any proposed development should not impact this native coastal dune ecosystem and resources.

5. The Maui Coastal Land Trust (Trust) is in the process of purchasing Project District 4 lands. Once the lands are purchased, the Trust will then develop programs to manage and preserve the many resources on these lands.

Thank you for the opportunity to comment. Should you require additional clarification, please contact Ms. Robyn Loudermilk, Staff Planner of this office at 270-7735.

Sincerely,

MICHAEL W. FOLEY
Planning Director

MWF:RLL:sp
c: Wayne A. Boteihlo, Deputy Planning Director
Clayton I. Yoshida, AICP, Planning Program Administrator
Robyn L. Loudermilk, Staff Planner
Project File
General File
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MUNEKIYO & HIRAGA, INC.

August 4, 2004

Michael W. Foley, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Mr. Foley

Thank you for your letter of December 1, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note that the proposed project is located west of and beyond the costal dunes ecosystem.

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:yp
cc: Mei Lee Wong, WK4, LLC
wk4llc\waikapu\dop.res

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
HOUSING DIVISION
COUNTY OF MAUI

OCT 23 2003

ALAN M. ARAKAWA
Mayor

ALICE L. LEE
Director

HERMAN T. ANDAYA
Deputy Director

86 W. KAMEHAMEHA AVENUE • KAHULUI, HAWAII 96732-2259 • PHONE (808) 270-7351 • FAX (808) 270-6284

October 16, 2003

Mr. Michael Munekiyo, A.I.C.P.
Project Manager
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: **Proposed Waiehu Kou Phase 4 Subdivision**

We have reviewed your October 3, 2003 letter and enclosures regarding the subject project and would like to offer the following comments:

1. We fully support the development of the project as it will help to alleviate the demand for affordable housing.

2. It is our understanding that the project will not be developed pursuant to Section 201G-118, Hawaii Revised Statutes.

3. If the project will involve deviations from the development standards of the County, we suggest that the applicant consult with the affected County agency as soon as possible to ensure the acceptability of such deviations.

Thank you for the opportunity to comment.

Very truly yours,

for ALICE L. LEE
Director

ETO:bp

c: Housing Administrator

MUNEKIYO & HIRAGA, INC.

August 4, 2004

Alice Lee, Director
County of Maui
Department of Housing and Human Concerns
200 S. High Street
Wailuku, Hawaii 96793

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Ms. Lee:

Thank you for your letter of October 16, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note the following:

1. The proposed project will not be processed as a 201G project.

2. As applicable, coordination will be undertaken with the appropriate County agencies to ensure acceptability of deviations from County code requirements.

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:tn
cc: Mei Lee Wong, WK4, LLC
wk4llc/waiehu/dhhcltr.001

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

ALAN M. ARAKAWA
MAYOR

OUR REFERENCE
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

KEKUHAUPIO R. AKANA
DEPUTY CHIEF OF POLICE

October 30, 2003

Mr. Michael T. Munekiyo, A.I.C.P.
Project Manager
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Mr. Munekiyo:

SUBJECT: Request for Comments on the Proposed Waiehu Kou Phase 4 Subdivision

Thank you for your letter of October 3, 2003, requesting comments on the above subject.

We have reviewed the proposed summary and have enclosed our comments and recommendations. Thank you for giving us the opportunity to comment on this project.

Very truly yours,

Assistant Chief Sydney Kikuchi
for: Thomas M. Phillips
Chief of Police

Enclosure

c: Michael W. Foley, Dept. of Planning

COPY

* Traffic Congestion is already very high on Kahekili thru Happy Valley and on Waiehu Boh. Rd. to the Kah. Boh. Rd/Lx.man st. intersection.... especially Mon-Fri, Morn: afternoon. Infrastructure needs to be improved.

TO: THOMAS PHILLIPS, CHIEF OF POLICE

VIA: CHANNELS 10/30/03

FROM: LISA ANN RODRIGUES, POIII, COMMUNITY POLICING

SUBJECT: COMMENTS RE: PROPOSED WAIEHU KOU PHASE 4 SUBDIVISION, WAIHEE, MAUI, HAWAII (TMK 3-2-12:01)

This proposed project will be a 95-lot single-family residential subdivision at Waihee, Maui, Hawaii (TMK3-2-12:01) located adjacent to the Waihee Ball Park and north of the current Waiehu Kou Phase 3 development that is currently underway.

CONCERNS:

1. Taken into consideration the 95 single-family residential homes that would add a low end estimate of about 190 additional vehicles traveling the roadway to and from the housing area, suggest a traffic study of the area and of the routes into both Wailuku via Kahekili Highway and Kahului via Waiehu Beach Road to Kahului Beach Road be conducted.
2. Special planning and consideration into the placement of accessing roadways from Kahekili Highway should be looked at. The north/west end of the proposed lot just before the ball park is on a bend in the roadway of Kahekili Highway and with the addition of the trees near the roadway area this causes a concern with the egress of that part of the project.
3. With construction projects moving closer toward the town of Waihee, morning and afternoon traffic will be affected by construction vehicles entering and exiting the job site. Also the increase of dust, debris, and noise will also increase.
4. Consideration of sidewalk improvements/addition for safe pedestrian traffic to the town of Waihee, including Waihee Elementary School where the new resident children would be attending.

Respectfully submitted for your perusal.

Lisa Ann Rodrigues / #2158
10-28-03 / 1330 hours

COMMENTS/CONCERNS NOTED. FORWARD TO PROJECT MANAGER FOR REVIEW & CONSIDERATION
10/29/03

FORWARD TO PROJECT MANAGER
APPT 10/30/03

MUNEKIYO & HIRAGA, INC.

August 4, 2004

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

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Chief Phillips:

Thank you for your letter of October 30, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note the following:

1. A traffic impact analysis report (TIAR) will be prepared for the proposed subdivision. The TIAR will be incorporated in the Draft EA.

2. Engineering sight distance studies will be prepared in connection with the design of the Kahekili Highway entrance. Coordination with the State Department of Transportation has also been initiated to ensure that appropriate design parameters are addressed as part of project planning.

3. We agree that construction traffic control must be addressed. Accordingly, appropriate traffic control measures will be implemented during construction to provide for the safe movement of vehicular traffic and pedestrians past the project site.

4. Curb, gutter and sidewalk improvements will be provided along Kahekili Highway fronting the project site.

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:tn
cc: Mei Lee Wong, WK4, LLC
wk4llc/waiehu/mpdltr.001

OCT 09 2003

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

October 7, 2003

Mr. Michael T. Munekiyo, A.I.C.P.
Project Manager
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Mr. Munekiyo:

Subject: Request for Comments on the Proposed Waiehu Kou Phase 4 Subdivision
TMK: 3-2-12:01

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

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

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

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

Sincerely,

Neal Shinyama
Manager, Energy Delivery

NS/fo:lh

MUNEKIYO & HIRAGA, INC.

August 4, 2004

Neal Shinyama, Manager
Energy Delivery
Maui Electric Company, Ltd.
210 West Kamehameha Avenue
P.O. Box 398
Kahului, Hawaii 96733-6898

SUBJECT: Waiehu Kou Phase 4 Draft Environmental Assessment (EA)
(Ref. No. P-10254)

Dear Mr. Shinyama:

Thank you for your letter of October 7, 2003, responding to our request for early consultation comments for the proposed Waiehu Kou Subdivision at TMK 3-2-12:01, Waihee, Maui. In response to your comments, we note that project consultants will initiate coordination with Maui Electric Company shortly.

Thank you again for providing your input to the proposed subdivision action. A copy of the Draft EA will be provided to your office for review and comment.

Very truly yours,

Michael T. Munekiyo, A.I.C.P.
Project Manager

MTM:tn
cc: Mei Lee Wong, WK4, LLC
wk4llc/waiehu/mecoltr.001

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhinconline.com

ALAN M. ARAKAWA
Mayor

GLENN T. CORREA
Director

JOHN L. BUCK III
Deputy Director

(808) 270-7230
Fax (808) 270-7934

OCT 17 2003

DEPARTMENT OF PARKS & RECREATION

700 Hali'a Nakoa Street, Unit 2 , Wailuku, Hawaii 96793

October 14, 2003

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: PROPOSED WAIEHU KOU PHASE 4 SUBDIVISION

We have reviewed the proposed action for the subject project and have no comments to offer at this time.

Thank you for the opportunity to review and comment. Should there be any questions, please contact Mr. Patrick Matsui, Chief of Parks Planning and Development, at 270-7387.

Sincerely,

GLENN T. CORREA
Director

c: Patrick Matsui, Chief of Planning and Development

Chapter XI

Letters Received During the Draft Environmental Assessment Public Comment Period and Responses to Substantive Comments

XI. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT PUBLIC COMMENT PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS

A Draft Environmental Assessment for the subject project was filed and published in the Office of Environmental Quality Control's The Environmental Notice on September 8, 2004. During the 30-day public comment period, agencies were provided the opportunity to comment on the proposed action. This section incorporates the comments received during the 30-day comment period between September 8, 2004 and October 8, 2004. Responses to the substantive comments are also incorporated herein.

SEP 17 2004

United States Department of Agriculture

USDA

NRCS Natural Resources Conservation Service

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

210 Imi Kala Street, Suite #209, Wailuku, HI 96793-2100

Mr. Matthew Stepin, Planner
Munekiyo & Hiraga, Inc.
305 High Street Suite 104
Wailuku, Hawaii 96793

Dear Mr. Stepin,

SUBJECT: Proposed Waiehu Kou Phase 4 Subdivision

To minimize drainage, grading and construction impacts the following needs are to be considered:

1) Erosion control calculations need to be identified for this area.
2) The on-site retention basin needs to have an operation and maintenance plan identifying the responsible party to keep the basins clean.

Thank you for the opportunity to comment.

Sincerely,

Ranae F. Ganske-Cerizo
District Conservationist

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 15, 2004

Ms. Ranae Ganske-Cerizo, District Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
210 Imi Kala Street, Suite 209
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Dear Ms. Ganske-Cerizo:

Thank you for your comments on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. The following are in response to your comments:

- Erosion-control calculation will be provided as part of the project's final drainage and soil erosion control report.

- The onsite retention basin will have an operation and maintenance plan. Ongoing maintenance responsibility for the basin will belong to the Department of Hawaiian Home Lands.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

Aloha and mahalo,

Micah A. Kane, ~~Chairman~~
Hawaiian Homes Commission

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

SEP 10 2004

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

REPLY TO
ATTENTION OF

September 8, 2004

Regulatory Branch

Mr. Michael T. Munekiyo, A.I.C.P
Project Manager
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Mr. Munekiyo:

This responds to your request for written comments for the draft Environmental Assessment (dEA) which addressess activities and impacts of the proposed Waiehu Kou Subdivision, Phase 4, at Waiehu, Maui Island (existing 35.6 acres and TMK (2) 3-2-12: por. 1).

Our records indicate that waters of the United States, as represented by perennial or intermittent streams, navigable waters and wetlands are not adjacent to the proposed project area. It also appears that other special aquatic sites such as anchialine ponds or springs are absent. The dES states in appropriate sections that there is no potential for waters of the U.S. to be impacted by construction of project structures and associated ground disturbing activities within the proposed improvement areas. Therefore, it is determined that a Department of Army (DA) permit for Section 404 activities of the Clean Water Act does not be appear to be required for the proposed improvements at Waiehu Kou Subdivision, Phase 4.

Thank you for your consideration of potential impacts to the aquatic environment in the Waihee watershed. Please contact Mr. Farley Watanabe of my staff at 438-7701, or facsimile 438-4060, if you have any questions or need additional information. Please refer to File Number **200400007** in any future correspondence with us.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

OCT 21 2004

LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
STEVE BRETSCHNEIDER
DEPUTY DIRECTOR
MARY LOU KOBAYASHI
ADMINISTRATOR
OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-10656

October 20, 2004

Mr. Michael T. Munekiyo, A.I.C.P.
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Department of Hawaiian Home Lands (DHHL) Single Family Subdivision, TMK: 3-2-12: 01, Waihee, Wailuku, Maui

The Office of Planning has reviewed the Draft Environmental Assessment (DEA) for the proposed Waiehu Kou Subdivision Phase 4 for 35.6 acres in the State Urban District to develop a 95-lot single-family residential subdivision for native Hawaiians. We offer the following comments.

An increase in the number of DHHL residential homesteads on Maui would assist the State of Hawaii in fulfilling its commitment to carry out the purpose of the Hawaiian Home Lands Act of 1921 as confirmed in the Statehood Admission Act. Therefore, we support this project.

We note that the impact of additional students on the existing schools serving the area has been included in the DEA and that DHHL has indicated that they will coordinate with the Department of Education to address the need for additional capacity in impacted facilities.

The State Department of Transportation (DOT) is promoting the transportation planning principle of "Connectivity." We ask that you discuss your roadway design with DOT. The proposed "loops and lollipops" design would isolate Phase 4 residents from adjacent DHHL communities and increase traffic on both Kahekili Highway and the one entry/egress to the subdivision. A well-connected network of narrow streets is safer and more efficient than a poorly connected network of wider streets. A well-connected grid of streets also enables active living which improves individual health and well being.

Thank you for the opportunity to provide preliminary comments. If you have any questions, please call Mary Alice Evans at (808) 587-2802.

Sincerely,

Mary Lou Kobayashi

Mary Lou Kobayashi
Administrator

c: Peter Young, DLNR
Micah Kane, DHHL
Anthony Ching, LUC

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 15, 2004

TO: Mary Lou Kobayashi, Administrator
Office of Planning
Department of Business, Economic Development, and Tourism

FROM: Micah A. Kane, Chairman
Hawaiian Homes Commission

SUBJECT: Draft Environmental Assessment
Proposed Waiehu Kou Phase 4 Subdivision

Thank you for your letter of October 20, 2004 commenting on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui.

In response to your comments:

- The Department of Transportation has been consulted regarding transportation issues and concerns.

- The application of the "Connectivity" principle between Phases 3 and 4 is not feasible due to the natural drainage channel which runs between the two projects.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

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
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

September 16, 2004

Micah Kane
Department of Hawaiian Home Lands
PO Box 1879
Honolulu, Hawaii 96805

Attn: Darrell Ing

Dear Mr. Kane:

Subject: Draft environmental assessment (EA), **Waiehu Kou 4 Subdivision**

We have the following comments to offer:

Sustainable building techniques: Please consider applying sustainable building techniques presented in the "Guidelines for Sustainable Building Design in Hawaii." In the final EA include a description of any of the techniques you will implement. Contact our office for a paper copy of the guidelines or go to our website at *http://www.state.hi.us/health/oeqc/guidance/sustainable.html*.

Segmentation: Is this the final phase of Waiehu Kou? The environmental impact statement law prohibits segmentation of larger projects and requires that full disclosure of impacts be made on projects in their entirety. If additional phases are planned give a full description of all phases, including their impacts.

Recycling: Although it is not specifically stated in section III.B.1.4. *Solid Waste*, we recommend that a construction/destruction waste recycling plan be developed.

Maps: In the final EA provide a map of the island with the project site indicated. This can be an inset on Figure 1.

FIRM zones: Although the text lists the project as being in zones B and C, the 10/13/03 memo from DLNR Engineering Division states that the project is sited in Zone X. Please correct this in the final EA.

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

Sincerely,

Genevieve Salmonson

GENEVIEVE SALMONSON
Director

c: Michael Munekiyo

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 15, 2004

TO: Genevieve Salmonson, Director
Office of Environmental Quality Control

FROM: Micah A. Kane, Chairman
Hawaiian Homes Commission

SUBJECT: Draft Environmental Assessment
Proposed Waiehu Kou Phase 4 Subdivision

Thank you for your letter of September 16, 2004 commenting on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. The following are in response to your comments:

- The building techniques employed in the proposed Phase 4 Subdivision will follow the general guidelines of Phase 3. That project received a two star rating certificate of merit from the Hawaii Built Green Program. The built green criteria are based on the sustainable building design guidelines.

- The prohibition against segmentation is not applicable because the various Waiehu Kou parcels were acquired by the Department of Hawaiian Home Lands (DHHL) at different times. Construction and occupancy of Phase 1 and Phase 2 had been completed, and construction of Phase 3 had commenced prior to DHHL receiving the offer to purchase Phase 4. This is expected to be the final phase of the Waiehu Kou project as the Department owns no other lands in the vicinity and has no plans for further acquisitions.

- Appropriate coordination will be undertaken with the Department of Public Works and Environmental Management's

Solid Waste Division to ensure that solid waste management considerations are incorporated in project planning and implementation.

- The Final EA will include an inset in Figure 1 depicting the island of Maui with the project site indicated.

- The Department of Land and Natural Resources, Engineering Division has corrected the FIRM designation. The enclosed memo, dated September 13, 2004, confirms that the project site occupies Flood Zones B and C, and not Zone X.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

enc.

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LA/NAV

Ref.: WAIEHUDHHLDEA.COM2

COMMENTS

(X) **We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zones B and C. The National Flood Insurance Program does not have any regulations for development within Zones B and C.**

( ) Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

( ) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP 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. Mario Antonio 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 so it can be included in the State Water Projects Plan Update.

( ) Additional Comments:_____

_____

( ) Other: _____

_____

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

Signed: _____
ERIC T. HIRANO, CHIEF ENGINEER

Date: 2/18/09

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

JAN 0 5 2005

HRD04/452D

December 28, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Re: Draft Environmental Assessment, Proposed Waiehu Kou Phase 4 Subdivision,

Dear Mr. Munekiyo:

The Office of Hawaiian Affairs (OHA) is in receipt of the Draft Environmental Assessment (DEA) from your firm, regarding the proposal to construct Phase 4 of the Waiehu Kou subdivision. Thank you for your patience during our review. After reviewing the submitted materials, OHA staff have comments and concerns in the area of historical and cultural resources.

Historical and Cultural Resources

According to the submitted information, archaeological studies in the project area were undertaken in 1993 as part of the then planned Waihe'e Oceanfront Golf Course project. That former golf course project covered part of the Waihe'e sand dune system which is extensive and known to contain unmarked human burial sites. It is also understood that earlier phases of the Waiehu Kou development have encountered unmarked human burial sites.

Notwithstanding the indication that no historic sites were located in the Waiehu Kou Phase 4 project limits in the 1993 archaeological survey, and that the area in question was utilized for ground disturbing agricultural activities, there is a high possibility that sub-surface cultural deposits, specifically human burial sites, continue to exist in this area.

OHA would concur with the recommendation for archaeological monitoring during ground disturbing activities on the parcels at a ratio of one archaeological monitor per piece of heavy machinery. Furthermore, OHA would encourage the developer to continue to work closely with the Maui/Lana'i Islands Burial Council of the Department of Land and Natural Resources in mitigating any inadvertent discoveries of human skeletal remains found during such monitoring.

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,

Clyde W. Nāmu'o
Administrator

c. Office of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813

JAN 20 2005

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

January 14, 2005

Mr. Clyde W. Namu`o, Administrator
Office of Hawaiian Affairs
711 Kapi`olani Boulevard, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Namuo:

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Thank you for your letter dated December 28, 2004 providing comments on the subject project.

Your concurrence on the need for archaeological monitoring during ground-disturbing activities is noted. A monitoring plan will be submitted to the Department of Land and Natural Resources, State Historic Preservation Division for approval prior to the commencement of such activities.

The Department of Hawaiian Home Lands and WK3, LLC look forward to continuing cooperation with your office and with the Maui/Lanai Islands Burial Council to properly manage any inadvertent finds of human remains or cultural artifacts.

Should you have any questions, please call me at 586-3801. Comments or questions regarding the subject project may be directed to Darrell Ing of our Land Development Division at 586-3844.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

c: Mei Lee Wong, WK3, LLC
Matt Slepin, Munekiyo & Hiraga, Inc.

NOV 0 2 2004

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

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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

October 28, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 South High Street, Suite 104
Wailuku, Hawaii 96793

LOG NO: 2004.3182
DOC NO: 0410CD27

Dear Mr. Munekiyo,

SUBJECT: Chapter 6E-8 Historic Preservation Review – Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision Waihe`e Ahupua`a, Wailuku District, Island of Maui
TMK: (2) 3-2-012:001

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (Draft EA) for the proposed Waiehu Kou Phase 4 Subdivision, which was received by our staff September 8, 2004. Based on the submitted document, we understand WK3, LLC, in cooperation with the State of Hawaii, Department of Hawaiian Home Lands (DHHL), is planning the development of an approximately 95-lot subdivision on a 35-acre property.

In 1989 PHRI conducted an archaeological inventory survey which included the proposed project area (*Archaeological Inventory Survey Proposed Waihee Golf Club Project Area, Lands of Waihee and Waiehu, Wailuku District, Island of Maui (TMK: 3-2-10, 12)*. Donham 1989). During the survey eighty-eight historic sites were identified including heiau, habitation, agriculture, shrine/possible burial, and burials. Three habitation sites (SIHP 50-50-04-2459, -2460, and - 2461) are located within the proposed project area.

Given the findings of the inventory survey and the fact that a burial was identified during recent archaeological monitoring of an adjacent property (not within the current project area), we believe it is possible that additional sites and/or previously disturbed site remnants may be present in the subsurface deposits of the proposed project area. Ground altering activities associated with the proposed undertaking may affect any historic sites which are present in the subsurface deposits of the proposed project area. We believe that any adverse effect may mitigated through a program of precautionary monitoring.

Given the above information, we recommend the following conditions be attached to any permitted actions pertaining to the subject property, should they be approved.

1) A qualified archaeological monitor shall be present during all ground-altering activities in order to document any historic properties which may be encountered during the proposed undertaking and to provide mitigation measures as necessary. An acceptable archaeological monitoring plan will need to be submitted to the State

Historic Preservation Division for review, prior to the commencement of any ground-altering activities. An archaeological monitoring plan must contain the following nine specifications: (1) The kinds of remains that are anticipated and where in the construction area the remains are likely to be found; (2) How the remains and deposits will be documented; (3) How the expected types of remains will be treated; (4) The archaeologist conducting the monitoring has the authority to halt the construction in the immediate area of the find in order to carry out the plan; (5) A coordination meeting between the archaeologist and construction crew is scheduled, so that the construction team is aware of the plan; (6) What laboratory work will be done on remains that are collected; (7) A schedule of report preparation; (8) Details concerning the archiving of any collections that are made; and (9) An acceptable report documenting the findings of the monitoring activities shall be submitted to the State Historic Preservation Division for review upon 180 days following the completion of the proposed undertaking.

2) The State Historic Preservation Division (Maui and O`ahu offices) shall be notified via facsimile upon the on-set and completion of the proposed undertaking.

If you have any questions, please call Cathleen A. Dagher at 692-8023.

Aloha,

Melanie Chinen, Administrator
State Historic Preservation Division

CD:jen

c: Michael Foley, Director, Dept of Planning, 250 South High Street, Wailuku, HI 96793
Cultural Resources Commission, Planning Dept, 250 S. High Street, Wailuku, HI 96793
Chair, Maui/Lana`i Islands Burial Council
Kana`i Kapeliela, Burial Sites Program

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII

DEPARTMENT OF HAWAIIAN HOME LANDS

P.O. BOX 1879

HONOLULU, HAWAII 96805

January 10, 2005

TO: Melanie Chinen, Administrator
State Historic Preservation Division

FROM: Micah A. Kane, Chairman
Hawaiian Homes Commission

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Thank you for your letter of October 28, 2004, commenting on the Draft Environmental Assessment (DEA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. In response to your comments, we note that an archaeological monitor will be present during all ground-altering activities and that an archaeological monitoring plan will be submitted to your department for review prior to the commencement of those activities. Your department will be notified at the commencement and completion of the proposed project.

Thank you again for providing your input to the proposed action.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

c: Mei Lee Wong, WK3, LLC
Matt Slepin, Munekiyo & Hiraga, Inc.

SEP 28 2004

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

AQUATIC RESOURCES
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BUREAU OF CONVEYANCES
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CONSERVATION AND RESOURCES ENFORCEMENT
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 24, 2004

LD-NAV

WAIEHUDHHLDEA.RCM
MAUI

Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 South High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Draft Environmental Assessment
Proposed: Waiehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
Applicant: Department of Hawaiian Home Lands

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
- Division of State Parks
- Commission on Water Resource Management
- Office of Conservation and Coastal Lands
- Maui District Land Office

Enclosed please find a copy of the Engineering Division comment.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter.

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: MDLO

LINDA LINGLE
GOVERNOR OF HAWAII

TO:
___ ADMINISTRATOR
___ ASST ADMIN
___ DEV BR
___ PLAN BR
___ RES MGT BR
___ CLERICAL
___ ADMIN ASST
___ INTERP BR

FOR:
___ CIRC/POST/STAFF RM
___ COMMENTS & REC
___ DRAFT REPLY
___ FILE
___ FOLLOW UP
___ INFO
___ RUN COPIES_____
___ RUSH DUE_____
___ SEE ME
___ FAX/SEND COPY TO

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LAND DIVISION
2004 SEP 22 P 3:33

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

DEPT. OF LAND & NATURAL RESOURCES
STATE 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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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

September 13, 2004

LD/NAV
Ref.: WAIEHUDHHLDEA.COM2

Suspense Date: 9/23/03

MEMORANDUM:

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

RECEIVED
STATE PARKS DIV
'04 SEP 14 A10:46
DEPT. OF LAND & NATURAL RESOURCES

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment (DEA)
Proposed: Wailehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
TMK: (2) 3-2-12: 001
Applicant: Department of Hawaiian Home Lands
Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

Please review the DEA pertaining to the subject matter and submit your comments if any on Division letterhead (signed and dated) by the suspense date. Should you need more time to review the document, please contact Nick Vaccaro at 587-0384.

NOTE: One copy of the DEA is available for your review in the Land Division Office, Room 220.

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.

Signed:

Date:

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 13, 2004

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

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CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

LD/NAV
Ref.: WAIEHUDHHLDEA.COM2

Suspense Date: 9/23/03

MEMORANDUM:

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

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment (DEA)
Proposed: Waiehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
TMK: (2) 3-2-12: 001
Applicant: Department of Hawaiian Home Lands
Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

Please review the DEA pertaining to the subject matter and submit your comments if any on Division letterhead (signed and dated) by the suspense date. Should you need more time to review the document, please contact Nick Vaccaro at 587-0384.

NOTE: One copy of the DEA is available for your review in the Land Division Office, Room 220.

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.

Signed: Paul J. Conry
PAUL J. CONRY, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE

Date: SEP 15 2004

LINDA LINGLE
GOVERNOR OF HAWAII

RECEIVED
LAND DIVISION

2004 SEP 20 A 10:31

DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

September 13, 2004

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

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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

LD/NAV
Ref.: WAIEHUDHHLDEA.COM2

Suspense Date: 9/23/04

MEMORANDUM:

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

FROM: Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment (DEA)
Proposed: Wailehu Kou Phase 4 Single-Family Residential Subdivision for Qualified Native Hawaiian Beneficiaries
Location: Waihee, Island of Maui, Hawaii
TMK: (2) 3-2-12: 001
Applicant: Department of Hawaiian Home Lands
Consultant: Munekiyo & Hiraga, Inc. (808-244-2015)

Please review the DEA pertaining to the subject matter and submit your comments if any on Division letterhead (signed and dated) by the suspense date. Should you need more time to review the document, please contact Nick Vaccaro at 587-0384.

NOTE: One copy of the DEA is available for your review in the Land Division Office, Room 220.

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.

Signed:

Date: 9/18/04

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LA/NAV

Ref.: WAIEHUDHHLDEA.COM2

COMMENTS

(X) **We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zones B and C. The National Flood Insurance Program does not have any regulations for development within Zones B and C.**

( ) Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

( ) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP 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. Mario Antonio 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 so it can be included in the State Water Projects Plan Update.

( ) Additional Comments:_____

_____

( ) Other: _____

_____

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

Signed: _____
ERIC T. HIRANO, CHIEF ENGINEER

Date: 2/18/04

[redacted]
LINDA LINGLE
GOVERNOR

OCT 07 2004

PATRICIA HAMAMOTO
SUPERINTENDENT

STATE OF HAWAI'I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI'I 96804

OFFICE OF THE SUPERINTENDENT

October 4, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: Draft Environmental Assessment for Waiehu Kou
Phase 4, TMK: 3-2-12:01

The Department of Education (DOE) has reviewed the Draft Environmental Assessment (DEA) for a 95-lot single-family subdivision in Waihee, Maui. The subdivision could become a fourth phase in the Department of Hawaiian Home Lands' (DHHL) Waiehu Kou community.

The DOE appreciates your letter dated August 4, 2004, which clarified the amount of school fair-share contribution the DOE would be asking from the developer, if the project was not being developed by the Department of Hawaiian Home Lands.

The DOE acknowledges the DEA statement that DHHL will coordinate with the DOE to address the impacts of Waiehu Kou on the public schools serving the project. The DOE has made a number of requests to DHHL for assistance with school facilities but has not yet received a response from the department. Since portable or temporary classrooms must be ordered one to two years in advance, we would appreciate the initiation of a discussion on school impacts as soon as possible.

The DOE appreciates the opportunity to review the DEA. If you have any questions, please call Rae Loui, Assistant Superintendent of the Office of Business Services, at 586-3444 or Heidi Meeker of the Facilities and Support Services Branch at 733-4862.

Very truly yours,

Patricia Hamamoto
Superintendent

PH:jmb

c: Rae Loui, OBS
Ken Nomura, CAS, Baldwin/Kekaulike/Maui Complex Area

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 15, 2004

To: The Honorable Patricia Hamamoto, Superintendent
Department of Education

From: Micah A. Kane, Chairman
Hawaiian Homes Commission

Subject: Waiehu Kou Phase 4 Subdivision
Draft Environmental Assessment

Thank you for your letter of October 4, 2004 commenting on the Draft Environmental Assessment (DEA) for the proposed Waiehu Kou, Phase 4 Subdivision (WK4) at TMK 3-2-12:01, Waiehu, Maui.

As noted in our memorandum of September 30, 2004, the Department of Hawaiian Home Lands (DHHL) acknowledges that the local school facilities have been impacted by recent and proposed residential developments in Waiehu Kou. However, DHHL has over 3,500 lots in the planning, design, or construction phase statewide. Those developments will likely affect their respective communities' educational facilities as do the Waiehu Kou projects. We therefore suggest that DHHL and the Department of Education address the situation on a statewide basis rather than singling out Waiehu Kou.

Should you have any questions, please call me at 586-3801. Comments or questions regarding the WK4 project may directed to Darrell Ing of our Land Development Division at 586-3844.

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

LINDA LINGLE
GOVERNOR OF HAWAII

SEP 24 2004

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

LORRIN W. PANG, M. D., M. P. H.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2102

September 22, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Mr. Munekiyo:

Subject: **Draft Environmental Assessment**
Waiehu Kou Phase 4
TMK: (2) 3-2-12: 01

Thank you for the opportunity to comment on the proposed Waiehu Kou Phase 4 project. The following comments are offered:

1. All lands formerly in the production of sugarcane should be characterized for arsenic contamination. If arsenic is detected above the US EPA Region preliminary remediation goal for non-cancer effects, then a removal and or remedial plan must be submitted to the Hazard Evaluation and Emergency Response Office of the Department of Health for approval. The plan must comply with Chapter 128D, Environmental Response Law, Hawaii Revised Statutes, and Title 11, Chapter 11-451, Hawaii Administrative Rules (HAR), State Contingency Plan.

2. The property may be harboring rodents that will be dispersed to the surrounding areas when any buildings are demolished or the site is cleared. The applicant is required by HAR, Chapter 11-26, "Vector Control" to eradicate any rodents prior to demolition or site clearing activities and to notify the Department of Health by submitting Form VC-12 to the Maui Vector Control program when such action is taken. Rodent traps and/or rodenticides should be set out on the project site for at least a week or until the rodent activity ceases. The Maui Vector Control program phone number is 873-3560.

Should you have any questions, please call me at 984-8230.

Sincerely,

Herbert S. Matsubayashi
District Environmental Health Program Chief

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 15, 2004

TO: Dr. Chiyome Fukino, Director
Department of Health

ATTN: Mr. Herbert Matsubayashi, Chief
District Environmental Health Program
Maui District Health Office

FROM: Micah A. Kane, Chairman
Hawaiian Homes Commission

SUBJECT: Draft Environmental Assessment for the
Proposed Waiehu Kou Phase 4 Subdivision

Thank you for your letter of September 22, 2004, commenting on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. The following are in response to your comments:

- A Phase I, Environmental Site Assessment has been performed for the proposed subdivision site. No unacceptable levels of toxins were detected at the site.

- Rodent populations will be dealt with in a manner consistent with Chapter 11-26, Hawaii Administrative Rules.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

OCT 12 2004

ALAN M. ARAKAWA
MAYOR

OUR REFERENCE
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

KEKUHAUPIO R. AKANA
DEPUTY CHIEF OF POLICE

October 6, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Mr. Munekiyo:

SUBJECT: Proposed Waiehu Kou Phase 4 Subdivision

Thank you for your letter of September 7, 2004, requesting comments on the above subject.

We have reviewed the revised environmental assessment on this project and have enclosed a copy of our comments. As always, thank you for giving us the opportunity to comment on this project.

Very truly yours,

Assistant Chief Sydney Kikuchi
for: Thomas M. Phillips
Chief of Police

c: Michael Foley, Planning Department

Enclosure

COPY

TO: **THOMAS PHILLIPS, CHIEF OF POLICE**

VIA: **CHANNELS** D 10/06/04

FROM: **LISA ANN RODRIGUES, POIII, COMMUNITY POLICING**

SUBJECT: **COMMENTS RE: PROPOSED WAIEHU KOU PHASE 4 SUBDIVISION, WAIHEE, MAUI, HAWAII (TMK 3-2-12:01)**

This proposed project will be a 95-lot single-family residential subdivision at Waihee, Maui, Hawaii (TMK3-2-12:01) located adjacent to the Waihee Ball Park and north of the current Waiehu Kou Phase 3 development that is currently underway.

In October 2003 comments were submitted in regards to this project. On August 6, 2004 a letter was received from Munekiyo & Hiraga, Inc. addressing those concerns, see attached copies of both.

Other concerns which may not necessarily mean planners are responsible for include:

Traffic issues unacceptable now, with the WKU. Country estate development.

1. Increase in traffic in arterial roadways leading to and from the Waihee area and Waiehu Kou phases, which are being addressed by other entities which includes the Kahekili Highway widening project up to the intersection at Waiehu Beach Road and Kahekili Highway. The increase in traffic on a whole will add to the already heavily congested areas that lead out of the outskirt areas, ie., Waiehu Beach Road morning traffic leading to Kahului Beach Road and Waiehu Beach Road intersection, as well as the A.M. traffic that goes through Happy Valley.

2. Taking into consideration the low level and tsunami zone of this area and of the main roadways leading to and from which are also in the tsunami zone, which includes L. Waiehu Beach Rd., Waiehu Beach Rd., and Kahului Beach Rd., will the flow for an area emergency evacuation be affected?

3. Significant area population increase without an increase in police manpower.

4. Will Waihee Elementary, Iao Intermediate, and Baldwin High School be able to accommodate the increase in students or are these students already a part of these schools' jurisdictions?

Respectfully submitted for your perusal.

The above-mentioned points should be taken into consideration during planning especially the increase to schools and surrounding roadway traffic.

Rodrigues

Lisa Ann Rodrigues / e2158
09-29-04 / 1100 hours

Concur
10/6/04

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

January 10, 2005

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

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Dear Chief Philips:

Thank you for your letter of October 6, 2004, responding to our request for comments on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. In response to your comments, we note the following:

1. The Department of Hawaiian Home Lands (DHHL) recognizes the recommendations for appropriate mitigation measures have been identified in this regard. The DHHL has been coordinating with DOT to address traffic issues, to the extent applicable to the project.

2. DHHL does not anticipate any impact on area emergency evacuations.

3. DHHL acknowledges your concern that there will be an increase in area population resulting from the approximately 96-lot subdivision. It should be noted, however, that for the previously developed Waiehu Kou Phases 2 and 3, approximately half of the lessees moved from residences in the Kahului-Wailuku area. Half of the remainder relocated from other locations on Maui. We therefore do not anticipate a significant increase to the population on the island of Maui as a result of the proposed project.

4. DHHL is coordinating with the Department of Education to

determine the best strategy for dealing with student population impacts resulting from the proposed subdivision.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

OCT 2 0 2004

ALAN M. ARAKAWA
Mayor

GEORGE Y. TENGAN
Director

JEFFREY T. PEARSON, P.E.
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

September 27, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street Suite 104
Wailuku HI 96793

Subject: Draft Environmental Assessment for Waiehu Kou Phase 4

Dear Mr. Munekiyo:

Thank you for the opportunity to provide comments on this Draft Environmental Assessment (EA). We note that our comment letter to this project of January 13, 2004 is included in the EA. The Department of Water Supply provides the following additional information:

The Department of Hawaiian Homelands (DHHL) has requested reservation for estimated demand of 57,600 gallons per day (gpd) for this project. DHHL will receive priority in meeting demand from the Central Maui system for this project.

The project overlies Iao aquifer. The Department of Water Supply strives to protect the integrity of surface and groundwater resources by encouraging the applicant to adopt best management practices (BMPs) designed to minimize infiltration and runoff from all construction and vehicle operations. We recommend that the applicant include BMPs designed to minimize infiltration and runoff from construction and vehicle operations in the EA. Sample BMPS were attached with our January 13, 2004 comment letter. Additional information can be obtained from the State Department of Health.

We ask Central Maui customers to voluntarily conserve water to alleviate demand on the Iao and Waihee aquifers. We strongly encourage that the applicant incorporate water conservation measures in the EA, to be implemented in project design and construction. Please refer to suggested measures in our January 13, 2004 letter.

Should you have any questions, please contact our Water Resources and Planning Division at 270-7199.

Sincerely,

George Y. Tengan
Director
emb

c: engineering division
DHHL, with attachment::

DWS form: Reservation of Available Service Capacity

C:\WPdocs\EAs EISs\Waiehu Kou Ph 4 SD DEA.wpd

"By Water All Things Find Life"

Printed on recycled paper

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII

DEPARTMENT OF HAWAIIAN HOME LANDS

P.O. BOX 1879

HONOLULU, HAWAII 96805

November 15, 2004

The Honorable George Tengan, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Dear Mr. Tengan:

Thank you for your letter of September 27, 2004, commenting on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. In response to your comments:

- The Department of Hawaiian Home Lands (DHHL) and WK3 LLC gratefully acknowledge that the proposed project will receive priority in meeting demand from the Central Maui system.

- DHHL and WK3 LLC will develop a Best Management Practices (BMP) plan and water conservation measures for the project and the recommendations of your Department will be considered. These plans are still under development and to the extent applicable will include the sample BMPs suggested by your January 13, 2004 comment letter.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

ALAN M. ARAKAWA
Mayor

GILBERT S. COLOMA-AGARAN
Director

MILTON M. ARAKAWA, A.I.C.P.
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

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

RALPH NAGAMINE, L.S., P.E.
Development Services Administration

TRACY TAKAMINE, P.E.
Wastewater Reclamation Division

Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

October 20, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR WAIEHU KOU PHASE 4 SUBDIVISION
TMK: (2) 3-2-012:001

We reviewed the subject application and have the following comments:

1. The plans submitted for this project do not adequately show sufficient detail to determine whether the project is compliant with the building and housing codes. We will review the project for building and housing code requirements during the building permit application process.

2. The proposed pedestrian accesses shall be kept under private ownership and maintenance.

3. The developer has indicated that the roadways will be dedicated to the County. As such, all roads shall be designed to County standards.

4. All off-site drainage improvements (not within County road rights-of-way) shall be kept under private ownership and maintenance.

5. The subject project shall comply with Title 18 (Subdivision Ordinance) of the Maui County Code.

6. All grading/grubbing work for the subject project shall comply with Chapter 20.08 (Soil Erosion and Sedimentation Control) of the Maui County Code. Best Management Practices (BMP) shall be implemented to the maximum extent practicable to prevent pollutants including dust and sediment from discharging off the project site.

7. The subject project shall comply with the "Rules for the Design of Storm Drainage Facilities in the County Of Maui".

8. Section B.4, Page 39 addresses solid waste issues. Submit plans for review and approval. Include cleared and grubbed material and demolition material.

9. Although wastewater system capacity is currently available as of October 8, 2004, the developer should be informed that wastewater system capacity cannot be ensured until the issuance of the building permit.

10. Wastewater contribution calculations are required before building permit is issued.

11. Developer shall pay assessment fees for treatment plant expansion costs in accordance with the ordinance setting forth such fees.

12. Developer is required to fund any necessary off-site improvements to collection system and wastewater pump stations.

13. Plans should show the installation of a single service lateral and an advance riser for each lot.

14. Non-contact cooling water, condensate, etc. should not drain to the wastewater system.

15. Indicate on the plans the ownership of each easement (in favor of which party). Note: County will not accept sewer easements that traverse private property.

16. Pump station(s) needed to accommodate flows from Waiehu Kou Phase 4 shall not be dedicated to the County.

17. Hawaiian Homes pump station will need to be upgraded at the developer's expense in order to accommodate flows from this subdivision.

Please call Milton Arakawa at 270-7845 if you have any questions regarding this letter.

Very truly yours,

for GILBERT S. COLOMA-AGARAN
Director

GSCA:MA:da
S:\LUCA\CZM\Waiehu_Kou_phase_4_dea_32012001_da.wpd

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

January 10, 2005

The Honorable Gilbert Coloma-Agaran, Director
County of Maui
Department of Public Works and Environmental Management
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Dear Mr. Coloma-Agaran:

Thank you for your letter of October 20, 2004, commenting on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. Our responses to your comments have been numbered in accordance with the numbering in your letter.

1. The Department of Hawaiian Home Lands (DHHL) and the developer, WK3 LLC, acknowledge that the plans will be reviewed for compliance with building and housing code requirements during the building permit process.

2. The proposed pedestrian accesses will be licensed to and maintained by the subdivision's owners association.

3. The roads are being designed to County standards and will be licensed to the County of Maui for maintenance purposes.

4. Drainage improvements located outside of the County road right-of-way will be owned and maintained by DHHL.

5. The project will comply with applicable requirements of Title 18, of the Maui County Code, except for those instances in which exemptions have been requested. A

list of exemptions requested will be included in the Final EA.

6. All grading and grubbing work for the proposed subdivision will comply with Chapter 20.08 of the Maui County Code. Best Management Practices will also be implemented to mitigate air and water quality impacts due to construction activities.

7. The project will comply with the *"Rules for the Design of Storm Drainage Facilities in the County of Maui."*

8. DHHL and WK3 LLC will coordinate with the Solid Waste Division to address solid waste management requirements.

9. DHHL and WK3 LLC acknowledge that wastewater system capacity cannot be ensured until the issuance of the building permits.

10. DHHL and WK3 LLC acknowledge that wastewater contribution calculations are required before the building permit is issued.

11. DHHL and WK3 acknowledge that assessment fees for treatment plant expansion may be required.

12. DHHL and WK3 acknowledge that it may be required to fund necessary offsite improvements to the collection system and wastewater pump stations.

13. Subdivision construction plans will indicate the installation of a single-service lateral and an advance riser for each lot.

14. Neither non-contact cooling water nor condensate will drain into the wastewater system.

15. Ownership of each easement will be indicated on project plans.

16. There are no new pump stations planned for the proposed project. An 8-inch gravity flow sewer line is proposed, which will connect with the Waiehu Kou, Phase 3, wastewater pump station.

17. As noted in the EA, the existing DHHL pump station at Waiehu Kou 2 will be upgraded to accommodate increased flows. Upgrade requirements will be determined in coordination with the Wastewater Reclamation Division of your department.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

c: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

ALAN M. ARAKAWA
Mayor

MICHAEL W. FOLEY
Director

WAYNE A. BOTEILHO
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

October 8, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo;

RE: Draft Environmental Assessment prepared for the Proposed Waiehu Kou Phase 4 Subdivision located at TMK: 3-2-012: 001, Kahekili Highway, Waihee, Island of Maui, Hawaii (LTR 2004/3421)

The Maui Planning Department (Department) is in receipt of the Draft Environmental Assessment (DEA) prepared for the Waiehu Kou Phase 4 Subdivision proposed in accordance with the mission of the Department of Hawaiian Home Lands (DHHL). The proposed action involves the development of a 96-lot single family subdivision and related improvements. The Department provides the following comments:

1. Section I.C, Proposed Improvements. The DEA indicates the lots will range in size from 7,200 ft^2 to 8,000 ft^2 and that four (4) house models will be offered as part of the house-lot packages. Identify whether ohana units will be allowed on the lots.

2. Section II.A, Physical Environment. Discuss the agricultural designations for the property in accordance with the Land Study Bureau and the Agricultural Lands of Importance to the State of Hawaii.

3. Section III, Potential Impacts and Mitigative Measures.

   a. If ohana units are allowed on the proposed lots, provide an analysis of potential impacts and mitigative measures resulting from the increase in density.

b. A cumulative impacts analysis should be included. Provide a list of proposed and constructed projects within the region that were included in the analysis. In addition to the 14-lot agricultural subdivision and Waiehu Kou Phases 1 thru 3, the following projects should be considered:

   i. Proposed Hale Mua Subdivision, a 400-lot single-family residential subdivision on 248 acres in Waiehu, Maui.

   ii. Wailuku Country Estates Subdivision, 189-lot subdivision, located adjacent to Kahekili Highway and south of the proposed project.

4. Section III.A, Physical Environment. The subject property has historically been used for agricultural purposes.

   a. Discuss potential impacts resulting from historical use, storage, and/or management of pesticides on the property.

   b. Discuss potential impacts of removing productive lands from agricultural use.

5. Section III.B.2, Police, Fire and Medical Services. Discuss any impacts the proposed internal roadway design with the cul-de-sacs may have on the maneuverability of the fire trucks. Further, if on-street parking is allowed, how will this impact the maneuverability of fire trucks.

6. Section III.C.1, Traffic. For your information, there is a typographical error on page 41 of the DEA, which should be corrected as follows:

   "...determined to be 6:45 AM to 7:45 AM (AM peak) and 4:15 *PM* to 5:15 *PM* (PM peak)..."

   a. Page 26 of the TIAR provides recommendations with the proposed project. Page 43 of the DEA indicates these recommendations *should be* conducted. Please clarify whether the proposed project will implement the recommendations.

b. Provide a list of proposed and constructed projects within the region that were included in the analysis. In addition to the 14-lot agricultural subdivision and Waiehu Kou Phase 3, the following projects are proposed or currently under construction in the area and should be considered in the TIAR analysis:

   i. Proposed Hale Mua Subdivision, a 400-lot single-family residential subdivision on 248 acres in Waiehu, Maui.

   ii. Wailuku Country Estates, 189-lot subdivision, located adjacent to Kahekili Highway and south of the proposed project.

7. Section III.C.2, Wastewater. The DEA indicates the current design capacity for the Wailuku-Kahului Wastewater Reclamation Facility (WWRF) is 7.9 million gallons per day (MDG).

   a. Discuss the current use capacity of the WWRF.

   b. Based on the proposed design, discuss the anticipated quantity of wastewater generated by the proposed project.

8. Section III.C.4, Drainage.

   a. A preliminary drainage analysis should be conducted and included within the appendices of the DEA. The analysis should include, but not be limited to, a discussion of the regional drainage system and identify the final discharge point of the natural drainage way that traverses along the property's eastern boundary. Discuss the rationale for designing the proposed drainage system on a 50-year, 1-hour storm versus the 100-year, 1-hour storm event.

   b. The DEA indicates that post development levels will be collected by an underground drainage system and routed into a proposed onsite retention basin. Discuss safety measures (e.g., fence) incorporated around the retention basin to protect the public during heavy rainfall events.

c. Preconsultation comments from the Department of Public Works and Environmental Management (DPWEM) indicates the drainageway shall be improved to their standards. Please be advised that the Department discourages concrete hardening of drainageways and recommends the use of alternative measures to blend in with the natural environment.

d. A proposed grading plan should be included in the DEA. Discuss mitigative measures to prevent erosion during ground altering activities, especially given the location of the natural drainageway along the eastern property boundary.

9. Section III.C.5, Electrical and Telephone Systems. Discuss energy conservation measures incorporated into the project.

10. Chapter IX, Permits, Variances, and Approvals. Provide a list of specified exemptions declared from State and County regulations.

11. Chapter X, Pre-Consultation. Provide a list of community groups consulted in preparation of the DEA.

The Department notes that the cover letter indicates DHHL will be the approving agency for the DEA. However, the Department recommends identifying the applicant and approving agency within the DEA for further clarification.

Thank you for the opportunity to comment. Should you require additional clarification, please contact Ms. Kivette A. Caigoy, Environmental Planner, at 270-7735.

Sincerely,

MICHAEL W. FOLEY
Planning Director

MWF:KAC:dm
c: Wayne Boteilho, Deputy Planning Director
Kivette A. Caigoy, Environmental Planner
DHHL
OEQC
TMK Folder
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LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

January 10, 2005

Honorable Michael W. Foley, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Dear Mr. Foley:

Thank you for your letter of October 8, 2004, responding to our request for comments on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. Our responses to your comments have been numbered in accordance with the numbering in your letter.

1. Ohana units will not be allowed on the Waiehu Kou, Phase 4 lots.

2. The Final EA will contain a discussion of the agricultural designations for the property in accordance with the Land Study Bureau and the Agricultural Lands of Importance to the State of Hawaii.

3.a. Comment not applicable; see response to No. 1 above.

3.b. A cumulative impacts analysis will be included in the Final EA.

4.a. A Phase I, Environmental Site Assessment was performed on the subject property. The Assessment determined that the property is free from hazardous materials relating to its historic use as agriculture land.

4.b. The project site, though formerly used for agricultural purposes, is no longer used in that manner. Adverse

impacts to agricultural productivity on the island is not anticipated. As property of the Department of Hawaiian Home Lands (DHHL), the site is intended to be used in the furtherance of DHHL's mission: to provide housing to native Hawaiians. The proposed subdivision will allow this to occur.

5. The Fire Department has been consulted and provided with a copy of the Draft EA for review and comment. Roadway width and cul-de-sac dimensions have been designed to conform to Maui County standards for road widths and turning radii.

   There will be no parking allowed within the cul-de-sac. "No Parking" signs will be posted within the area per County standards.

6.a. The TIAR addressed a number of traffic-issues, many of which are regional in nature and not project-specific. The following project-specific recommendations will be implemented as follows:

   - Provide an exclusive southbound, left-turn lane on Kahekili Highway for traffic entering the project site at the Primary Access Road.

   - Provide a shared left-turn/through lane and separate right-turn lane on the westbound Primary Access road approach to Kahekili Highway.

   - Provide shared lane approaches at the Halewaiu Road/Secondary Access Road intersection.

   The other improvements recommended on page 26 of the TIAR are required to mitigate base year traffic and would be necessary even without the development of Waiehu Kou, Phase 4. These regional recommendations will not be implemented as part of the proposed action.

6.b. The traffic engineer has reviewed the growth assumptions used in the TIAR and has confirmed that the rates used are applicable to the analysis. A growth rate of two percent (2%) per year, or eight percent (8%) over four (4) years, was used for the TIAR; this is consistent with the Maui Long Range Land Transportation Plan (MLRLTP), dated

February 1997. The report, therefore, accounts for the Wailuku Country Estates project and other developments in the area by applying the growth rate to existing traffic volumes collected for the report.

7.a. The current use capacity of the Kahului-Wailuku Wastewater Reclamation Facility (WWRF) is 5.5. MGD. It should be noted that in the early consultation process, the Department of Public Works and Environmental Management (DPWEM)noted that the current wastewater reclamation facility has adequate capacity, but that it will not guarantee that capacity to be available at the time of connection.

7.b. Based upon DPWEM wastewater guidelines, the proposed 96 residential unit subdivision will generate an average, daily wastewater flow of approximately 36,000 gallons. This information will be included in the Final EA.

8.a. A preliminary drainage analysis was conducted and included within the Preliminary Engineering Report (PER), Appendix "A". Exhibits to the PER were inadvertently omitted in the Draft EA; this will be corrected in the Final EA.

The drainage system was designed for the 50-year, 1-hour storm, based off of Maui County drainage standards for the design of storm water systems.

8.b. The retention basin for the proposed subdivision will be enclosed within a 4-foot chain link fence for safety reasons. This will be similar to the safety measures incorporated into Waiehu Kou, Phase 3. The retention basin will be designed to control stormwater discharge from the basin to down-grade areas at the predevelopment rate of flow.

8.c. The project plans do not call for the hardening of the existing, natural drainageway. The natural drainageway will be maintained in its natural state to the greatest extent feasible.

8.d. A preliminary grading plan was prepared and will be included in the Final EA. Best Management Practices will be included in the construction documents.

9. Solar water heating will be offered as a design option for the new homes.

10. The Final EA will include a list of exemptions sought.

11. During the project planning stages, DHHL communicated with a number of potential residents for the Waiehu Kou, Phase 4 Subdivision. These are people of Hawaiian ancestry who have registered their interest in Hawaiian Home Lands residency.

The Department of Hawaiian Home Lands will serve as the proposing agency and determination agency for the proposed action.

Thank you again for your input into the proposed action.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

c: Mei Lee Wong, WK3, LLC
Matt Slepin, Munekiyo & Hiraga, Inc.

SEP 16 2004

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

ALAN M. ARAKAWA
Mayor

ALICE L. LEE
Director

HERMAN T. ANDAYA
Deputy Director

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 270-7805 • FAX (808) 270-7165

September 8, 2004

Mr. Matthew Slepin, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Slepin:

Subject: **Proposed Waiehu Kou Phase 4 Subdivision**

We have reviewed the draft Environmental Assessment for the subject project and would like to request that the Final Environmental Assessment include the house plans of the other models that will be constructed in the project.

Thank you for the opportunity to comment.

Very truly yours,

ALICE L. LEE
Director

ETO:bp

c: Housing Administrator

LINDA LINGLE
GOVERNOR
STATE OF HAWAII

MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

BEN HENDERSON
DEPUTY TO THE CHAIRMAN

KAULANA H. PARK
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 15, 2004

Honorable Alice Lee, Director
County of Maui
Department of Housing and Human Concerns
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for the Proposed Waiehu Kou Phase 4 Subdivision

Dear Ms. Lee:

Thank you for your letter of September 8, 2004, commenting on the Draft Environmental Assessment (EA) for the proposed Waiehu Kou, Phase 4 Subdivision at TMK 3-2-12:01, Waiehu, Maui. In response to your comments, the plans for all four house models will be included in the Final EA.

Should you have any questions regarding the project, please call Mr. Darrell Ing of our Land Development Division at 586-3844.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

cc: WK3 LLC
Munekiyo & Hiraga, Inc., Attn: Matt Slepin

SEP 17 2004

ALAN M. ARAKAWA
Mayor

GLENN T. CORREA
Director

JOHN L. BUCK III
Deputy Director

(808) 270-7230
Fax (808) 270-7934

DEPARTMENT OF PARKS & RECREATION

700 Hali'a Nakoa Street, Unit 2 , Wailuku, Hawaii 96793

September 14, 2004

Mr. Michael Munekiyo
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: PROPOSED WAIEHU KOU PHASE 4 SUBDIVISION

We have reviewed the Draft Environmental Assessment for the proposed Waiehu Kou Phase 4 Subdivision and have no comments to the proposed action.

Thank you for the opportunity to review and comment. Should there be any questions, please contact Mr. Patrick Matsui, Chief of Parks Planning and Development, at 270-7387.

Sincerely,

GLENN T. CORREA
Director

c: Patrick Matsui, Chief of Parks Planning and Development

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Appendices

Appendix A

Exemptions Declared from State and County Regulations

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

January 25, 2005

The Honorable Milton Arakawa, Director
Department of Public Works and
Environmental Management
County of Maui
250 South High Street
Wailuku, Hawaii 96793

Dear Mr. Arakawa,

Subject: Letter of Authorization and
Declaration of Exemptions
Waiehu Kou Residence Lots Phase IV
TMK: (2) 3-2-012:001

This letter serves to authorize WK3 LLC, developer and subsidiary of Dowling Company, Inc., and their engineering consultant, Austin, Tsutsumi & Associates, Inc. to act on behalf of the Department of Hawaiian Home Lands (DHHL) to process the proposed subdivision of the subject parcel.

The subdivision shall be exempt from the underlying County agricultural zoning designation and will be submitted for processing, review and compliance under the R-1 residential standard, 6,000 square-foot minimum lot size.

DHHL is exempting itself from various State of Hawaii and County of Maui subdivision development related statutes and regulations related to the development of Waiehu Kou Phase IV, TMK: (2) 3-2-12:01.

The declaration of exemptions below is intended to facilitate the granting of final subdivision approval to allow for the construction of houses prior to the full construction and completion of the subdivision improvements and to minimize the cost of improvements. The following exemptions are declared:

1. State Land Use Commission District Boundary Amendment
   - Chapter 205, Hawaii Revised Statutes, as Amended
   - State Land Use Commission Rules

2. Title 19, Maui County Code, 1980, as Amended
   - Chapter 19.510 Application and Procedures
   - Section 19.510.040 Change of Zoning

3. Community Plan Amendment
   - Maui County Code, Chapter 2.80
   - Maui County Charter, Section 8-8.4 and 8-8.5

4. Special Management Area Permit Application
   (See attached State Attorney General Memorandum)

5. Subdivision Design Standards
   - Maui County Code 18.16.130, Cul-de Sacs
   - Maui County Code 18.24.010, Filing Fees for Subdivision Plan Review

6. Subdivision Design Standards
   - Maui County Code 18.20.140, Underground Utilities

7. Subdivision Design Standards
   - Maui County Code 19.08.040, Minimum Lot Width of 60 feet

8. Subdivision Design Standards
   - Maui County Code 18.16.220, Minimum Lot Width of 65 feet for corner lots

9. Standard concrete curbs and gutters for interior subdivision roadways.
   - The project will have standard concrete rolled curbs for interior roadways

10. Location of sidewalk next to curb.
    - The project will locate the sidewalks along the road right-of-way boundary. The location along the road right-of-way boundary is similar to constructed road section of the existing Waiehu Kou Phase 1, Phase 2 and Phase 3 subdivisions.

11. All County of Maui Assessments, including but not limited to park, traffic, etc.

12. Subdivision Design Standards
    - Maui County Code 18.16.040, 18.16.050, 18.16.060, Roadway widening and improvements to Halewaiu Road.

13. County of Maui, Department of Water Supply (DWS) Section 2-14
    - *In lieu of entering into an agreement* with DWS for the repair and replacement of the water system improvements, DHHL, by written letter, will guarantee the improvements for a period of one year after DWS acceptance through the developer and contractor.

14. Maui County Code Articles 18.20.200 & 18.20.210
    - It is DHHL's intent to obtain final subdivision approval prior to completion of the construction in accordance with Maui County Code Section 18.20.190. DHHL however is exempting itself from Articles 18.20.200 and 18.20.210 of the subdivision code and Section 2-13 of the DWS Rules and Regulations, which requires DHHL to enter into an agreement with the County of Maui to complete the improvements and utilities and to further provide a surety bond or other security acceptable to the County of Maui to guarantee that improvements and utilities will be completed. DHHL shall complete all improvement and utilities in accordance with the construction plans approved by the County of Maui.

Should you have any questions, please call me at 586-3801 or Stewart Matsunaga, Project Manager, Land Development Division at 587-6454.

Aloha and mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission

Enc.

c: WK3 LLC
Austin, Tsutsumi & Associates, Inc.

Appendix B

Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT
WAIEHU KOU, PHASE 4

Waiehu, Maui, Hawaii

FINAL

Prepared for

WK3, LLC
2005 Main Street
Wailuku, Hawaii 96793

Prepared by
Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
Honolulu • Wailuku, Hawaii

March 9, 2004

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AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

KENNETH K. KUROKAWA, P.E.
LAMBERT J. YAMASHITA, P.E.
DONOHUE M. FUJII, P.E.
STANLEY T. WATANABE
TERRANCE S. ARASHIRO, P.E.

TRAFFIC IMPACT ANALYSIS REPORT
WAIEHU KOU, PHASE 4
WAIEHU, MAUI, HAWAII

I. INTRODUCTION

A. Purpose and Scope

This report documents the findings and recommendations of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. to evaluate the potential traffic impacts from the development of the Waiehu Kou, Phase 4 subdivision (the "Project") on the island of Maui. The current plans call for development of a 96 single-family dwelling unit subdivision.

B. Project Location

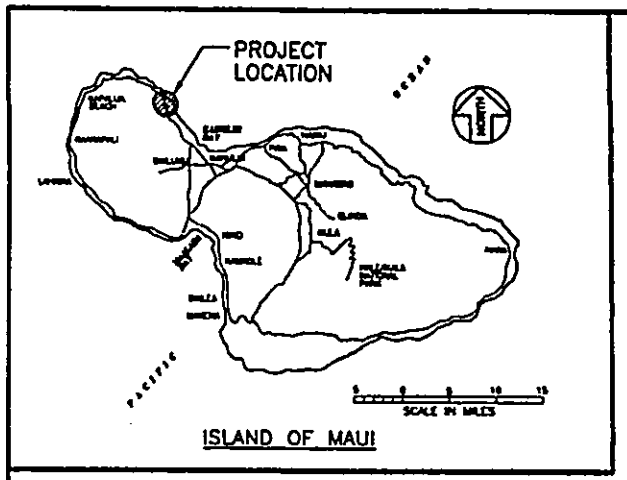
The proposed Project is located on the northern side of the island of Maui northeast of Wailuku and northwest of Kahului. The Project site is more specifically identified as Tax Map Key (TMK): (2) 3-2-012:001. The total area of the Project site is approximately 35.6 acres. The Project will be located directly northwest of the Waiehu Kou, Phase 3 subdivision, which is presently under construction. Vehicular access to the Project site will be provided on Kahekili Highway and on Halewaiu Road. Figure 1 shows the location of the Project.

C. Project Description

The Project includes 96 single-family dwelling units. Completion of the Project is anticipated in mid 2006. Figure 2 shows the Project site plan.

REPLY TO:
501 SUMNER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE (808) 533-3646 • FAX (808) 526-1267 • EMAIL: atahnl@atahawaii.com

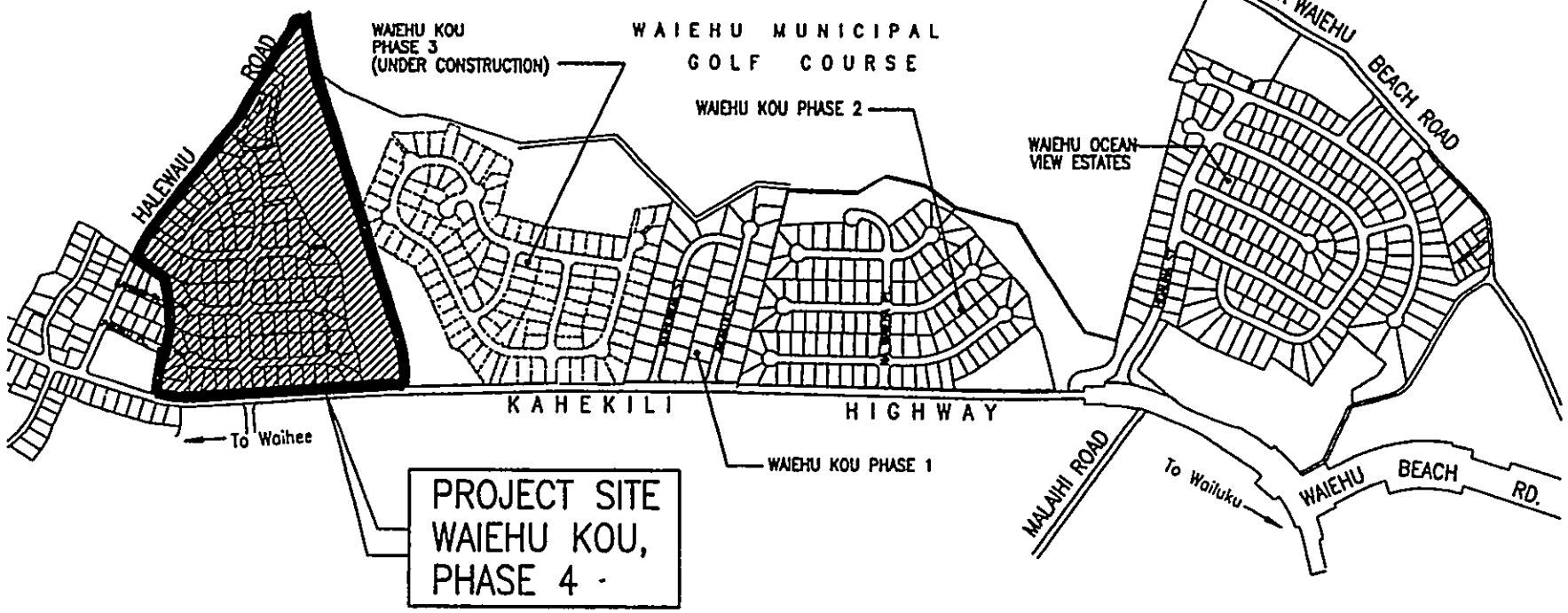
OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII



ISLAND OF MAUI

NORTH

NOT TO SCALE

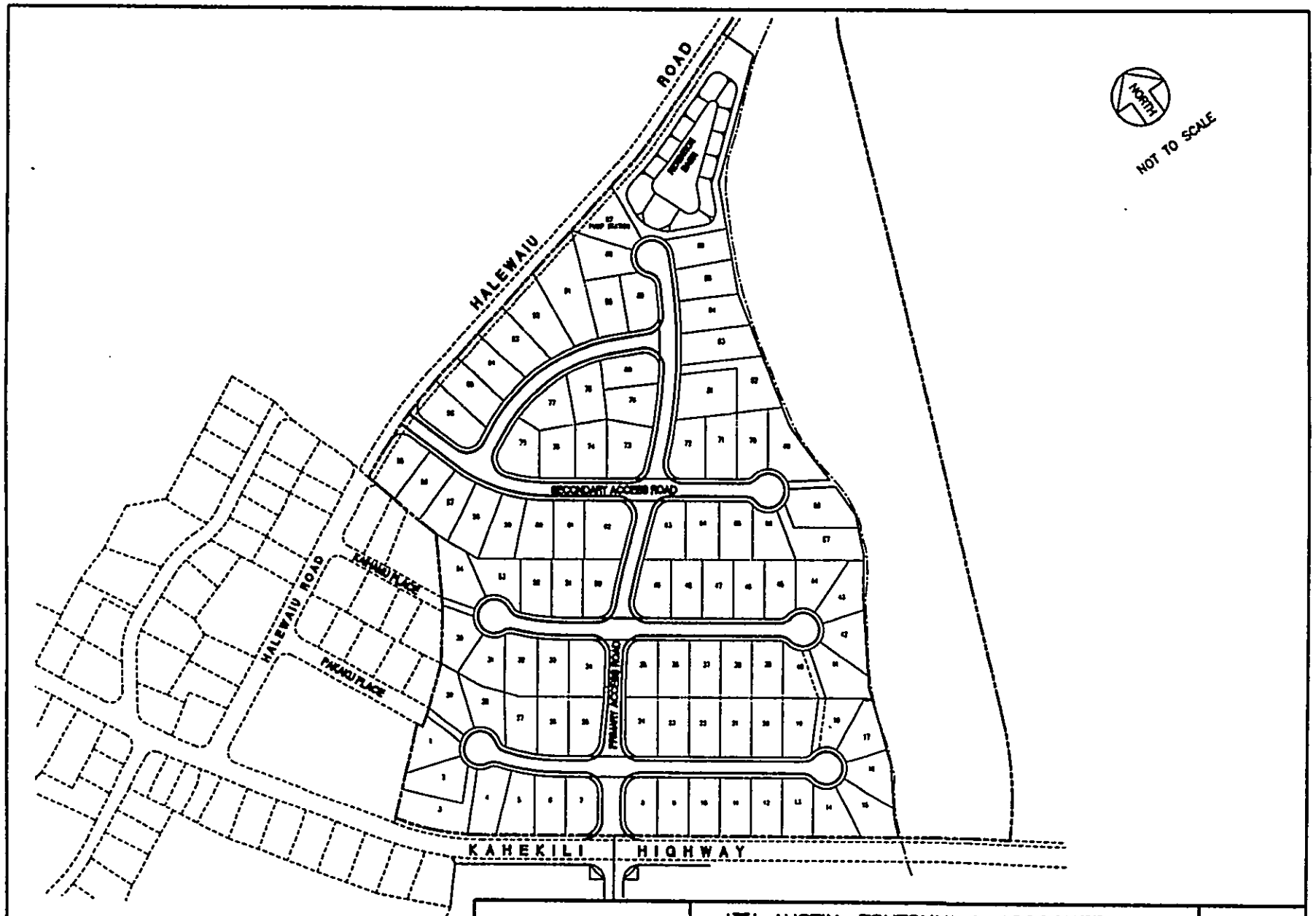


WAIEHU KOU, PHASE 4

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

FIGURE 1

PROJECT LOCATION



WAIEHU KOU, PHASE 4

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
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SITE PLAN

FIGURE 2

D. Study Methodology

This study will address the following:

1. Existing traffic operating conditions.
2. Base Year (build-out year of the proposed Project) traffic projections without Project-generated traffic.
3. Trip generation and traffic assignment characteristics for the proposed Project.
4. Determination of the potential impact of Project-generated traffic on the base year traffic operation.
5. Recommendation of traffic mitigation measures as appropriate to mitigate the traffic impacts resulting from the development of the proposed Project.

II. EXISTING CONDITIONS

A. Roadway System

Kahekili Highway – is a two-lane, two-way State rural highway that provides the only link between Wailuku and the communities of Waihee and Kahakuloa to the north. On its southern end, Kahekili Highway begins in Wailuku at its intersection with Mokuhau Road, Piihana Road and North Market Street and becomes Honoapiilani Highway just north of Kahakuloa Village. In the vicinity of the Project, Kahekili Highway has a posted speed limit that varies by direction from 20 miles per hour (mph) to 35 mph.

Waiehu Beach Road – is a two-lane, two-way State collector roadway. Waiehu Beach Road begins at its intersection with Kahului Beach Road and Lower Main Street and ends at its intersection with Kahekili Highway.

Na Waieha Place – is a two-lane, two-way residential road that provides access to the existing Waiehu Kou, Phase 2 subdivision. Na Waieha Place begins at its intersection with Kahekili Highway and terminates to the east in a cul-de-sac.

Kohomua Street - is a two-lane, two-way residential road that provides access to the existing Waiehu Kou, Phase 1 subdivision. Kohomua Street and Akakuu Street form a loop road within the Waiehu Kou, Phase 1 subdivision. Kohomua Street begins at its intersection with Kahekili Highway and terminates to the east at its intersection with Akakuu Street.

Akakuu Street - is a two-lane, two-way residential road that provides a second access to the existing Waiehu Kou, Phase 1 subdivision. Akakuu Street begins at its intersection with Kahekili Highway and terminates to the east in a cul-de-sac.

Halewaiu Road - is a two-lane, two-way County road that serves existing residences and provides access to Waihee Beach Park and Waiehu Municipal Golf Course.

Kahamu Place - is a two-lane, two-way residential road that serves existing residences. Kahamu Place begins at its intersection with Halewaiu Road and terminates to the south in a "dead-end."

Pakaku Place - is a two-lane, two-way residential road that serves existing residences. Pakaku Place begins at its intersection with Halewaiu Road and terminates to the south in a "dead-end."

B. Study Intersections

Manual turning count surveys and field observations were conducted on August 14, 2002 at the Kahekili Highway/Kohomua Street and Kahekili Highway/Akakuu Street intersections.

Additional manual turning count surveys were also conducted on January 30 and 31, 2003 at the Kahekili Highway/Waiehu Beach Road intersection and on September 30, 2003 and October 1, 2003 at the Kahekili Highway/Halewaiu Road intersection.

For the purpose of the study, Kahekili Highway will be referenced as a north-south roadway, although it is actually situated in the southeast to northwest direction in the vicinity of the Project. Similarly, Waiehu Beach Road, Kohomua Street, Akakuu Street and Halewiau Road will be referred to as east-west roadways.

Kahekili Highway/Waiehu Beach Road form an unsignalized "tee"-intersection with Waiehu Beach Road serving as the stop sign-controlled stem of the intersection. The Kahekili Highway northbound approach consists of a single shared through/right-turn lane. The Kahekili Highway southbound approach has a single shared left-turn/through lane. The Waiehu Beach Road approach has a single shared left/right-turn lane.

Kahekili Highway/Kohomua Street form an unsignalized "tee"-intersection with Kohomua Street serving as the stop sign-controlled stem of the intersection. The Kahekili Highway northbound approach consists of a single shared through/right-turn lane. The Kahekili Highway southbound approach has a single shared left-turn/through lane. The Kohomua Street approach has a single shared left/right-turn lane.

Kahekili Highway/Akakuu Street form an unsignalized "tee"-intersection with Akakuu Street serving as the stop sign-controlled stem of the intersection. The Kahekili Highway northbound approach consists of a single shared through/right-turn lane. The Kahekili southbound Highway approach has a single shared left-turn/through lane. The Akakuu Street approach has a single shared left/right-turn lane.

Kahekili Highway/Halewaiu Road form an unsignalized "tee"-intersection with Halewaiu Road serving as the stop sign-controlled stem of the intersection. The Kahekili Highway northbound approach consists of a single shared through/right-turn lane. The Kahekili Highway southbound approach has a single shared left-turn/through lane. The Halewaiu Road approach has a single shared left/right-turn lane.

Field observations noted that existing fences along the highway limits sight distance for vehicles turning from Halewaiu Road onto Kahekili Highway.

Figure 3 shows the existing traffic lane configuration for the intersections included in the study.

C. Traffic Operations

The weekday peak hours of traffic were determined to be from 6:45 AM to 7:45 AM and from 4:15 PM to 5:15 PM during the traffic counts described in the previous Section. Figure 4 shows the existing traffic volumes at the study

intersections. The traffic count data is provided in Appendix A. Through traffic volumes on Kahekili Highway were adjusted to account for the variation between the counts taken in August and September/October since the through traffic volumes on Kahekili Highway were higher in August due to Waihee Elementary School being in session, while the counts taken in September/October were taken during intersession.

Level of service (LOS) is a qualitative measure used to describe the condition of traffic flow, ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual – HCM 2000 methodology for calculating levels of service for unsignalized intersections was used in this study. LOS definitions for unsignalized intersections are provided in Appendix B. LOS calculations are provided in Appendix C. It should be noted that overall unsignalized intersection LOS is no longer calculated in the HCM 2000 procedure; LOS is only calculated for the stop sign-controlled (minor) approaches and for left-turns from the major roadway.

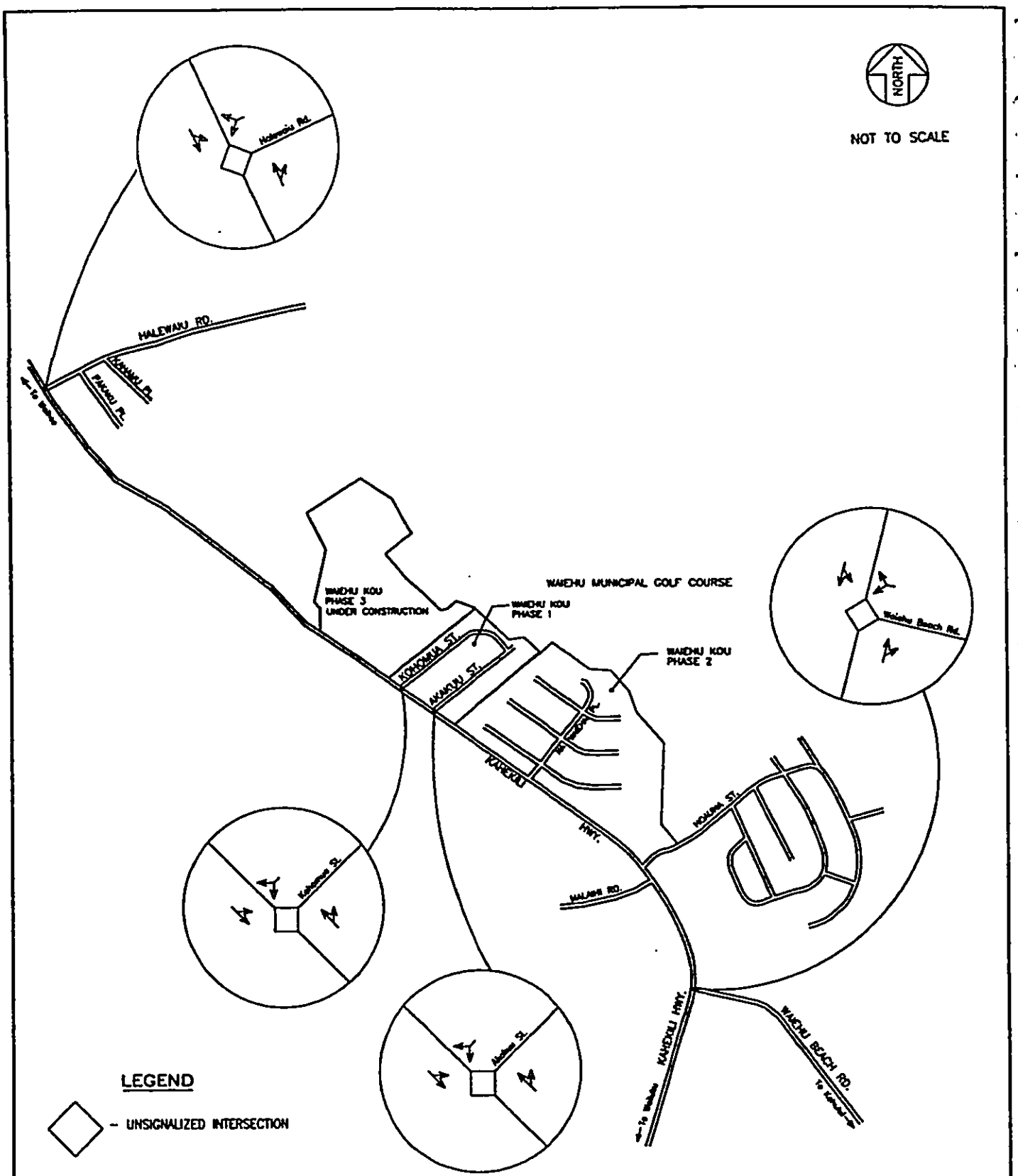
The analysis of existing traffic conditions indicates that the critical traffic movements at all unsignalized intersections currently operate at LOS D or better during the AM and PM peak hours of traffic, except at the Kahekili Highway/Waiehu Beach Road intersection.

Kahekili Highway/Waiehu Beach Road

Westbound traffic on Waiehu Beach Road using the shared left/right-turn lane operates at LOS E during the AM peak hour of traffic and at LOS B during the PM peak hour of traffic. The poor operation of this movement is caused by the high (359 vehicles per hour) southbound left-turn demand from Kahekili Highway to Waiehu Beach Road during the AM peak hour of traffic.

It should be noted that "Warrant 3, Peak Hour," described in the Manual on Uniform Traffic Control Devices (MUTCD), states the following in regard to peak hour volumes to warrant installation of traffic signal systems.

> *"This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time."*



WAIEHU KOU, PHASE 4	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII EXISTING LANE CONFIGURATION	FIGURE 3

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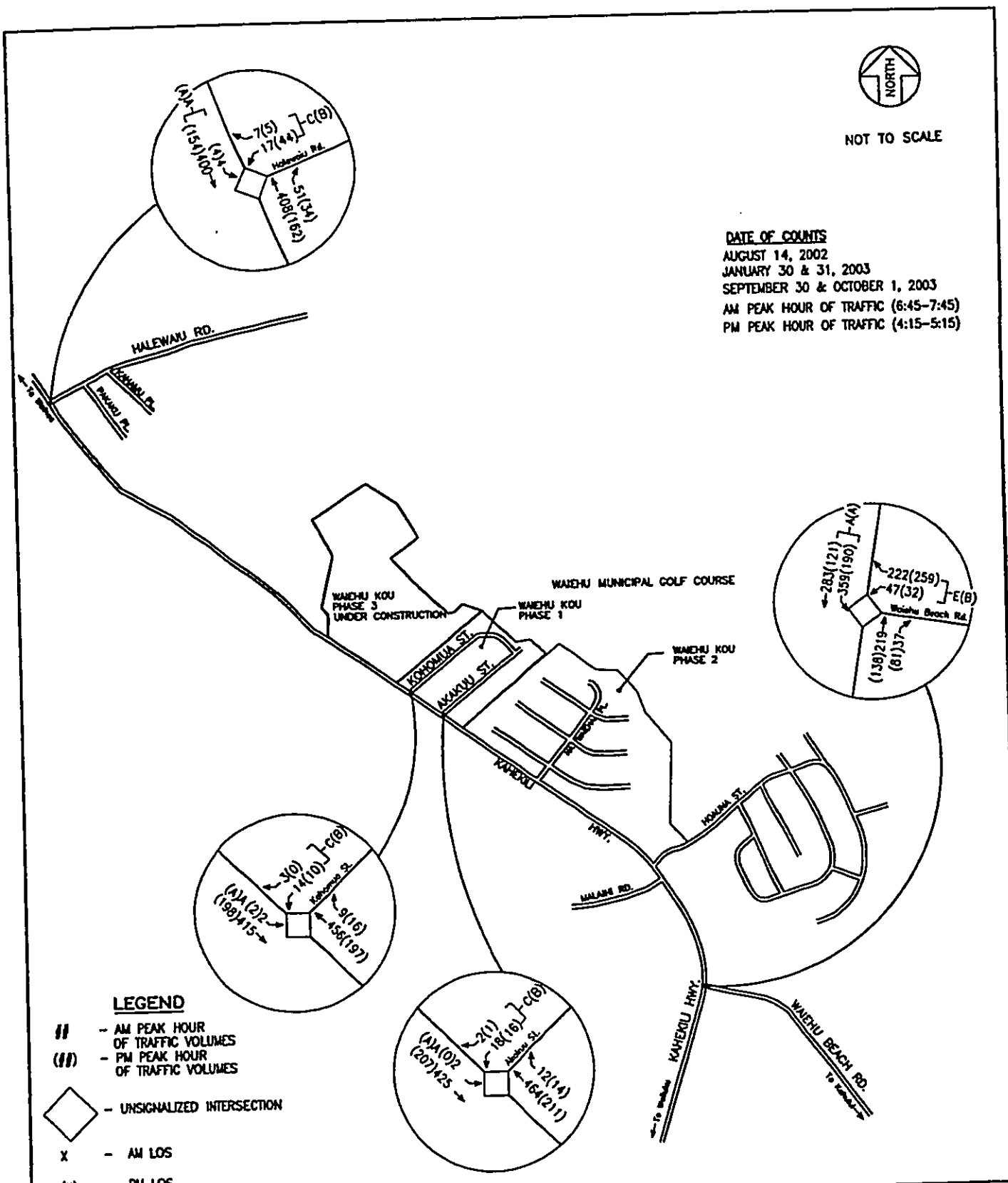

WAIEHU KOU, PHASE 4

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
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FIGURE 4

EXISTING TRAFFIC VOLUMES

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Therefore, warranting a traffic signal system using peak hour volumes is not applicable in this case. Additional 24-hour machine counts were taken on each approach at this intersection on February 11, 2003 to determine whether the installation of a traffic signal system is warranted based on traffic volumes. Evaluation of the 24-hour count data indicates that the conditions of "Warrant 1, Eight-Hour Vehicular Volume" and "Warrant 2, Four-Hour Vehicular Volume" as described in the MUTCD were not met. Thus, installation of a traffic signal system is not warranted at this intersection based on an evaluation of existing traffic volumes.

The southbound left-turn volume on Kahekili Highway of 359 vehicles during the AM peak hour of traffic meets the guidelines published by Harmelink for an exclusive left-turn lane. During the PM peak hour of traffic, the left-turn volume is 190 vehicles and does not meet the guidelines for an exclusive left-turn lane.

Table 1 shows the existing LOS for the study intersections.

Table 1 **Existing Level of Service**	Peak Hour Of Traffic	
	AM	PM
Kahekili Hwy./Waiehu Beach Rd.		
SB LT/TH	A	A
WB LT/RT	E	B
Kahekili Hwy./Kohomua St.		
SB LT	A	A
WB LT/RT	C	B
Kahekili Hwy./Akakuu St.		
SB LT	A	A
WB LT/RT	C	B
Kahekili Hwy./Halewaiu Rd.		
SB LT	A	A
WB LT/RT	C	B

III. FUTURE TRAFFIC CONDITIONS WITHOUT PROJECT

A. Base Year Traffic Projections

The Project is scheduled to be completed in mid-Year 2006. An annual vehicular growth rate of two percent per year is projected for Kahekili Highway based on information contained in the Maui Long-Range Land Transportation Plan (MLRLTP), dated February 1997. Existing traffic volumes on Kahekili

Highway were factored by a total of eight percent to represent traffic growth from 2002/2003 to 2006. Figure 5 shows the traffic volumes for Base Year 2006 conditions without Project-generated traffic.

B. Regional Base Year Roadway Network

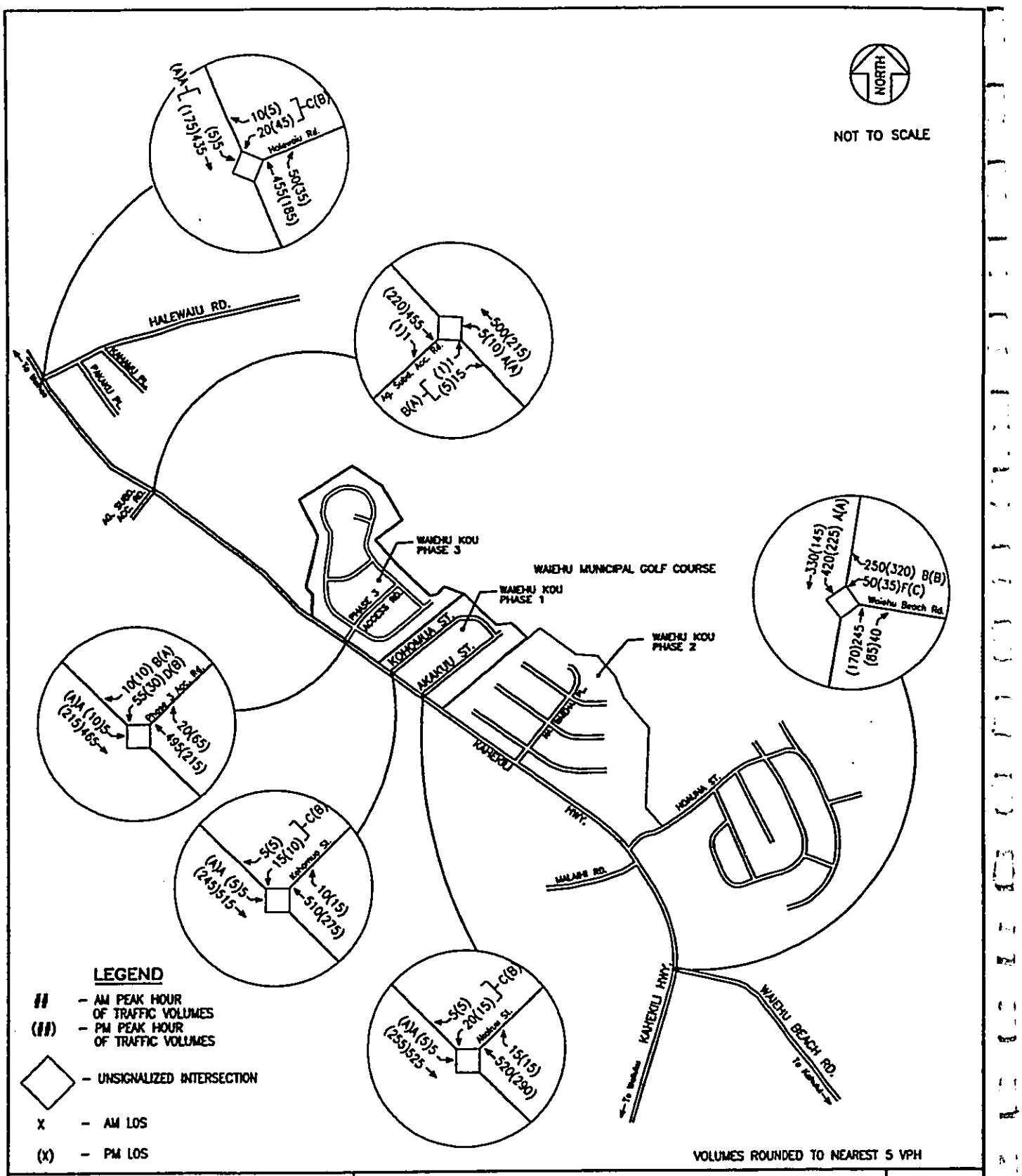
Capital improvement projects that are required in the 2006-2020 timeframe listed in the MLRLTP that are in the vicinity of the Project include:

- Widening Kahekili Highway to four lanes from Waiehu Beach Road toward Wailuku to Waihee Valley Road is identified as project "S10".
- Widening Waiehu Beach Road to four lanes from Kahekili Highway to Kahului Beach Road is identified as project "S11."

C. Base Year Roadway Network – Waiehu Kou, Phase 3 Widening

At the time of writing the study, the Waiehu Kou, Phase 3 development was under construction with completion and occupancy anticipated in late 2004. Traffic generated from the Waiehu Kou, Phase 3 development was based on projections contained in the Traffic Assessment Report, Waiehu Kou, Phase 3, by Julian Ng, Inc., dated June 2002. Table 2 summarizes the trip generation estimate for development of the 111-unit Waiehu Kou, Phase 3 development contained in the study.

There is also a proposed 14-lot agricultural subdivision that will be located directly across from the Project. Access for this subdivision will be on Kahekili Highway on the west side of Kahekili Highway between Halewaiu Road and the Phase 3 Access Road. At the time of writing this study, the development timeframe was unknown, therefore, traffic from the subdivision was included in the Base Year projections to provide a conservative estimate. Trip equations contained in Trip Generation - 7th Edition for Single-Family Detached Housing were used to estimate traffic volumes for the agricultural subdivision. Table 3 shows the trip generation equations used by the study and Table 4 shows the trip generation estimate for the agricultural subdivision.



WAIEHU KOU, PHASE 4

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FIGURE 5

BASE YEAR 2006 TRAFFIC VOLUMES
WITHOUT PROJECT-GENERATED TRAFFIC
(including traffic mitigation measures)

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Table 2 Peak Hour Trips Waiehu Kou Phase 3 Development	Average Weekday Daily Trips (vpd)	AM Peak Hour of Traffic (vph)		PM Peak Hour of Traffic (vph)	
		Enter	Exit	Enter	Exit
Single-Family Detached Housing (111 Dwelling Units)	N/A	21	62	72	40

vpd = vehicles per day

vph = vehicles per hour

N/A = *not provided by study*

Table 3 Trip Generation Equations and Rates	Average Weekday Daily Trip Rate (vpd)	AM Peak Hour of Traffic (vph)		PM Peak Hour of Traffic (vph)	
		Trip Rate	% Enter	Trip Rate	% Enter
Single-Family Detached Housing – Dwelling Units (ITE Code 210)	Ln(T)=0.92Ln(X) +2.71	T=0.70X +9.43	25	Ln(T)= 0.90Ln (X) +0.53	63

vpd = vehicles per day

vph = vehicles per hour

X = number of dwelling units

T = number of trips

Table 4 Peak Hour Trips Agricultural Subdivision	Average Weekday Daily Trips (vpd)	AM Peak Hour of Traffic (vph)		PM Peak Hour of Traffic (vph)	
		Enter	Exit	Enter	Exit
Single-Family Detached Housing (14 Dwelling Units)	170	5	14	11	7

The following roadway improvements on Kahekili Highway are planned as part of the Waiehu Kou, Phase 3 development (shown in Figure 5A) and have been included in the traffic analysis. Waiehu Kou, Phase 3 will have a single point of access on Kahekili Highway ("Phase 3 Access Road").

Phase 3 Access Road

A southbound left-turn lane on Kahekili Highway is planned at this intersection in conjunction with a westbound to southbound left-turn median storage/acceleration lane. This configuration will allow a two-stage left-turn vehicular movement from the Phase 3 Access Road.

However, due to the proximity of the Phase 3 Access Road to Kohomua Street, the median storage/acceleration lane for the Access Road will be continued to Kohomua Street to provide a southbound left-turn lane to Kohomua Street. This configuration will create a southbound median auxiliary lane between the Phase 3 Access Road and Kohomua Street. The auxiliary lane will operate as a weaving section for accelerating left-turns from the Access Road with the southbound left-turns entering to Kohomua Street.

Kohomua Street

A westbound to southbound left-turn median storage/acceleration lane is also planned at Kohomua Street to facilitate left-turns onto Kahekili Highway in conjunction with the improvements described above. Similar to the condition between the Access Road and Kohomua Street, this lane will be continued to Akakuu Street to provide a southbound left-turn lane to Akakuu Street. This configuration will create a median southbound auxiliary lane from Kohomua Street to Akakuu Street. The auxiliary lane will operate as a weaving section for accelerating left-turns from Kohomua Street with the southbound left-turns turning to Akakuu Street.

Kohomua Street and Akakuu Street are only separated by 300 feet, which will provide a short weaving area.

Akakuu Street

A westbound to southbound left-turn median storage/acceleration lane should also be implemented at Akakuu Street to facilitate left-turns onto Kahekili Highway.

D. Base Year 2006 Traffic Conditions Without Project

The analysis indicates that the LOS for critical traffic movements at the unsignalized study intersections will operate at LOS D or better during the AM and PM peak hours of traffic except at the Kahekili Highway/Waiehu Beach Road intersection.

Kahekili Highway/Waiehu Beach Road

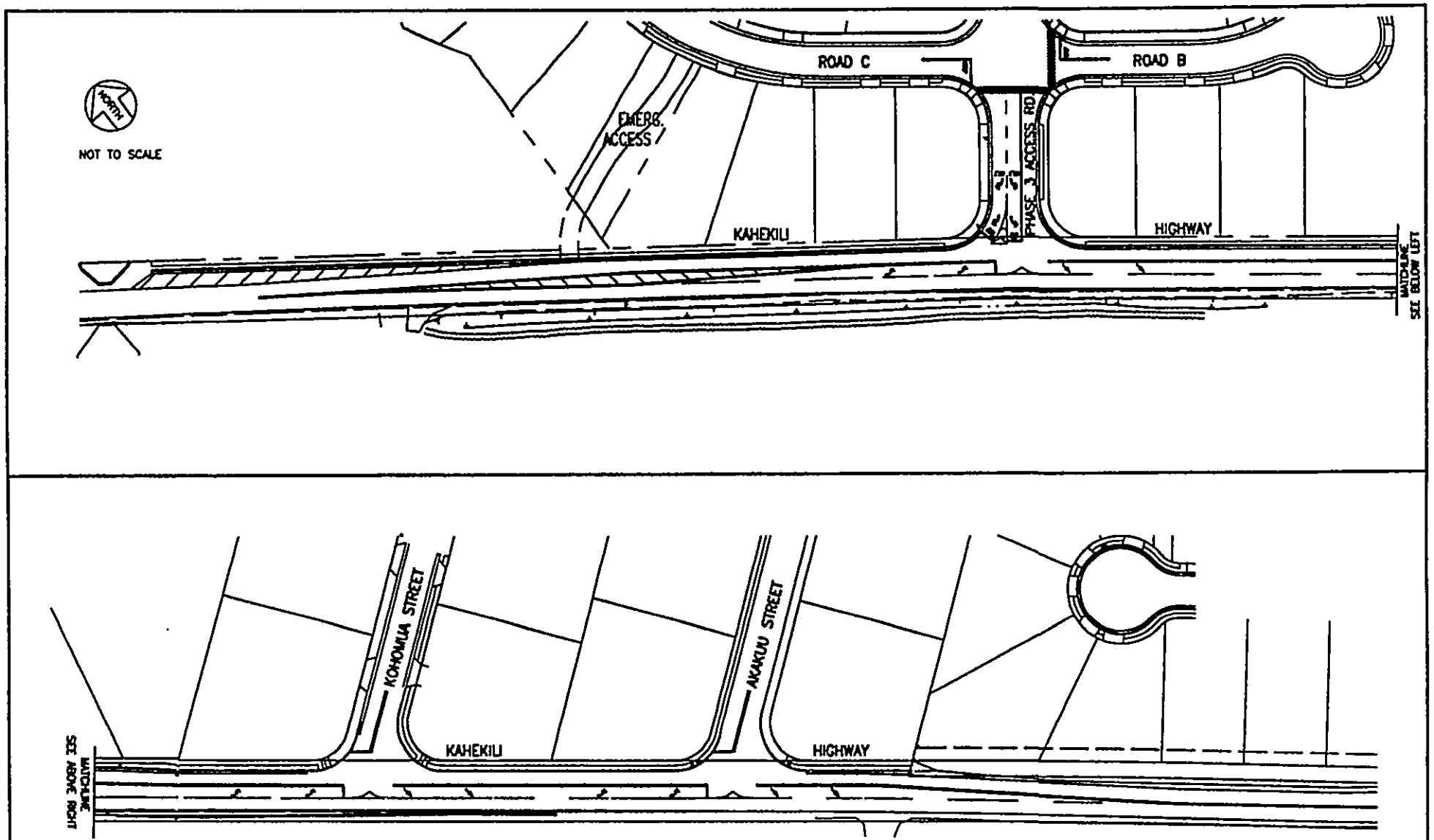
Westbound traffic on the shared left/right-turn lane on Waiehu Beach Road will deteriorate to LOS F conditions during the AM peak hour of traffic and will operate at LOS C during the PM peak hour of traffic.

E. Base Year Mitigation Measures

Widening the Waiehu Beach Road westbound approach to provide an exclusive left-turn lane and exclusive right-turn lane will improve operating conditions for westbound right-turn traffic on Waiehu Beach Road to LOS B during the AM and PM peak hours of traffic by allowing the higher right-turn volume of 250 and 320 (AM and PM peak hours of traffic, respectively) vehicles per hour to turn while the westbound left-turn traffic waits for a gap in the traffic on Kahekili Highway.

Although not required for capacity, widening Kahekili Highway to provide an exclusive southbound left-turn lane will also improve operating conditions at this intersection by allowing southbound through traffic on Kahekili Highway to pass vehicles waiting to turn left on to Waiehu Beach Road.

It should be noted that these improvements would be difficult to implement as a stand-alone intersection improvement project due to the existing topography adjacent to the roadways that involve existing stream crossings. These improvements would need to be considered and implemented in conjunction with the implementation of larger scope capital improvement projects "S10" and "S11."



WAIEHU KOU, PHASE 4

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

PROPOSED HIGHWAY WIDENING
WAIEHU KOU, PHASE 3

FIGURE
5A

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With the widening of Waiehu Beach Road, westbound left-turn traffic will continue to operate at LOS F during the AM peak hour of traffic and will operate at LOS C during the PM peak hour of traffic. However, the poor LOS projected during the AM peak hour of traffic will be limited to approximately 50 vehicles per hour. It is not uncommon, however, for left-turns from a low-volume side street on to a major regional facility such as Kahekili Highway to experience long delays. Table 5 shows the results of the Base Year 2006 intersection analysis.

Table 5 Base Year Level of Service Comparison	Existing		Base Year 2006 Without Project	
	AM	PM	AM	PM
Kahekili Hwy./Waiehu Beach Rd.				
SB LT/TH	A	A	A	A
WB LT/RT	E	B	F	C
SB LT (with mitigation)	-	-	A	A
WB LT (with mitigation)	-	-	F	C
WB RT (with mitigation)	-	-	B	B
Kahekili Hwy./Kohomua St.				
SB LT	A	A	A	A
WB LT/RT	C	B	C	B
Kahekili Hwy./Akakuu St.				
SB LT	A	A	A	A
WB LT/RT	C	B	C	B
Kahekili Highway/Phase 3 Access Rd.				
SB LT	-	-	A	A
WB LT	-	-	D	B
WB RT	-	-	B	A
Kahekili Highway/Ag. Subd. Acc. Rd.				
NB LT	-	-	A	A
EB LT/RT	-	-	B	A
Kahekili Hwy./Halewaiu Rd.				
SB LT	A	A	A	A
WB LT/RT	C	B	C	B

IV. FUTURE TRAFFIC CONDITIONS WITH PROJECT

A. Trip Generation

Project-generated traffic was estimated using trip generation rates for Single-Family Detached Housing in ITE's Trip Generation – 7th Edition. Table 6 shows displays the peak hour trips generated by the Project.

Table 6 Peak Hour Trips	Average Weekday Daily Trips (vpd)	AM Peak Hour of Traffic (vph)		PM Peak Hour of Traffic (vph)	
		Enter	Exit	Enter	Exit
Single-Family Detached Housing (96 Dwelling Units)	1,001	19	58	65	38

B. Project and Roadway Access

The Project site will be located directly north of the existing Waiehu Kou, Phase 3 development. The Project will have two (2) points for vehicular access: one ("Primary Access Road") on Kahekili Highway, located south of Halewaiu Road directly across from the agricultural subdivision, forming an unsignalized standard four-legged intersection with Kahekili Highway. The second ("Secondary Access Road") on Halewaiu Road, will intersect Halewaiu Road approximately 800 feet east of Kahekili Highway forming an unsignalized "tee"-intersection.

Kahekili Highway/Primary Access Road/Agricultural Subdivision Access Road

The intersection of Kahekili Highway/Primary Access Road was analyzed as an unsignalized intersection with the following lane configuration. The Kahekili Highway southbound approach will be designed with a separate left-turn lane and a shared through/right-turn lane. The Kahekili Highway northbound approach will have a separate left-turn lane and a shared through/right-turn lane. The Primary Access Road westbound approach will have a shared left-turn/through lane and a separate right-turn lane that will be stop-sign controlled. The Agricultural Subdivision Access Road eastbound approach will be analyzed as a stop-sign controlled shared left-turn/through/right-turn lane.

Halewaiu Road/Secondary Access Road

The intersection of Halewaiu Road/Secondary Access Road was also analyzed as an unsignalized intersection with the following lane configuration. The Halewaiu Road eastbound approach will have a shared through/right-turn lane. The Halewaiu Road westbound approach will have a shared left-turn/through lane. The Secondary Access Road westbound approach will have a shared left-/right-turn lane that will be stop-sign controlled.

C. Traffic Distribution and Assignment

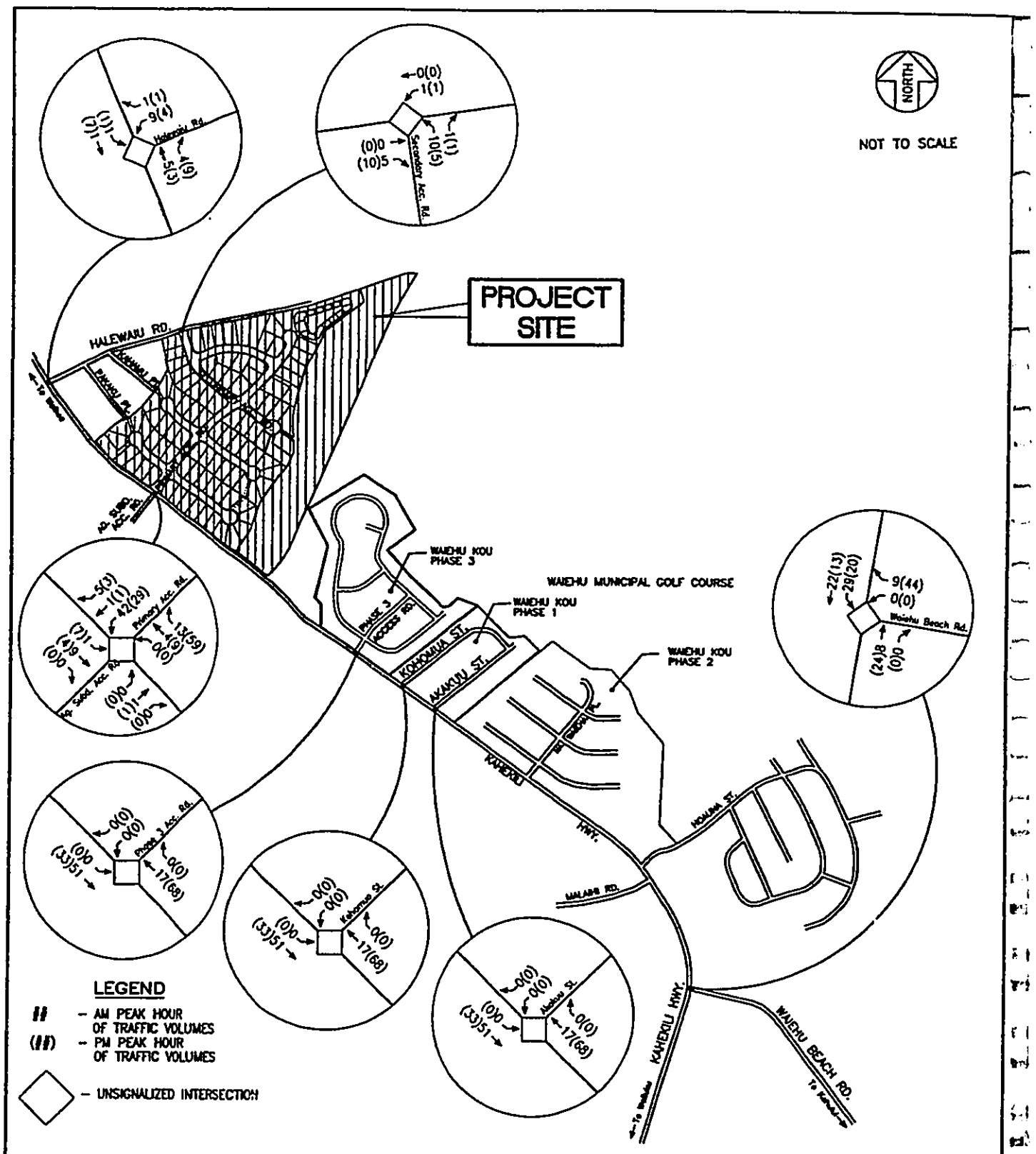
The existing traffic count data indicates that approximately 90 percent of vehicles entering and exiting the Waiehu Kou, Phase 1 subdivision are to/from the Wailuku (south) direction and approximately 10 percent of the vehicles were to/from the Waihee direction (north). The majority of Project-generated traffic is anticipated to be home-based work trips, thus, these factors are also consistent with the location of population and employment centers on the island of Maui. Project-generated trips were assigned to the roadway network based upon these distribution factors. Figure 6 shows the Project-generated traffic assignment.

V. TRAFFIC ANALYSIS WITH PROJECT

Project-generated traffic was added to Base Year 2006 traffic volumes, resulting Year 2006 traffic conditions with Project-generated traffic shown in Figure 7. The analysis of Year 2006 traffic conditions with Project-generated traffic indicates that the LOS for the critical intersection movements at the study intersections will operate at LOS D or better except at the Kahekili Highway/Waiehu Beach Road intersection.

Kahekili Highway/Waiehu Beach Road

With the required Base Year mitigation measures, westbound traffic on Waiehu Beach Road using the exclusive left-turn lane will continue to operate at LOS F during the AM peak hour of traffic and at LOS B during the PM peak hour of traffic. Westbound traffic on Waiehu Beach Road using the exclusive right-turn lane will operate at LOS B during the AM peak hour of traffic and at LOS D during the PM peak hour of traffic.



WAIEHU KOU, PHASE 4

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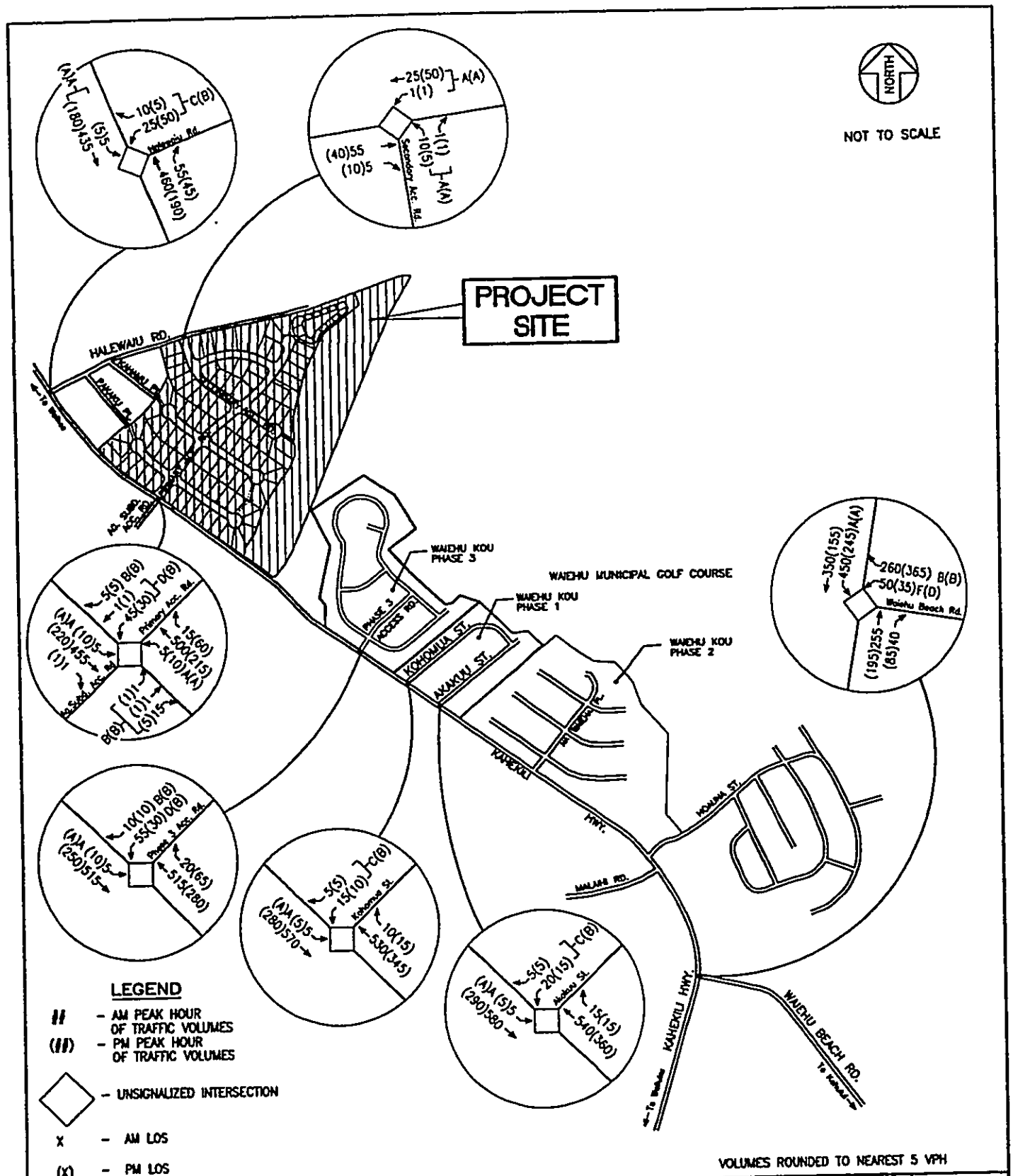
FIGURE 6

PROJECT-GENERATED TRAFFIC ONLY

FN: 03-542.5\fig 6 wk4R.dwg



WAIEHU KOU, PHASE 4

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FIGURE 7

FUTURE YEAR WITH PROJECT
(including traffic mitigation measures)

FN: 03-542.5\fig 7 wk4R.dwg

As indicated earlier, per the MUTCD, the Peak Hour Warrant is not applicable in this situation to justify installation of a traffic signal system. However, the poor LOS projected during the AM peak hour of traffic will continue to be limited to approximately 50 vehicles per hour. It is not uncommon, however, for left-turns from a low-volume side street on to a major regional facility such as Kahekili Highway to experience long-delays.

Table 7 compares the future year with project LOS to Base Year 2006 LOS.

Table 7 Year 2006 Level of Service Comparison	Base Year 2006 Without Project		Future With Project	
	AM	PM	AM	PM
Kahekili Hwy/Waiehu Beach Rd.				
SB LT/TH	A	A	A	A
SB LT (with mitigation)	A	A	A	A
WB LT/RT	F	C	F	C
WB LT (with mitigation)	F	C	F	D
WB RT (with mitigation)	B	B	B	B
Kahekili Hwy./Kohomua St.				
SB LT	A	A	A	A
WB LT/RT	C	B	C	B
Kahekili Hwy./Akakuu St.				
SB LT	A	A	A	A
WB LT/RT	C	B	C	B
Kahekili Hwy./Phase 3 Access Rd.				
SB LT	A	A	A	A
WB LT	D	B	D	B
WB RT	B	A	B	B
Kahekili Hwy./Halewaiu Road				
SB LT	A	A	A	A
WB LT/RT	C	B	C	B
Kahekili Hwy./Primary Access Road/Ag. Subd. Access Rd.				
NB LT	A	A	-	-
EB LT/TH/RT	B	A	-	-
SB LT	-	-	A	A
WB RT	-	-	B	A
WB LT/TH	-	-	D	B
Halewaiu Road/Secondary Access Rd.				
WB LT	-	-	A	A
NB LT/RT	-	-	A	A

VI. FINDINGS AND CONCLUSIONS

The following are the findings and conclusions of the traffic study.

A. Without Project

Kahekili Highway/Halewaiu Road

- Sight distance is limited by an existing wall/fence along the highway for vehicles turning from Halewaiu Road onto Kahekili Highway. This condition will be difficult to mitigate unless relocation of objects are pursued. Installation of a convex mirror to enhance sight lines may need to be pursued unless these objects can be relocated.

Kahekili Highway/Waiehu Beach Road intersection

- The existing topography and stream crossings at this intersection will make incremental intersection lane improvements difficult to implement. The following improvements will improve operation, however, they will become more feasible if included as part of larger capital improvement projects such as the widening of Kahekili Highway and Waiehu Beach Road identified in the MLRLTP.

- The LOS E/F operating condition during the AM peak hour of traffic for westbound traffic using the shared left/right-turn lane on Waiehu Beach Road is an **existing and projected Base Year** condition. However, installation of a traffic signal system is not warranted by existing traffic volumes. This condition can be improved by widening the westbound approach to include separate lanes for left-turns and right-turns. These improvements could be implemented when Waiehu Beach Road is widened to a four-lane cross section as recommended the MLRLTP.

- Westbound left-turn traffic will operate at LOS F during the AM peak hour of traffic with the widening of the Waiehu Beach Road approach. However, operation of westbound right-turn traffic will improve from LOS F to LOS B during the AM peak hour of traffic as the right-turn movements will no longer be blocked by traffic waiting to turn left to Kahekili Highway. The westbound left-turn demand is relatively low as the projected Base Year volumes are approximately 50 and 35 vehicles

during the AM and PM peak hours of traffic, respectively. It is not uncommon, however, for left-turns from a low-volume side street on to a major regional facility such as Kahekili Highway to experience long-delays.

- The **existing** southbound left-turn vehicular demand on Kahekili Highway already meets guidelines for consideration of an exclusive left-turn lane. This improvement could be implemented when Kahekili Highway is widened to a four-lane cross section as recommended the MLRLTP.
- As regional traffic demands increase in the area, signalization may become warranted at this intersection in the future.

Agricultural Subdivision Access Road

- The projected left-turn demand entering the Agricultural Subdivision site from Kahekili Highway does not warrant an exclusive left-turn lane. However, widening Kahekili Highway to provide an exclusive northbound left-turn lane will improve operating conditions by allowing northbound through traffic on Kahekili Highway to pass vehicles waiting to turn left on to the Agricultural Subdivision Access Road.

Phase 3 Access Road

- The addition of a westbound to southbound left-turn median storage/auxiliary lane on Kahekili Highway will facilitate westbound left-turn traffic exiting the Phase 3 project site.
- The southbound weaving area on Kahekili Highway between Kohomua Street and the Project Access Road can serve the projected Base Year traffic demands.

Kohomua Street

- The addition of a westbound to southbound left-turn median storage/auxiliary lane on Kahekili Highway between Kohomua Street to Akakuu Street will accommodate longer-term traffic demands.
- The southbound weaving area on Kahekili Highway between Kohomua Street and Akakuu Street has capacity to serve the projected Base Year traffic demands.

Akakuu Street

- The addition of a westbound to southbound left-turn median storage/acceleration lane on Kahekili Highway at Akakuu Street will accommodate longer-term traffic demands.

B. With Project

Primary Access Road

- The Project will generate approximately 77 total trips (entering and exiting) during the AM peak hour of traffic and 103 total trips during the PM peak hour of traffic.
- The Kahekili Highway/Primary Access Road/Agricultural Subdivision Access Road intersection will have adequate capacity to meet the projected traffic demands as an unsignalized intersection.
- The projected left-turn demand entering the Project site from Kahekili Highway does not warrant an exclusive left-turn lane. However, widening Kahekili Highway to provide an exclusive southbound left-turn lane will improve operating conditions by allowing southbound through traffic on Kahekili Highway to pass vehicles waiting to turn left on to the Primary Access Road.
- The Primary Access Road westbound approach to Kahekili Highway should be designed to provide a separate right-turn lane and a shared left-turn/through lane.

Halewaiu Road

- The Kahekili Highway/Halewaiu Road intersection will also have adequate capacity to meet the projected traffic demands as an unsignalized intersection.
- The Halewaiu/Secondary Access Road intersection will have adequate capacity to meet the projected traffic demands as an unsignalized intersection.
- The intersection of Halewaiu Road and the Secondary Access Road can serve the projected traffic demands with single-lane shared approaches.

VII. RECOMMENDATIONS

A. Without Project

The following recommendations are made for Existing or Base Year traffic conditions without the Project.

- Consider installation of convex mirrors at the Kahekili Highway/Halewaiu Road intersection to enhance existing sight distance.
- Provide an exclusive northbound left-turn lane on Kahekili Highway for traffic entering the project site at the Agricultural Subdivision Access Road.
- Widen the Waiehu Beach Road westbound approach at the Kahekili Highway/Waiehu Beach Road intersection to provide separate lanes for left-turn and right-turn traffic in conjunction with capital improvement project "S11" in the MLRLTP.
- Widen the Kahekili Highway southbound approach at the Kahekili Highway/Waiehu Beach Road intersection to provide an exclusive left-turn lane in conjunction with capital improvement project "S10" in the MLRLTP.
- Install conduit at the Kahekili Highway/Waiehu Beach Road intersection for future traffic signal system use at this intersection as part of the capital improvements described above. Monitor traffic volumes at the Kahekili Highway/Waiehu Beach Road intersection and signalize this intersection when warranted.

B. With Project

The following recommendation is made for future conditions with the Project:

- Provide an exclusive southbound left-turn lane on Kahekili Highway for traffic entering the project site at the Primary Access Road.
- Provide a shared left-turn/through lane and separate right-turn lane on the westbound Primary Access Road approach to Kahekili Highway.
- Provide shared lane approaches at the Halewaiu Road/Secondary Access Road intersection.

REFERENCES

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3. Institute of Transportation Engineers, Trip Generation Handbook, March 2001.

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6. Transportation Research Board, Highway Capacity Manual – HCM 2000, *Special Report* 209, 2000.

7. U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices – Millennium Edition, 2003, as amended.

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APPENDICES

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APPENDIX A

TRAFFIC COUNT DATA

Austin Tsutsumi & Associates, Inc.
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817
Ph: (808)533-3646 Fax: (808)526-1267

Major Street: Waiehu Beach Rd
Minor Street: Kahekili Hwy
Time of Count: 6:15 AM-8:15 AM
Weather:

File Name : waikaham
Site Code : 00000000
Start Date : 01/31/2003
Page No : 1

Groups Printed- Unshifted

	KAHEKILI HWY Southbound					WAIEHU BEACH RD Westbound					KAHEKILI HWY Northbound					WAIEHU BEACH RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:15 AM	37	26	0	0	63	12	0	28	0	40	0	11	0	0	11	0	0	0	0	0	114
06:30 AM	60	26	0	0	86	11	0	27	0	38	0	10	5	0	15	0	0	0	0	0	139
06:45 AM	54	32	0	0	86	11	0	61	0	72	0	24	7	0	31	0	0	0	0	0	189
Total	151	84	0	0	235	34	0	116	0	150	0	45	12	0	57	0	0	0	0	0	442
07:00 AM	79	53	0	0	132	11	0	59	0	70	1	47	4	0	52	0	0	0	0	0	254
07:15 AM	89	86	0	0	175	12	0	66	0	78	0	81	6	0	87	0	0	0	0	0	340
07:30 AM	90	76	0	0	166	10	0	64	0	74	0	66	11	0	77	0	0	0	0	0	317
07:45 AM	101	68	0	0	169	14	0	33	0	47	0	25	16	0	41	0	0	0	0	0	257
Total	359	283	0	0	642	47	0	222	0	269	1	219	37	0	257	0	0	0	0	0	1168
08:00 AM	45	36	0	0	81	6	0	40	0	46	0	19	7	0	26	0	0	0	0	0	153
Grand Total	555	403	0	0	958	87	0	378	0	465	1	283	56	0	340	0	0	0	0	0	1763
Apprch %	57.9	42.1	0.0	0.0		18.7	0.0	81.3	0.0		0.3	83.2	16.5	0.0		0.0	0.0	0.0	0.0		
Total %	31.5	22.9	0.0	0.0	54.3	4.9	0.0	21.4	0.0	26.4	0.1	16.1	3.2	0.0	19.3	0.0	0.0	0.0	0.0	0.0	

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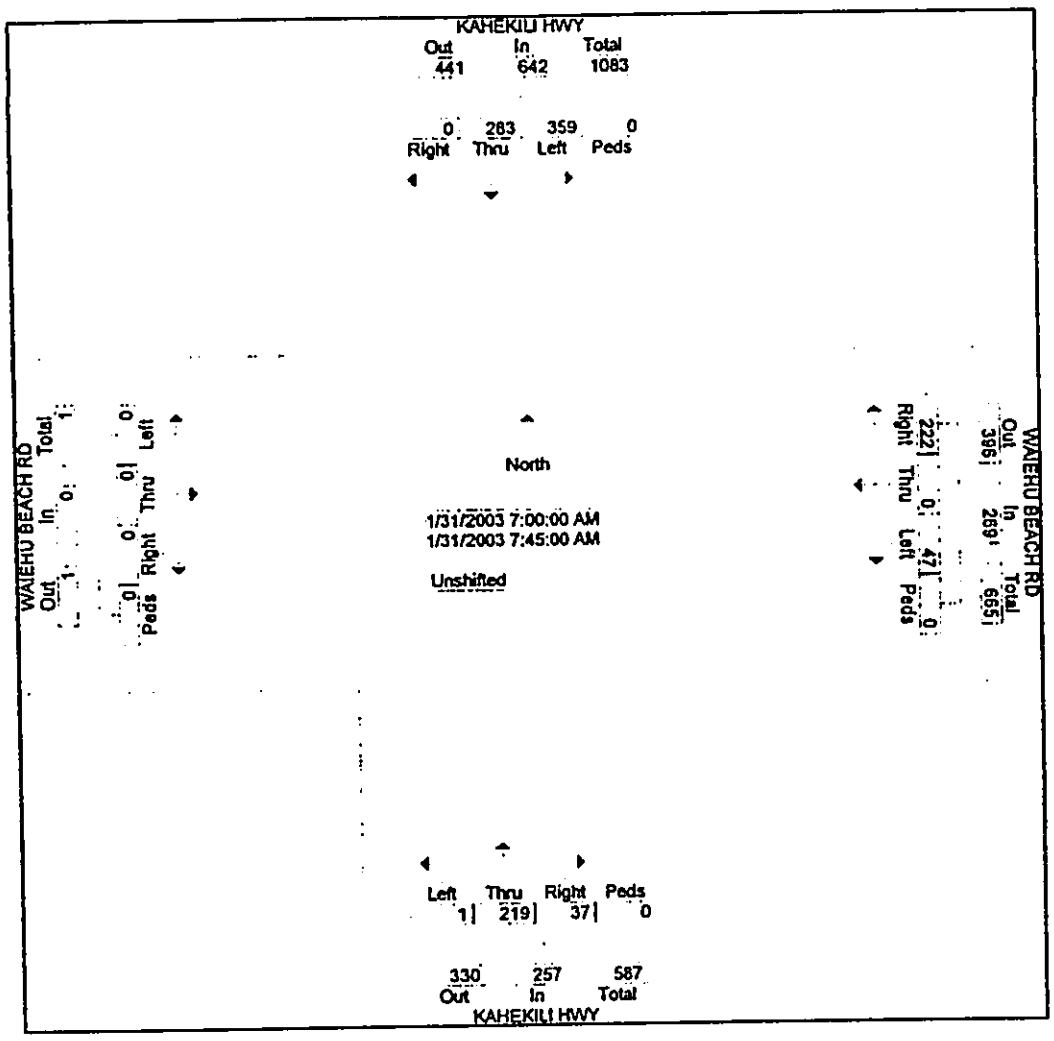
File Name : waikaham
Site Code : 00000000
Start Date : 01/31/2003
Page No : 2

	KAHEKILI HWY Southbound					WAIEHU BEACH RD Westbound					KAHEKILI HWY Northbound					WAIEHU BEACH RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 06:15 AM to 08:00 AM - Peak 1 of 1																					
Intersection	07:00 AM																				
Volume	359	283	0	0	642	47	0	222	0	269	1	219	37	0	257	0	0	0	0	0	1168
Percent	55.9	44.1	0.0	0.0		17.5	0.0	82.5	0.0		0.4	85.2	14.4	0.0		0.0	0.0	0.0	0.0		
07:15 Volume	89	86	0	0	175	12	0	66	0	78	0	81	6	0	87	0	0	0	0	0	340
Peak Factor																					0.859
High Int.	07:15 AM					07:15 AM					07:15 AM					6:00:00 AM					
Volume	89	86	0	0	175	12	0	66	0	78	0	81	6	0	87						
Peak Factor					0.917					0.862					0.739						



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Honolulu, Hawaii 96817
Ph: (808)533-3646 Fax: (808)526-1267

Major Street: Waiehu Beach Rd
Minor Street: Kahekili Hwy
Time of Count: 4:00 PM-6:00 PM
Weather:

File Name : waikahpm
Site Code : 00000000
Start Date : 01/30/2003
Page No : 1

Groups Printed- Unshifted

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04:00 PM	38	31	0	0	69	10	0	60	0	70	0	19	21	0	40	0	0	0	0	0	179
04:15 PM	54	43	0	0	97	10	0	53	0	63	0	32	10	0	42	0	0	0	0	0	202
04:30 PM	45	26	0	0	71	9	0	60	0	69	0	28	18	0	46	0	0	0	0	0	186
04:45 PM	45	26	0	0	71	7	0	72	0	79	0	48	33	0	81	0	0	0	0	0	231
Total	182	126	0	0	308	36	0	245	0	281	0	127	82	0	209	0	0	0	0	0	798
05:00 PM	46	26	0	0	72	6	0	74	0	80	0	30	20	0	50	0	0	0	0	0	202
05:15 PM	40	38	0	0	78	5	0	45	0	50	0	28	25	0	53	0	0	0	0	0	181
05:30 PM	37	23	0	0	60	5	0	47	0	52	0	33	13	0	46	0	0	0	0	0	158
05:45 PM	52	23	0	0	75	8	0	39	0	47	0	25	16	0	41	0	0	0	0	0	163
Total	175	110	0	0	285	24	0	205	0	229	0	116	74	0	190	0	0	0	0	0	704
Grand Total	357	236	0	0	593	60	0	450	0	510	0	243	156	0	399	0	0	0	0	0	1502
Apprch %	60.2	39.8	0.0	0.0		11.8	0.0	88.2	0.0		0.0	60.9	39.1	0.0		0.0	0.0	0.0	0.0		
Total %	23.8	15.7	0.0	0.0	39.5	4.0	0.0	30.0	0.0	34.0	0.0	16.2	10.4	0.0	26.6	0.0	0.0	0.0	0.0	0.0	

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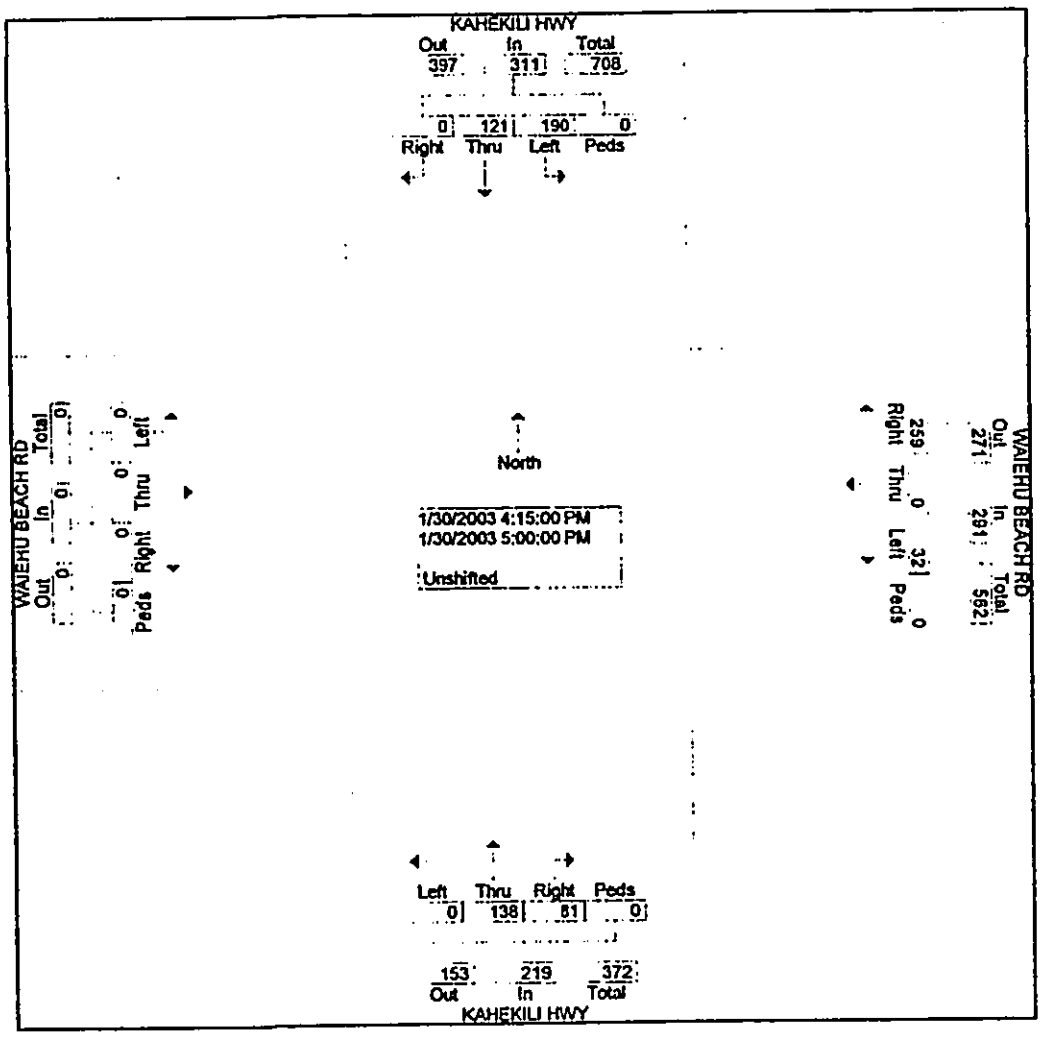
File Name : waikahpm
Site Code : 00000000
Start Date : 01/30/2003
Page No : 2

	KAHEKILI HWY Southbound					WAIEHU BEACH RD Westbound					KAHEKILI HWY Northbound					WAIEHU BEACH RD Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	190	121	0	0	311	32	0	259	0	291	0	138	81	0	219	0	0	0	0	0	821
Percent	61.1	38.9	0.0	0.0		11.0	0.0	89.0	0.0		0.0	63.0	37.0	0.0		0.0	0.0	0.0	0.0		
04:45 Volume	45	26	0	0	71	7	0	72	0	79	0	48	33	0	81	0	0	0	0	0	231
Peak Factor																					0.889
High Int.	04:15 PM					05:00 PM					04:45 PM					3:45:00 PM					
Volume	54	43	0	0	97	6	0	74	0	80	0	48	33	0	81						
Peak Factor					0.802					0.909					0.676						



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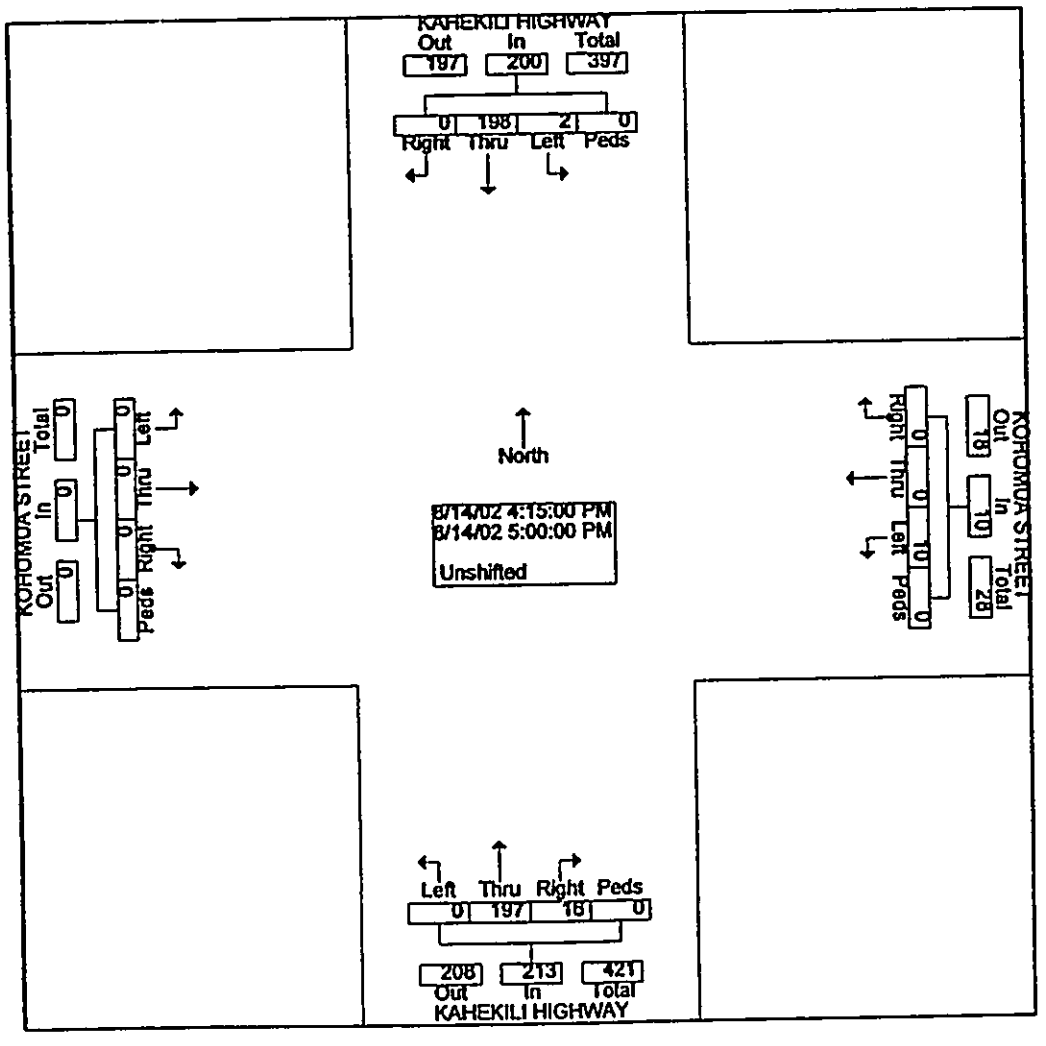
Ph: (808) 533-3646 Fax: (808) 526-1267

Major: Kahekili Highway
Minor: Kohomua Street
Time of Count: 3:45 PM - 5:45 PM
Weather:

File Name : KAHKOHPM
Site Code : 00000002
Start Date : 08/14/2002

	KAHEKILI HIGHWAY Southbound					KOHOMUA STREET Westbound					KAHEKILI HIGHWAY Northbound					KOHOMUA STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 04:15 PM to 05:00 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	0	198	2	0	200	0	0	10	0	10	16	197	0	0	213	0	0	0	0	0	423
Percent	0.0	99.0	1.0	0.0		0.0	0.0	100.0	0.0		7.5	92.5	0.0	0.0		0.0	0.0	0.0	0.0		
04:45 Volume	0	58	1	0	59	0	0	2	0	2	3	56	0	0	59	0	0	0	0	0	120
Peak Factor																					0.881
High Int.	04:45 PM					04:15 PM					04:45 PM										
Volume	0	58	1	0	59	0	0	3	0	3	3	56	0	0	59						
Peak Factor					0.847					0.833					0.903						



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Major: Kahekili Highway
Minor: Kohomua Street
Time of Count: 3:45 PM - 5:45 PM
Weather:

File Name : KAHKOHPM
Site Code : 00000002
Start Date : 08/14/2002
Page No : 1

Groups Printed- Unshifted

	KAHEKILI HIGHWAY Southbound					KOHOMUA STREET Westbound					KAHEKILI HIGHWAY Northbound					KOHOMUA STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:45 PM	0	65	0	0	65	0	0	0	0	0	2	57	0	0	59	0	0	0	0	0	124
Total	0	65	0	0	65	0	0	0	0	0	2	57	0	0	59	0	0	0	0	0	124
04:00 PM	0	51	0	0	51	0	0	1	0	1	8	47	0	0	55	0	0	0	0	0	107
04:15 PM	0	49	0	0	49	0	0	3	0	3	5	43	0	0	48	0	0	0	0	0	100
04:30 PM	0	38	1	0	39	0	0	3	0	3	3	47	0	0	50	0	0	0	0	0	92
04:45 PM	0	58	1	0	59	0	0	2	0	2	3	56	0	0	59	0	0	0	0	0	120
Total	0	196	2	0	198	0	0	9	0	9	19	193	0	0	212	0	0	0	0	0	419
05:00 PM	0	53	0	0	53	0	0	2	0	2	5	51	0	0	56	0	0	0	0	0	111
05:15 PM	0	46	1	0	47	1	0	1	0	2	1	51	0	0	52	0	0	0	0	0	101
05:30 PM	0	33	0	0	33	1	0	3	0	4	3	42	0	0	45	0	0	0	0	0	82
Grand Total	0	393	3	0	396	2	0	15	0	17	30	394	0	0	424	0	0	0	0	0	837
Apprch %	0.0	99.2	0.8	0.0		11.8	0.0	88.2	0.0		7.1	92.9	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	47.0	0.4	0.0	47.3	0.2	0.0	1.8	0.0	2.0	3.6	47.1	0.0	0.0	50.7	0.0	0.0	0.0	0.0	0.0	

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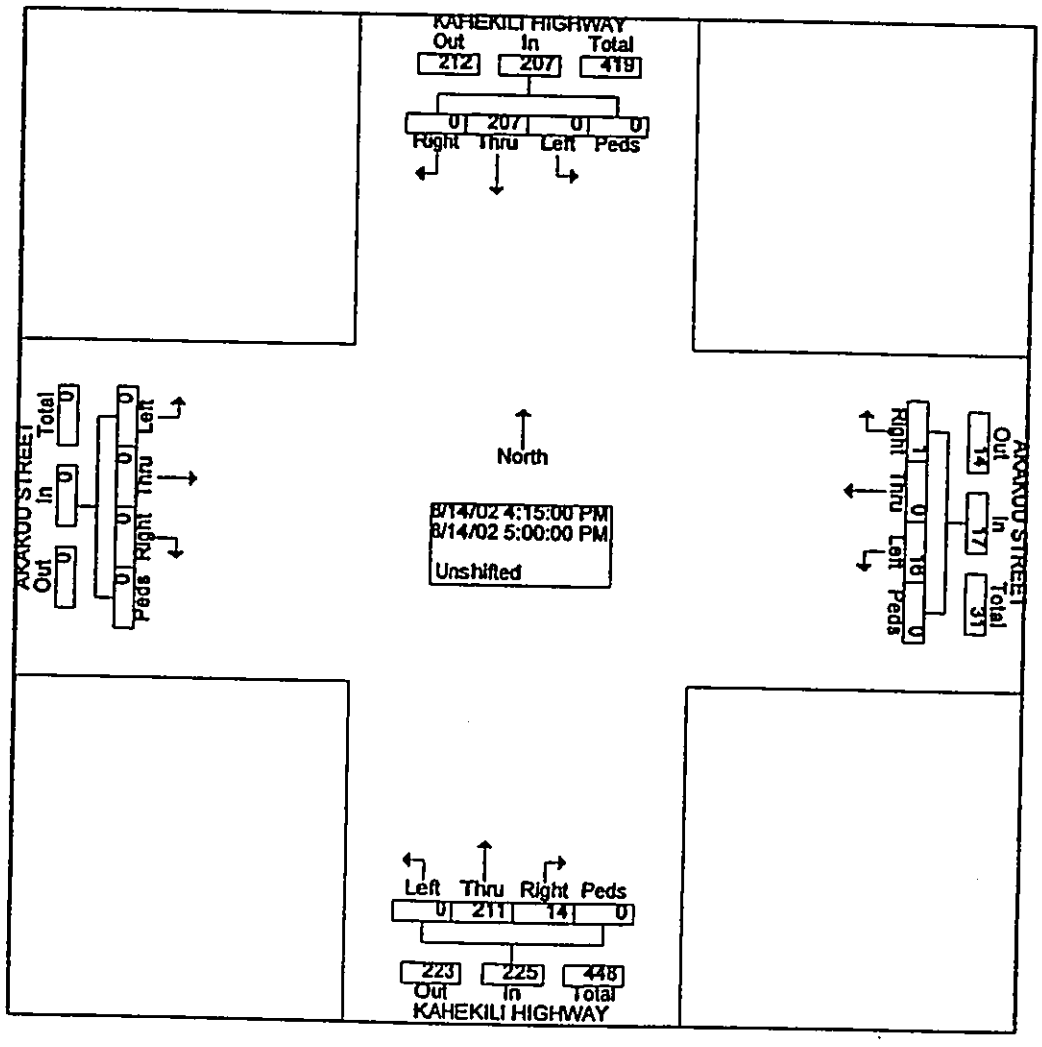
Ph: (808) 533-3646 Fax: (808) 526-1267

Major: Kahekili Highway
Minor: Akakuu Street
Time of Count: 3:45 PM - 5:45 PM
Weather:

File Name : KAHAKAPM
Site Code : 00000003
Start Date : 08/14/2002

	KAHEKILI HIGHWAY Southbound					AKAKUU STREET Westbound					KAHEKILI HIGHWAY Northbound					AKAKUU STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 04:15 PM to 05:30 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	0	207	0	0	207	1	0	16	0	17	14	211	0	0	225	0	0	0	0	0	449
Percent	0.0	100.0	0.0	0.0		5.9	0.0	94.1	0.0		6.2	93.8	0.0	0.0		0.0	0.0	0.0	0.0		
04:45 Volume	0	59	0	0	59	0	0	4	0	4	3	58	0	0	61	0	0	0	0	0	124
Peak Factor																					0.905
High Int.	04:45 PM					04:30 PM					04:45 PM										
Volume	0	59	0	0	59	0	0	5	0	5	3	58	0	0	61						
Peak Factor					0.877					0.850					0.922						



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Ph: (808) 533-3646 Fax: (808) 526-1267

Major: Kahekili Highway
Minor: Akakuu Street
Time of Count: 3:45 PM - 5:45 PM
Weather:

File Name : KAHAKAPM
Site Code : 00000003
Start Date : 08/14/2002

Groups Printed- Unshifted

	KAHEKILI HIGHWAY Southbound					AKAKUU STREET Westbound					KAHEKILI HIGHWAY Northbound					AKAKUU STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
03:45 PM	0	65	0	0	65	0	0	0	0	0	5	58	0	0	63	0	0	0	0	0	128
Total	0	65	0	0	65	0	0	0	0	0	5	58	0	0	63	0	0	0	0	0	128
04:00 PM	0	50	0	0	50	0	0	3	0	3	1	57	0	0	58	0	0	0	0	0	111
04:15 PM	0	54	0	0	54	0	0	4	0	4	4	48	0	0	52	0	0	0	0	0	110
04:30 PM	0	42	0	0	42	0	0	5	0	5	3	50	0	0	53	0	0	0	0	0	100
04:45 PM	0	59	0	0	59	0	0	4	0	4	3	58	0	0	61	0	0	0	0	0	124
Total	0	205	0	0	205	0	0	16	0	16	11	213	0	0	224	0	0	0	0	0	445
05:00 PM	0	52	0	0	52	1	0	3	0	4	4	55	0	0	59	0	0	0	0	0	115
05:15 PM	0	48	1	0	49	0	0	2	0	2	3	53	0	0	56	0	0	0	0	0	107
05:30 PM	0	34	0	0	34	0	0	2	0	2	6	47	0	0	53	0	0	0	0	0	89
Grand Total	0	404	1	0	405	1	0	23	0	24	29	426	0	0	455	0	0	0	0	0	884
Apprch %	0.0	99.8	0.2	0.0		4.2	0.0	95.8	0.0		6.4	93.6	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	45.7	0.1	0.0	45.8	0.1	0.0	2.6	0.0	2.7	3.3	48.2	0.0	0.0	51.5	0.0	0.0	0.0	0.0	0.0	

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Major: Kahekili Highway
Minor: Akakuu Street
Time of Count: 6:30 AM - 8:30 AM
Weather:

File Name : KAHAKAAM
Site Code : 00000003
Start Date : 08/14/2002
Page No : 1

Groups Printed- Unshifted

	KAHEKILI HIGHWAY Southbound					AKAKUU STREET Westbound					KAHEKILI HIGHWAY Northbound					AKAKUU STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:30 AM	0	43	0	0	43	0	1	5	0	6	0	34	0	0	34	0	0	0	0	0	83
06:45 AM	0	57	1	0	58	0	0	2	0	2	1	80	0	0	81	0	0	0	0	0	141
Total	0	100	1	0	101	0	1	7	0	8	1	114	0	0	115	0	0	0	0	0	224
07:00 AM	0	85	1	0	86	1	0	5	0	6	3	125	0	0	128	0	0	0	0	0	220
07:15 AM	0	123	0	0	123	0	0	7	0	7	4	176	0	0	180	0	0	0	0	0	310
07:30 AM	0	156	0	0	156	1	0	4	0	5	4	83	0	0	87	0	0	0	0	0	248
07:45 AM	0	82	1	0	83	1	0	6	0	7	1	38	0	0	39	0	0	0	0	0	129
Total	0	446	2	0	448	3	0	22	0	25	12	422	0	0	434	0	0	0	0	0	907
08:00 AM	0	37	0	0	37	0	0	0	0	0	4	32	0	0	36	0	0	0	0	0	73
08:15 AM	0	19	0	0	19	0	0	1	0	1	2	26	0	0	28	0	0	0	0	0	48
Grand Total	0	602	3	0	605	3	1	30	0	34	19	594	0	0	613	0	0	0	0	0	1252
Apprch %	0.0	99.5	0.5	0.0		8.8	2.9	88.2	0.0		3.1	96.9	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	48.1	0.2	0.0	48.3	0.2	0.1	2.4	0.0	2.7	1.5	47.4	0.0	0.0	49.0	0.0	0.0	0.0	0.0	0.0	

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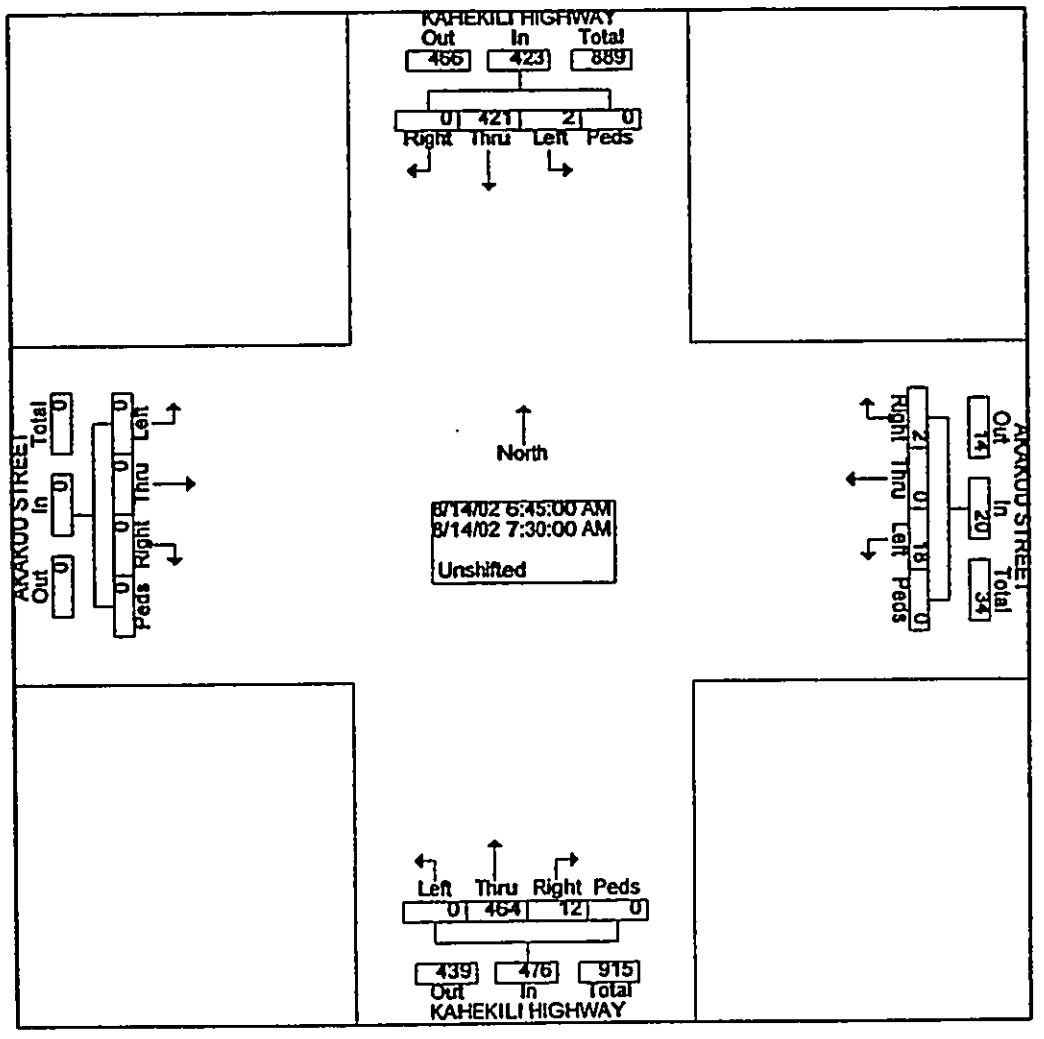
Major: Kahekili Highway
Minor: Akakuu Street
Time of Count: 6:30 AM - 8:30 AM
Weather:

File Name : KAHAKAAM
Site Code : 00000003
Start Date : 08/14/2002

	KAHEKILI HIGHWAY Southbound					AKAKUU STREET Westbound					KAHEKILI HIGHWAY Northbound					AKAKUU STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Intersection	06:45 AM																				
Volume	0	421	2	0	423	2	0	18	0	20	12	464	0	0	476	0	0	0	0	0	919
Percent	0.0	99.5	0.5	0.0		10.0	0.0	90.0	0.0		2.5	97.5	0.0	0.0		0.0	0.0	0.0	0.0		
07:15 Volume	0	123	0	0	123	0	0	7	0	7	4	176	0	0	180	0	0	0	0	0	310
Peak Factor																					0.741
High Int.	07:30 AM					07:15 AM					07:15 AM					6:15:00 AM					
Volume	0	156	0	0	156	0	0	7	0	7	4	176	0	0	180						
Peak Factor					0.678					0.714					0.661						



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Major: Kahekili Highway
Minor: Kohomua Street
Time of Count: 6:30 AM - 8:30 AM
Weather:

File Name : KAHKOHAM
Site Code : 00000002
Start Date : 08/14/2002
Page No : 1

Groups Printed- Unshifted

	KAHEKILI HIGHWAY Southbound					KOHOMUA STREET Westbound					KAHEKILI HIGHWAY Northbound					KOHOMUA STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:30 AM	0	39	1	0	40	0	0	4	0	4	1	35	0	0	36	0	0	0	0	0	80
06:45 AM	0	57	0	0	57	0	0	4	0	4	1	78	0	0	79	0	0	0	0	0	140
Total	0	96	1	0	97	0	0	8	0	8	2	113	0	0	115	0	0	0	0	0	220
07:00 AM	0	87	0	0	87	1	0	1	0	2	5	122	0	0	127	0	0	0	0	0	216
07:15 AM	0	117	1	0	118	2	0	5	0	7	1	180	0	0	181	0	0	0	0	0	306
07:30 AM	0	154	1	0	155	0	0	4	0	4	2	76	0	0	78	0	0	0	0	0	237
07:45 AM	0	79	0	0	79	0	0	3	0	3	4	33	0	0	37	0	0	0	0	0	119
Total	0	437	2	0	439	3	0	13	0	16	12	411	0	0	423	0	0	0	0	0	878
08:00 AM	0	31	0	0	31	1	0	4	0	5	0	31	0	0	31	0	0	0	0	0	67
08:15 AM	0	22	1	0	23	0	0	1	0	1	1	26	0	0	27	0	0	0	0	0	51
Grand Total	0	586	4	0	590	4	0	26	0	30	15	581	0	0	596	0	0	0	0	0	1216
Apprch %	0.0	99.3	0.7	0.0		13.3	0.0	86.7	0.0		2.5	97.5	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	48.2	0.3	0.0	48.5	0.3	0.0	2.1	0.0	2.5	1.2	47.8	0.0	0.0	49.0	0.0	0.0	0.0	0.0	0.0	

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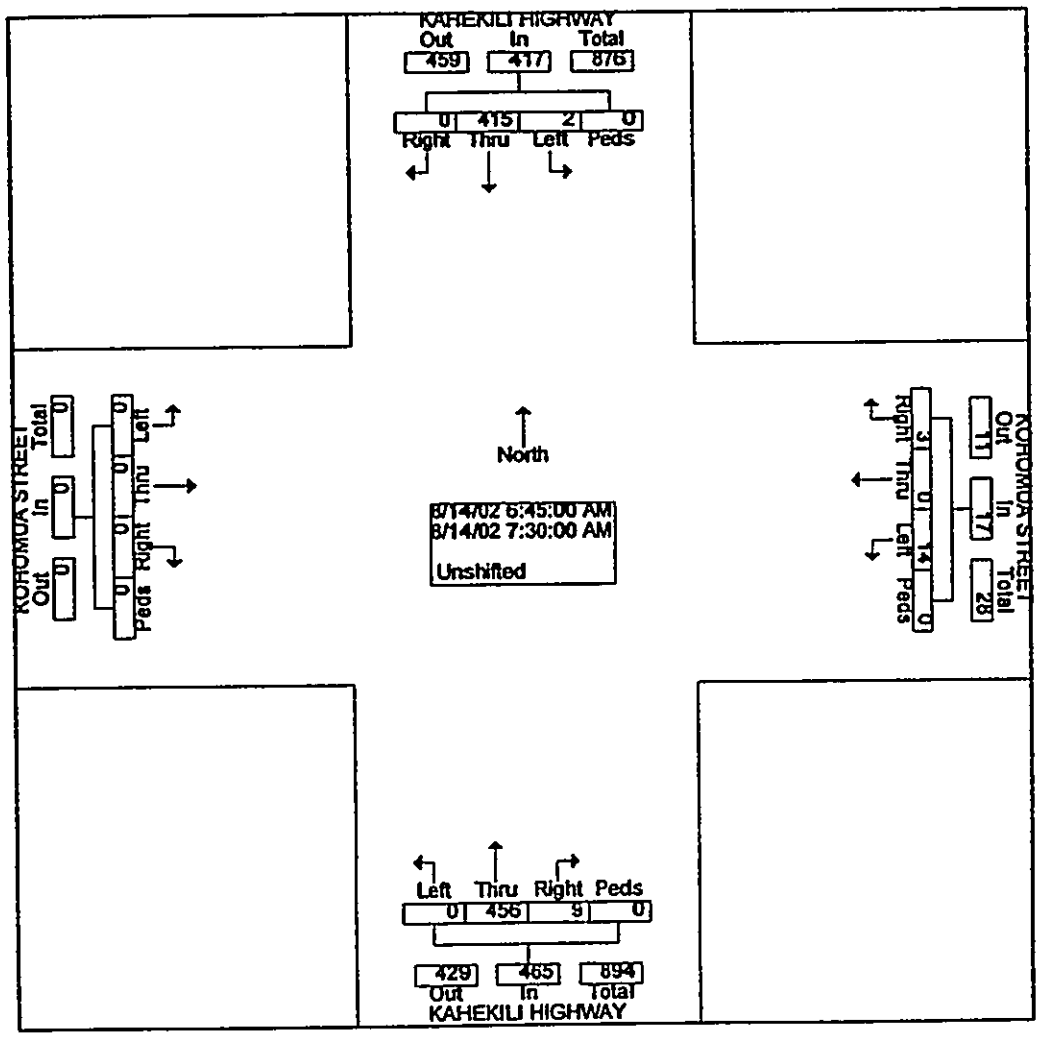
Major: Kahekili Highway
Minor: Kohomua Street
Time of Count: 6:30 AM - 8:30 AM
Weather:

File Name : KAHKOHAM
Site Code : 00000002
Start Date : 08/14/2002

	KAHEKILI HIGHWAY Southbound					KOHOMUA STREET Westbound					KAHEKILI HIGHWAY Northbound					KOHOMUA STREET Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Intersection	06:45 AM																				
Volume	0	415	2	0	417	3	0	14	0	17	9	456	0	0	465	0	0	0	0	0	899
Percent	0.0	99.5	0.5	0.0		17.6	0.0	82.4	0.0		1.9	98.1	0.0	0.0		0.0	0.0	0.0	0.0		
07:15 Volume	0	117	1	0	118	2	0	5	0	7	1	180	0	0	181	0	0	0	0	0	306
Peak Factor																					0.734
High Int.	07:30 AM					07:15 AM					07:15 AM					6:15:00 AM					
Volume	0	154	1	0	155	2	0	5	0	7	1	180	0	0	181						
Peak Factor					0.673					0.607					0.642						



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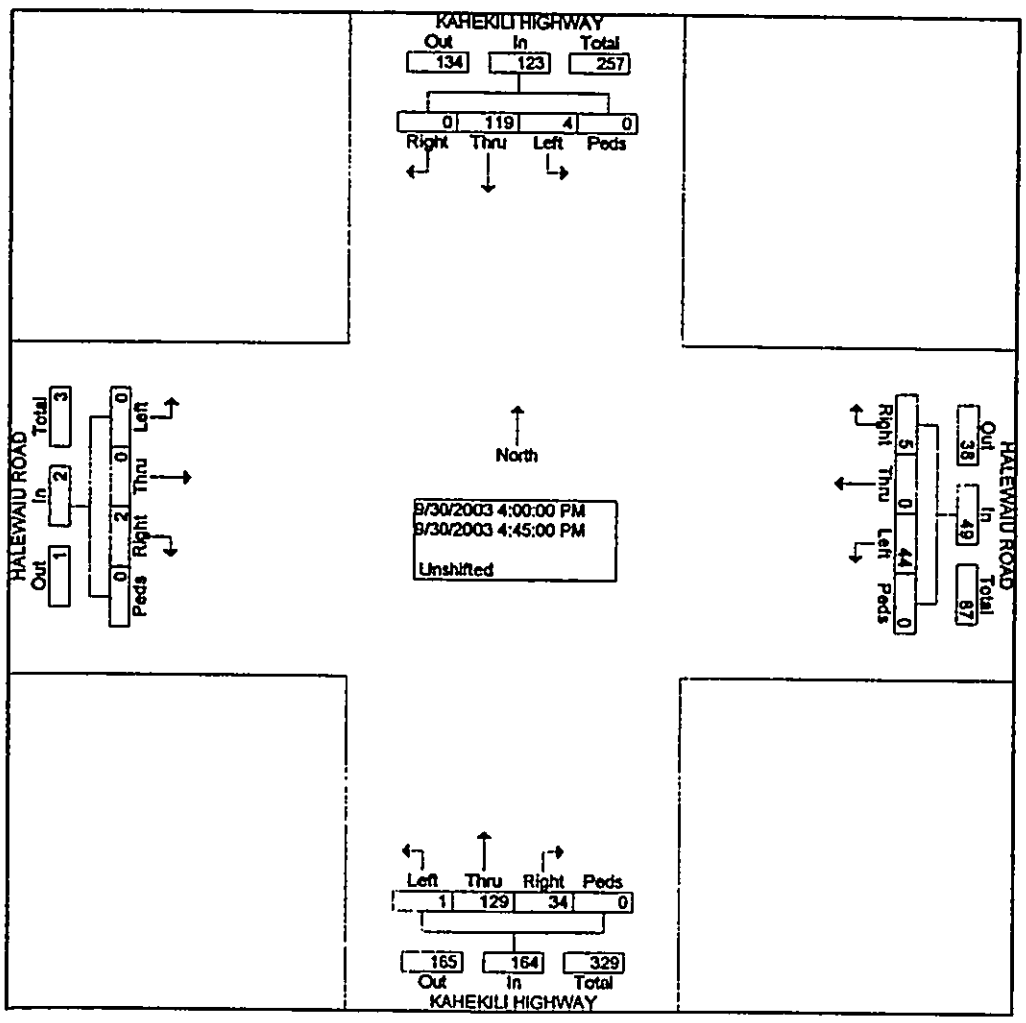
File Name : kahekili-halewaiu-PM
Site Code : 00000000
Start Date : 09/30/2003

	KAHEKILI HIGHWAY Southbound					HALEWAIU ROAD Westbound					KAHEKILI HIGHWAY Northbound					HALEWAIU ROAD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:15 PM - Peak 1 of 1																					
Intersection 04:00 PM																					
Volume	0	119	4	0	123	5	0	44	0	49	34	129	1	0	164	2	0	0	0	2	338
Percent	0.0	96.7	3.3	0.0		10.2	0.0	89.8	0.0		20.7	78.7	0.6	0.0		100.0	0.0	0.0	0.0		
04:45 Volume	0	31	3	0	34	1	0	11	0	12	7	38	0	0	45	1	0	0	0	1	92
Peak Factor																					0.918
High Int. 04:45 PM						04:15 PM					04:30 PM					04:30 PM					
Volume	0	31	3	0	34	2	0	14	0	16	8	40	0	0	48	1	0	0	0	1	
Peak Factor					0.904					0.766					0.854					0.500	



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Major Street: Kahekili Highway
Minor Street: Halewaiu Road
Time of Count: 6:30 - 8:00 AM
Weather: Sunny

File Name : kahekili-halewaiu-AM
Site Code : 00000000
Start Date : 10/01/2003
Page No : 1

Groups Printed- Unshifted

	KAHEKILI HIGHWAY Southbound					HALEWAIU ROAD Westbound					KAHEKILI HIGHWAY Northbound					HALEWAIU ROAD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
06:30 AM	0	33	1	0	34	1	0	6	0	7	16	15	0	0	31	1	0	0	0	1	73
06:45 AM	0	31	1	0	32	1	0	7	0	8	23	24	0	0	47	0	0	0	0	0	87
Total	0	64	2	0	66	2	0	13	0	15	39	39	0	0	78	1	0	0	0	1	160
07:00 AM	0	53	0	0	53	4	0	2	0	6	14	36	0	0	50	0	0	0	0	0	109
07:15 AM	0	58	1	0	59	1	0	5	0	6	10	37	0	0	47	0	1	0	0	1	113
07:30 AM	0	43	2	0	45	1	0	5	1	7	10	41	0	0	51	0	0	0	0	0	103
07:45 AM	0	38	1	0	39	1	0	5	0	6	17	37	0	0	54	0	0	0	0	0	99
Total	0	192	4	0	196	7	0	17	1	25	51	151	0	0	202	0	1	0	0	1	424
Grand Total	0	256	6	0	262	9	0	30	1	40	90	190	0	0	280	1	1	0	0	2	584
Apprch %	0.0	97.7	2.3	0.0		22.5	0.0	75.0	2.5		32.1	67.9	0.0	0.0		50.0	50.0	0.0	0.0		
Total %	0.0	43.8	1.0	0.0	44.9	1.5	0.0	5.1	0.2	6.8	15.4	32.5	0.0	0.0	47.9	0.2	0.2	0.0	0.0	0.3	

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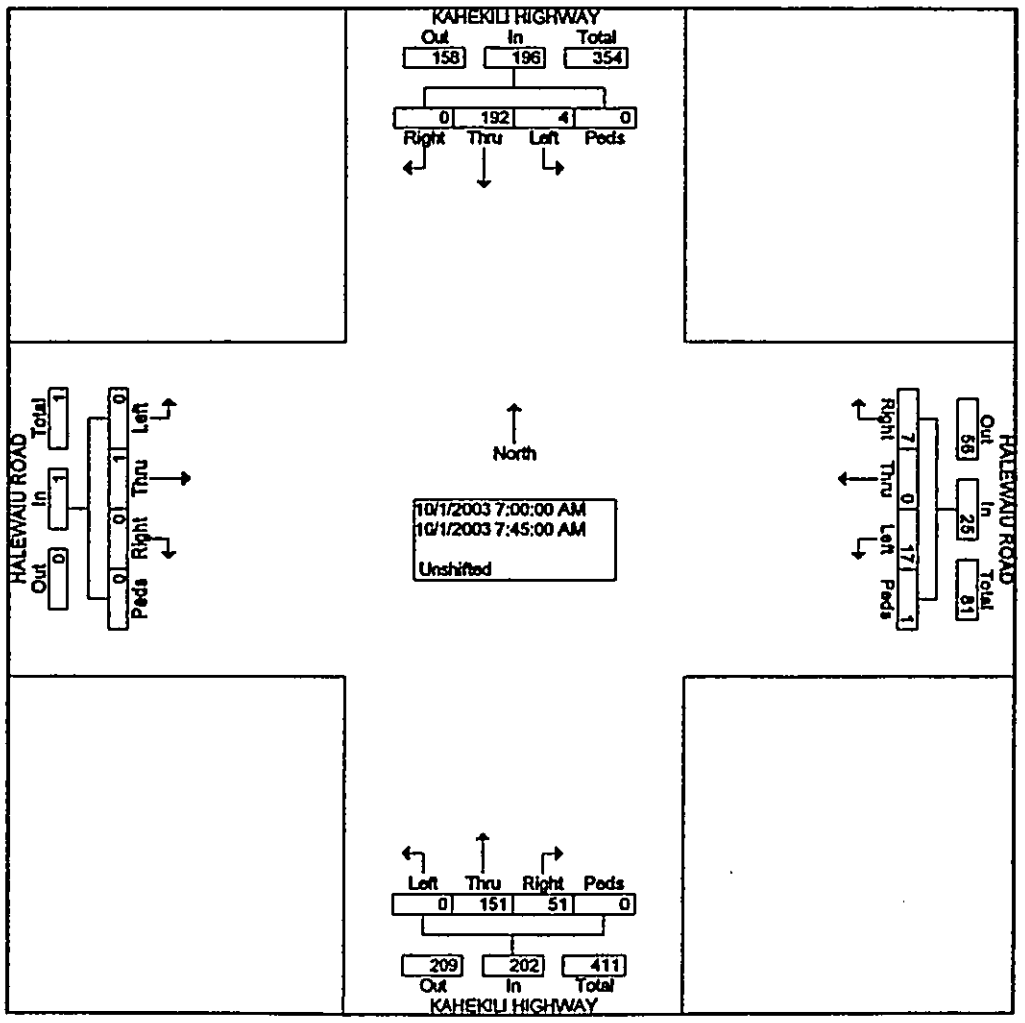
File Name : kahekili-halewaiu-AM
Site Code : 00000000
Start Date : 10/01/2003

	KAHEKILI HIGHWAY Southbound					HALEWAIU ROAD Westbound					KAHEKILI HIGHWAY Northbound					HALEWAIU ROAD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:30 AM to 07:45 AM - Peak 1 of 1																					
Intersection	07:00 AM																				
Volume	0	192	4	0	196	7	0	17	1	25	51	151	0	0	202	0	1	0	0	1	424
Percent	0.0	98.0	2.0	0.0		28.0	0.0	68.0	4.0		25.2	74.8	0.0	0.0		0.0	100.0	0.0	0.0		
07:15 Volume	0	58	1	0	59	1	0	5	0	6	10	37	0	0	47	0	1	0	0	1	113
Peak Factor																					0.938
High Int.	07:15 AM					07:30 AM					07:45 AM					07:15 AM					
Volume	0	58	1	0	59	1	0	5	1	7	17	37	0	0	54	0	1	0	0	1	
Peak Factor					0.831					0.893					0.935					0.250	



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Major Street: Kahekili Highway
Minor Street: Halewaiu Road
Time of Count: 4:00 - 5:30 PM
Weather: Sunny

File Name : kahekili-halewaiu-PM
Site Code : 00000000
Start Date : 09/30/2003
Page No : 1

Groups Printed- Unshifted

	KAHEKILI HIGHWAY Southbound					HALEWAIU ROAD Westbound					KAHEKILI HIGHWAY Northbound					HALEWAIU ROAD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
04:00 PM	0	31	0	0	31	1	0	8	0	9	7	22	1	0	30	0	0	0	0	0	70
04:15 PM	0	31	1	0	32	2	0	14	0	16	12	29	0	0	41	0	0	0	0	0	89
04:30 PM	0	26	0	0	26	1	0	11	0	12	8	40	0	0	48	1	0	0	0	1	87
04:45 PM	0	31	3	0	34	1	0	11	0	12	7	38	0	0	45	1	0	0	0	1	92
Total	0	119	4	0	123	5	0	44	0	49	34	129	1	0	164	2	0	0	0	2	338
05:00 PM	0	21	0	0	21	2	0	7	0	9	6	27	0	0	33	0	1	0	0	1	64
05:15 PM	0	28	3	0	31	1	1	3	0	5	7	37	0	0	44	0	0	0	0	0	80
Grand Total	0	168	7	0	175	8	1	54	0	63	47	193	1	0	241	2	1	0	0	3	482
Apprch %	0.0	96.0	4.0	0.0		12.7	1.6	85.7	0.0		19.5	80.1	0.4	0.0		66.7	33.3	0.0	0.0		
Total %	0.0	34.9	1.5	0.0	36.3	1.7	0.2	11.2	0.0	13.1	9.8	40.0	0.2	0.0	50.0	0.4	0.2	0.0	0.0	0.6	

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File Name : kahekili-halewalu-PM
Site Code : 00000000
Start Date : 09/30/2003

	KAHEKILI HIGHWAY Southbound					HALEWAIU ROAD Westbound					KAHEKILI HIGHWAY Northbound					HALEWAIU ROAD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 04:00 PM to 05:15 PM - Peak 1 of 1																					
Intersection	04:00 PM																				
Volume	0	119	4	0	123	5	0	44	0	49	34	129	1	0	164	2	0	0	0	2	338
Percent	0.0	96.7	3.3	0.0		10.2	0.0	89.8	0.0		20.7	78.7	0.6	0.0		100.0	0.0	0.0	0.0		
04:45 Volume	0	31	3	0	34	1	0	11	0	12	7	38	0	0	45	1	0	0	0	1	92
Peak Factor																					0.918
High Int.	04:45 PM					04:15 PM					04:30 PM					04:30 PM					
Volume	0	31	3	0	34	2	0	14	0	16	8	40	0	0	48	1	0	0	0	1	
Peak Factor					0.904					0.766					0.854					0.500	

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501 Sumner Street, Suite 521
Honolulu, Hawaii 96817
Ph: (808) 533-3646 Fax: (808) 526-1267

Major Street: Kahekili Highway
Minor Street: Halewaiu Road
Time of Count: 4:00 - 5:30 PM
Weather: Sunny

File Name : kahekili-halewaiu-PM
Site Code : 00000000
Start Date : 09/30/2003
Page No : 1

Groups Printed- Unshifted

	KAHEKILI HIGHWAY Southbound					HALEWAIU ROAD Westbound					KAHEKILI HIGHWAY Northbound					HALEWAIU ROAD Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
04:00 PM	0	31	0	0	31	1	0	8	0	9	7	22	1	0	30	0	0	0	0	0	70
04:15 PM	0	31	1	0	32	2	0	14	0	16	12	29	0	0	41	0	0	0	0	0	89
04:30 PM	0	26	0	0	26	1	0	11	0	12	8	40	0	0	48	1	0	0	0	1	87
04:45 PM	0	31	3	0	34	1	0	11	0	12	7	38	0	0	45	1	0	0	0	1	92
Total	0	119	4	0	123	5	0	44	0	49	34	129	1	0	164	2	0	0	0	2	338
05:00 PM	0	21	0	0	21	2	0	7	0	9	6	27	0	0	33	0	1	0	0	1	64
05:15 PM	0	28	3	0	31	1	1	3	0	5	7	37	0	0	44	0	0	0	0	0	80
Grand Total	0	168	7	0	175	8	1	54	0	63	47	193	1	0	241	2	1	0	0	3	482
Apprch %	0.0	96.0	4.0	0.0		12.7	1.6	85.7	0.0		19.5	80.1	0.4	0.0		66.7	33.3	0.0	0.0		
Total %	0.0	34.9	1.5	0.0	36.3	1.7	0.2	11.2	0.0	13.1	9.8	40.0	0.2	0.0	50.0	0.4	0.2	0.0	0.0	0.6	

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APPENDIX B

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 2000)

The level of service criteria for unsignalized intersections is defined as the average total delay, in seconds per vehicle. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. While the criteria for level of service for two-way-stop-controlled (TWSC) and all-way-stop-controlled (AWSC) intersections are the same, procedures to calculate the average total delay may differ.

Level of Service Criteria for Two-Way Stop-Controlled Intersections

Level of Service	Average Total Delay (sec/veh)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	> 50

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APPENDIX C

LEVEL OF SERVICE CALCULATIONS

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APPENDIX C
LEVEL OF SERVICE CALCULATIONS

- Existing Conditions

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/8/03
AgencyorCompany	ATA	MajorStreet	HALEWAIU
AnalysisPeriod/Year	EXIST2003 AM	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	4	400			408	51					17	7
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	4	444			453	57					19	8
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	27	343	.079	<1	16.4	C	16.4
	2								
	3								C
		①	4	1050	.004	<1	8.4	A	
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/8/03
AgencyorCompany	ATA	MajorStreet	HALEWAIU
AnalysisPeriod/Year	EXIST2003 PM	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	4	154			162	34					44		5
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	4	171			180	38					49		6
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft MovementS _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	55	637	.086	<1	11.2	B	11.2
	2								
	3								B
		①	4	1346	.003	<1	7.7	A	
		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation

Analyst	NK	Jurisdiction/Date	12/16/02
AgencyorCompany	ATA	MajorStreet	KAHEKILI
AnalysisPeriod/Year	AMEXIST 2002	MinorStreet	KOHOMUA
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	2	415			456	9					14	3
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	2	461			507	10					16	3
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

SignalupstreamofMovement2 _____ft Movement5 _____ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	19	300	.063	<1	17.8	C	17.8
	2								
	3								C
		①	2	1044	.002	<1	8.5	A	
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	2/5/03
AgencyorCompany	ATA	MajorStreet	KAHEKILI
AnalysisPeriod/Year	PMEXIST 2002	MinorStreet	KOHOMUA
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB				WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	2	198			197	16					10		0
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	2	220			219	18					11		0
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	14	602	.023	<1	11.1	B	11.1
	2								
	3								B
		①	2	1325	.002	<1	7.7	A	
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/13/03
AgencyorCompany	ATA	MajorStreet	KAHEKILI
AnalysisPeriod/Year	AMEXIST 2002	MinorStreet	AKAKUU
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	2	425			464	12					18		2
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	2	472			516	13					20		2
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	22	281	.078	<1	18.9	C	18.9 C
	2								
	3								
		①	2	1033	.002	<1	8.5	A	
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	2/5/03
AgencyorCompany	ATA	MajorStreet	KAHEKILI
AnalysisPeriod/Year	PMEXIST 2002	MinorStreet	AKAKUU
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	0	207			211	14					16		1
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	0	230			234	16					18		1
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

Signalupstreamof Movement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	19	558	.034	<1	11.7	B	11.7
	2								
	3								B
		①	0						
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	AMEXIST	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	359	283			219	37					47	222
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	399	314			243	41					52	247
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	299	376	.796	7	43.1	E	43.1
	2								E
	3								
		①	399	1272	.314	1	9.1	A	
		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	PMEXIST	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	190	121			138	81					32		259
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	211	134			153	90					36		288
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

Signalupstreamof Movement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	324	709	.457	2	14.3	B	14.3
	2								
	3								B
		①	211	1317	.16	1	8.3	A	
		④							

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APPENDIX C
LEVEL OF SERVICE CALCULATIONS

- Base Year

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information			*Site Information*		
Analyst	nk		Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata		Major Street	Kahekili	
Analysis Period/Year	am base	Year	Minor Street	Halewaiu	
Comment	Comments				

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	LT	TR		LR
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	435			455	50				20		10
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	483			506	56				22		11
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	33	312	0.106	0	17.9	C	17.9
	2								
	3								C
SB		①	6	1005	0.006	0	8.6	A	
NB		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information			*Site Information*		
Analyst	nk		Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata		Major Street	Kahekili	
Analysis Period/Year	pm base	Year	Minor Street	Halewaiu	
Comment	Comments				

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	LT	TR		LR
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	175			185	35				45		5
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	194			206	39				50		6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	56	596	0.094	0	11.7	B	11.7
	2								
	3								B
SB		①	6	1316	0.004	0	7.7	A	
NB		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information ***Site Information***

Analyst	nk	Jurisdiction/Date	Jurisdiction 3/5/2004
Agency or Company	ata	Major Street	Kahekili
Analysis Period/Year	am base Year	Minor Street	Ag Subd Acc Road
Comment	Comments		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	T	LR	
Lane 2		L		
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)		455	1	5	500		1		15			
PHF		0.90	0.90	0.90	0.90		0.90		0.90			
Percent of heavy vehicles, HV		3	3	3	3		3		3			
Flow rate		506	1	6	556		1		17			
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LR	18	525	0.034	0	12.1	B	12.1
	2								
	3								B
WB	1								
	2								
	3								
SB		①							
NB		④	6	1053	0.005	0	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	nk		
Agency or Company	ata		
Analysis Period/Year	pm base	Year	
Comment	Comments		

Site Information

Jurisdiction/Date	Jurisdiction 3/5/2004
Major Street	Kahekili
Minor Street	Ag Subd Acc Road

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	T	LR	
Lane 2		L		
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)		220	1	10	215		1		5			
PHF		0.90	0.90	0.90	0.90		0.90		0.90			
Percent of heavy vehicles, HV		3	3	3	3		3		3			
Flow rate		244	1	11	239		1		6			
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LR	7	736	0.010	0	9.9	A	9.9
	2								A
	3								
WB	1								
	2								
	3								
SB		①							
NB		④	11	1315	0.008	0	7.8	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	nk	Jurisdiction/Date	Jurisdiction 3/5/2004
Agency or Company	ata	Major Street	kahekili
Analysis Period/Year	am base Year	Minor Street	phase 3 acc rd
Comment	Comments		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	T	TR		R
Lane 2	L			L
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	465			495	20				55		10
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	517			550	22				61		11
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	R	11	525	0.021	0	12.0	B	23.4
	2	L	61	236	0.258	1	25.5	D	C
	3								
SB		①	6	996	0.006	0	8.6	A	
NB		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst: NK | Jurisdiction/Date: 10/9/03
AgencyorCompany: ATA | MajorStreet: PHASE3ACCESSROAD
AnalysisPeriod/Year: PMBASE2006 W/O | MinorStreet: KAHEKILI
Comment:

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		R
Lane2	L			L
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	10	215			215	65					30		10
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	11	239			239	72					33		11
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft
Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	R	11	761	.014	<1	9.8	A	12
	2	L	33	499	.066	<1	12.7	B	
	3								B
		①	11	1244	.009	<1	7.9	A	
		④							

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CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information			*Site Information*		
Analyst	nk		Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata		Major Street	kahekili	
Analysis Period/Year	am base	Year	Minor Street	kohomua st	
Comment	Comments				

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	T	TR		LR
Lane 2	L			
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	515			510	10				15		5
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	572			567	11				17		6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	23	254	0.091	0	20.6	C	20.6
	2								C
	3								
SB		①	6	991	0.006	0	8.7	A	
NB		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	KOHOMUA
AnalysisPeriod/Year	PMBASE2006 W/O	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		LR
Lane2	L			
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	5	245			275	15					10	5
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	6	272			306	17					11	6
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

Signalupstreamof(Movement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	17	530	.032	<1	12	B	12
	2								
	3								B
		①	6	1232	.005	<1	7.9	A	
		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information			*Site Information*		
Analyst	nk		Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata		Major Street	kahekili	
Analysis Period/Year	am base	Year	Minor Street	akakuu st	
Comment	Comments				

Input Data

Lane Configuration	SB			NB			EB			WB		
Lane 1 (curb)	T			TR						LR		
Lane 2	L											
Lane 3												
Lane 4												
Lane 5												
	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	525			520	15				20		5
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	583			578	17				22		6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	28	238	0.118	0	22.1	C	22.1
	2								
	3								C
SB		①	6	977	0.006	0	8.7	A	
NB		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation — **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	AKAKUU
AnalysisPeriod/Year	PMBASE2006 W/O	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		LR
Lane2	L			
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	5	255			290	15					15	5
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	6	283			322	17					17	6
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

SignalupstreamofMovement2 _____ ft MovementS _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	23	493	.047	<1	12.7	B	12.7
	2								B
	3								
		①	6	1215	.005	<1	8	A	
		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	AMBASEW/O	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	420	330			245	40					50	250
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	467	367			272	44					56	278
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) 25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	334	292	1.143	14	135.4	F	135.4
	2								
	3								F
		①	467	1238	.377	2	9.7	A	
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	PMBASEW/O	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	LT	TR		LR
Lane2				
Lane3				

	SB			NB			EB				WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	225	145			170	85					35		320
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	250	161			189	94					39		356
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	395	656	.602	4	18.4	C	18.4
	2								
	3								C
		①	250	1273	.196	1	8.5	A	
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	AMBASE2006 W/O	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		R
Lane2	L			L
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	420	330			245	40					50		250
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	467	367			272	44					56		278
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	R	278	743	.374	2	12.7	B	34.6
	2	L	56	73	.769	4	143.1	F	
	3								D
		①	467	1238	.377	2	9.7	A	
		④							

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CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	PMBASE2006 W/O	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		R
Lane2	L			L
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	225	145			170	85					35		320
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	250	161			189	94					39		356
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____R Movement5 _____R

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	R	356	800	.445	2	13	B	14
	2	L	39	248	.157	1	22.2	C	B
	3								
		①	250	1273	.196	1	8.5	A	
		④							

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CIVIL ENGINEERS • SURVEYORS

APPENDIX C
LEVEL OF SERVICE CALCULATIONS

- With Project

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information			*Site Information*		
Analyst	nk		Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata		Major Street	Kahekili	
Analysis Period/Year	am with	Year	Minor Street	Halewaiu	
Comment	Comments				

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	LT	TR		LR
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	435			460	55				25		10
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	483			511	61				28		11
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	39	298	0.131	0	18.9	C	18.9
	2								
	3								C
SB		①	6	996	0.006	0	8.6	A	
NB		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	nk	Jurisdiction/Date	Jurisdiction 3/5/2004
Agency or Company	ata	Major Street	Kahekili
Analysis Period/Year	pm with Year	Minor Street	Halewaiu
Comment	Comments		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	LT	TR		LR
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	180			190	45				50		5
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	200			211	50				56		6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	62	581	0.107	0	11.9	B	11.9
	2								
	3								B
SB		①	6	1297	0.004	0	7.8	A	
NB		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*		
Analyst	nk	Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata	Major Street	Kahekili	
Analysis Period/Year	am with	Year	Minor Street	Proj Acc/Ag Subd Acc
Comment	Comments			

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	R
Lane 2	L	L		LT
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	455	1	5	500	15	1	1	15	45	1	5
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	6	506	1	6	556	17	1	1	17	50	1	6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LTR	19	471	0.040	0	13.0	B	13.0
	2								B
	3								
WB	1	R	6	523	0.011	0	12.0	B	30.3
	2	LT	51	181	0.282	1	32.5	D	D
	3								
SB		①	6	996	0.006	0	8.6	A	
NB		④	6	1053	0.005	0	8.4	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information			*Site Information*		
Analyst	nk		Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata		Major Street	Kahekili	
Analysis Period/Year	pm with	Year	Minor Street	Proj Acc/Ag Subd Acc	
Comment	Comments				

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	TR	TR	LTR	R
Lane 2	L	L		LT
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	10	220	1	10	215	60	1	1	5	30	1	5
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent of heavy vehicles, HV	3	3	3	3	3	3	3	3	3	3	3	3
Flow rate	11	244	1	11	239	67	1	1	6	33	1	6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1	LTR	8	646	0.012	0	10.6	B	10.6 B
	2								
	3								
WB	1	R	6	764	0.008	0	9.7	A	13.5 B
	2	LT	34	425	0.080	0	14.2	B	
	3								
SB		①	11	1250	0.009	0	7.9	A	
NB		④	11	1315	0.008	0	7.8	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	nk	Jurisdiction/Date	Jurisdiction 3/5/2004
Agency or Company	ata	Major Street	kahekili
Analysis Period/Year	am with Year	Minor Street	phase 3 acc rd
Comment	Comments		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	T	TR		R
Lane 2	L			L
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	515			515	20				55		10
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	572			572	22				61		11
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	R	11	510	0.022	0	12.2	B	26.2
	2	L	61	212	0.288	1	28.7	D	
	3								D
SB		①	6	977	0.006	0	8.7	A	
NB		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	PHASE3ACCESSROAD
AnalysisPeriod/Year	PM WITH	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		R
Lane2	L			L
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	10	250			280	65					30		10
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	11	278			311	72					33		11
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	R	11	694	.016	<1	10.3	B	13.1
	2	L	33	430	.077	<1	14.1	B	
	3								B
		①	11	1170	.009	<1	8.1	A	
		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information			*Site Information*		
Analyst	nk		Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata		Major Street	kahekili	
Analysis Period/Year	am with	Year	Minor Street	kohomua st	
Comment	Comments				

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	T	TR		LR
Lane 2	L			
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	570			530	10				15		5
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	633			589	11				17		6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	23	229	0.101	0	22.5	C	22.5
	2								
	3								C
SB		①	6	972	0.006	0	8.7	A	
NB		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	KOHOMUA
AnalysisPeriod/Year	PM WITH	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		LR
Lane2	L			
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	5	280			345	15					10	5
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	6	311			383	17					11	6
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	17	459	.037	<1	13.1	B	13.1
	2								B
	3								
		①	6	1153	.005	<1	8.1	A	
		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*		
Analyst	nk	Jurisdiction/Date	Jurisdiction	3/5/2004
Agency or Company	ata	Major Street	kahekili	
Analysis Period/Year	am with Year	Minor Street	akakuu st	
Comment	Comments			

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	T	TR		LR
Lane 2	L			
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	5	580			540	15				20		5
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	6	644			600	17				22		6
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	28	214	0.131	0	24.4	C	24.4
	2								C
	3								
SB		①	6	958	0.006	0	8.8	A	
NB		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	AKAKUU
AnalysisPeriod/Year	PM WITH	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		LR
Lane2	L			
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	5	290			360	15					15	5
PHF	.9	.9			.9	.9					.9	.9
Proportionofheavyvehicles,HV	3	3			3	3					3	3
Flowrate	6	322			400	17					17	6
Flarestorage(#ofvehs)												0
Medianstorage(#ofvehs)											0	

Signalupstreamof Movement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	LR	23	425	.054	<1	14	B	14
	2								
	3								B
		①	6	1137	.005	<1	8.2	A	
		④							

HICAP2000 ™ 1of1

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	AMWITH PROJ	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		R
Lane2	L			L
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)
Volume(veh/h)	450	350			255	40					50		260
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	500	389			283	44					56		289
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	R	289	732	.395	2	13.1	B	44.9
	2	L	56	60	.932	4	208.9	F	
	3								E
		①	500	1226	.408	2	9.9	A	
		④							

CHAPTER17-TWSC-UNSIGNALIZEDINTERSECTIONSWORKSHEET

AnalysisSummary

GeneralInformation | **SiteInformation**

Analyst	NK	Jurisdiction/Date	10/9/03
AgencyorCompany	ATA	MajorStreet	WAIEHUBEACH
AnalysisPeriod/Year	PMWITH PROJ	MinorStreet	KAHEKILI
Comment			

InputData

LaneConfiguration	SB	NB	EB	WB
Lane1(curb)	T	TR		R
Lane2	L			L
Lane3				

	SB			NB			EB			WB		
Movement	1(LT)	2(TH)	3(RT)	4(LT)	5(TH)	6(RT)	7(LT)	8(TH)	9(RT)	10(LT)	11(TH)	12(RT)	
Volume(veh/h)	245	155			195	85					35		365
PHF	.9	.9			.9	.9					.9		.9
Proportionofheavyvehicles,HV	3	3			3	3					3		3
Flowrate	272	172			217	94					39		406
Flarestorage(#ofvehs)													0
Medianstorage(#ofvehs)											0		

SignalupstreamofMovement2 _____ ft Movement5 _____ ft

Lengthofstudyperiod(h) .25

OutputData

	Lane	Movement	FlowRate (veh/h)	Capacity (veh/h)	v/c	QueueLength (veh)	ControlDelay (s)	LOS	Approach DelayandLOS
EB	1								
	2								
	3								
WB	1	R	406	772	.526	3	14.7	B	15.6
	2	L	39	215	.181	1	25.4	D	
	3								C
		①	272	1244	.219	1	8.7	A	
		④							

HICAP2000 ™

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information		*Site Information*	
Analyst	nk	Jurisdiction/Date	Jurisdiction 2/27/2004
Agency or Company	ata	Major Street	Kahekili
Analysis Period/Year	pm with project 2006	Minor Street	Waiehu Beach
Comment	Comments		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	LT	TR		LR
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	245	155			195	85				35		365
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	272	172			217	94				39		406
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	445	630	0.707	6	23.3	C	23.3
	2								
	3								C
SB		①	272	1244	0.219	1	8.7	A	
NB		④							

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	nk	Jurisdiction/Date	Jurisdiction 2/27/2004
Agency or Company	ata	Major Street	Kahekili
Analysis Period/Year	am with project 2006	Minor Street	Waiehu Beach
Comment	Comments		

Input Data

Lane Configuration	SB	NB	EB	WB
Lane 1 (curb)	LT	TR		LR
Lane 2				
Lane 3				
Lane 4				
Lane 5				

	SB			NB			EB			WB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	450	350			255	40				50		260
PHF	0.90	0.90			0.90	0.90				0.90		0.90
Percent of heavy vehicles, HV	3	3			3	3				3		3
Flow rate	500	389			283	44				56		289
Flare storage (# of vehs)												
Median storage (# of vehs)												

Signal upstream of Movement 2 _____ R Movement 5 _____ R

Length of study period (h) 0.25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
EB	1								
	2								
	3								
WB	1	LR	345	260	1.327	18	209.4	F	209.4
	2								F
	3								
SB		①	500	1226	0.408	2	9.9	A	
NB		④							

Appendix C

Preliminary Engineering Report

PRELIMINARY ENGINEERING REPORT

FOR

WAIEHU KOU RESIDENCE LOTS, PHASE 4

WAILUKU, MAUI, HAWAII

TMK: (2) 3-2-12: 001

PREPARED FOR

Dowling Company, Inc.

BY

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

March 2004

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APPENDICES

APPENDIX A: EXHIBITS

APPENDIX B: PRELIMINARY HYDROLOGIC CALCULATIONS

PRELIMINARY ENGINEERING REPORT

FOR THE

WAIEHU KOU RESIDENCE LOTS, PHASE 4

I. INTRODUCTION

The purpose of this report is to summarize the civil engineering design criteria for the Waiehu Kou Residence Lots, Phase 4. It evaluates the existing site conditions and defines requirements for grading, drainage, and utility provisions for the proposed subdivision.

II. PROPOSED PROJECT

A. Location

The proposed project is located in Wailuku, Maui. It is south of Halewaiu Road and north of Kahekili Highway. The Tax Map key for the site is 3-2-12: 1. The property is owned by Waihee Oceanfront Hawaii, Inc. and is 35.64 acres in size. (Refer to Exhibit 1).

B. Project Description

The proposed project consists of 96 single family residential lots, 2 reserve lots (for drainage purposes), and an onsite retention basin. Improvements will include grading, paved roadways, concrete sidewalk, concrete curbs and gutters, storm drainage system, sewer system and water system. (Refer to Exhibit 2).

III. EXISTING CONDITIONS

A. Adjacent Land Uses

The southeastern boundary of the project site abuts the Waiehu Kou Phase 3 Subdivision and the Waiehu Golf Course. A macadamia nut

orchard is located next to Kahekili Highway along its southwestern boundary. On the northern boundary runs Halewaiu Road, which fronts Waihee Ball Park and the entrance to Waiehu Golf Course.

B. Topography and Soil Conditions

The subject parcel has an average moderate slope from 2% to 4% in the easterly direction. Elevation on the site ranges from 40 to 125 feet mean sea level (msl).

The major soil classification for this parcel is composed of "Iao Clay (IcB)", "Iao Silty Clay (IaA)", and "Wailuku Silty Clay (WvB)" by the U.S. Soil Conservation Services "Soil Survey of the Islands of Kauai, Oahu, Molokai, Maui and Lanai". All soil series have slow to moderate permeability, slow to medium runoff, and erosion hazards slight to moderate.

C. Roadways

There are no existing paved roadways within the project area. Kahekili Highway, a state owned, two lane highway, runs along the western boundary of the site. Halewaiu Road, which fronts Waihee Ball Park and the entrance to Waiehu Golf Course is located along the northern boundary.

D. Drainage

The majority of the onsite storm runoff sheet flows in an easterly direction and eventually discharges into a gulch located along the eastern boundary of the subject parcel. There are no active underground drainage systems on the project site. An existing culvert is located along Kahekili Highway and the southwest corner of Waiehu Kou Residence

Lots, Phase 3 Subdivision. The Phase 3 is adjacent to the Phase 4 parcel.

Offsite storm runoff generated from the adjacent mauka macadamia nut orchard is contained along the mauka side of Kahekili Highway and, routes through a natural waterway. This runoff is then intercepted by an existing culvert under Kahekili Highway, and into the existing gulch located along the eastern boundary of the subject parcel. This existing 10'x10' culvert, which was constructed in the early 1980's, is sized to accommodate a 50 year, 1 hour storm.

E. Wastewater

The site is currently unoccupied and generates no wastewater flow. There is no existing sewer system within the subject parcel.

F. Water

There is an existing County 12-inch and 8-inch waterline along Kahekili Highway. There is no existing water system within the subject parcel.

G. Flood Zone

The vast majority of the project site resides in Flood Zone designation "C". Flood Zone "C" is described as an area of minimal flooding. All flood zone designations and descriptions are according to a Flood Insurance Rate Map (FIRM), Panel Number 150003-0160B (June 1, 1981), as provided by the Federal Emergency Management Agency (FEMA). Along the northern boundary, a small portion of the parcel is designated as Zone "B" which are areas between the 100 year flood and 500 year flood. Portions surrounding the gulch along the south-eastern boundary is classified as Zone "A1" which are areas of 100-year flood.

IV. PROPOSED GRADING AND DRAINAGE PLAN

A. Grading Plan

The proposed grading plan will require excavation and embankment for the construction of the roadways and house lots. (Refer to Exhibit 3).

Erosion control measures will be incorporated during the construction period to minimize soil loss and erosion hazards. Dust screens and periodic water spraying will be provided to minimize disturbances to adjoining homes and property. Construction plans and an erosion control plan will be submitted to the County of Maui for approval. An application for a National Pollutant Discharge Elimination System (NPDES) permit will be submitted to the State of Hawaii for review and approval.

B. Drainage Plan

The majority of the onsite runoff will be collected by an underground drainage system and routed into a proposed onsite retention basin. The remaining onsite runoff will be collected by a separate underground drainage system and routed into the existing gulch located along the eastern boundary of the project. The onsite retention basin will be designed to retain the increase in runoff for a 50-year, 1-hour storm generated by the subject project. (Refer to Exhibit 3).

The existing culvert located along the southeast corner of the project parcel will be lengthened to accommodate the widening of Kahekili Highway. The existing culvert is designed to intercept runoff for a 50-year, 1-hour storm runoff, as required by the Department of Transportation. The existing natural waterway will not be altered or affected by the proposed drainage plan.

The drainage system described above will be designed according to the County of Maui's "Rules for the Design of Storm Drainage Facilities in the County of Maui" (Title MC-15, Chapter 4) and the Department of Transportation, State of Hawaii. Construction plans and a drainage report will be submitted to the County of Maui and the Department of transportation, State of Hawaii for approval.

C. Hydrology

The Rational Method, as described in the "Rules for the Design of Storm Drainage Facilities in the County of Maui" was used in calculating the storm runoff. These calculations are based on a 50-year, 1-hr storm recurrence interval.

The existing onsite storm runoff rate from the Phase 4 project site is approximately 48 cubic feet per second (cfs). A runoff rate of approximately 88.43 cfs is calculated for the developed Phase 4 site.

The existing offsite runoff mauka of the subject property is approximately 915 cfs.

V. PROPOSED UTILITY IMPROVEMENTS

A. Water

Water service to the project site will be provided by an existing 12-inch waterline on Kahekili Highway. Onsite mains within the proposed subdivision roads will provide water and fire protection to the residential lots.

B. Wastewater

Wastewater from the project site will gravity flow through the subdivision and into the wastewater pump station facility located at Waiehu Kou Residence Lots, Phase 3. From this pump station, the wastewater will be pumped through a force main to the pump station at

Waiehu Kou Residence Lots, Phase 2. It will then be pumped through a force main along Kahekili Highway and discharged into and existing sewer manhole at Waiehu Beach Road. In order to accommodate the additional flows, the pump station in Phase 2 will be upgraded, and approximately 5,200 lineal feet of new 8-inch diameter force main will be installed along Kahekili Highway, from the entrance of Phase 2, to the discharge sewer manhole at Waiehu Beach Road.

VI. PROPOSED ROADWAY IMPROVEMENTS

Roadways in the project site will include paved roads, rolled curb and gutter, and concrete sidewalks.

A 10-foot wide strip along Kahekili Highway will be set aside for the widening of the existing right-of-way. A primary access road will be provided into the project site as well as a separate left turn lane on Kahekili Highway for left turn movements. A second access road will be provided along Halewaiu Road.

Roadway improvements will be designed in accordance to State and County standards.

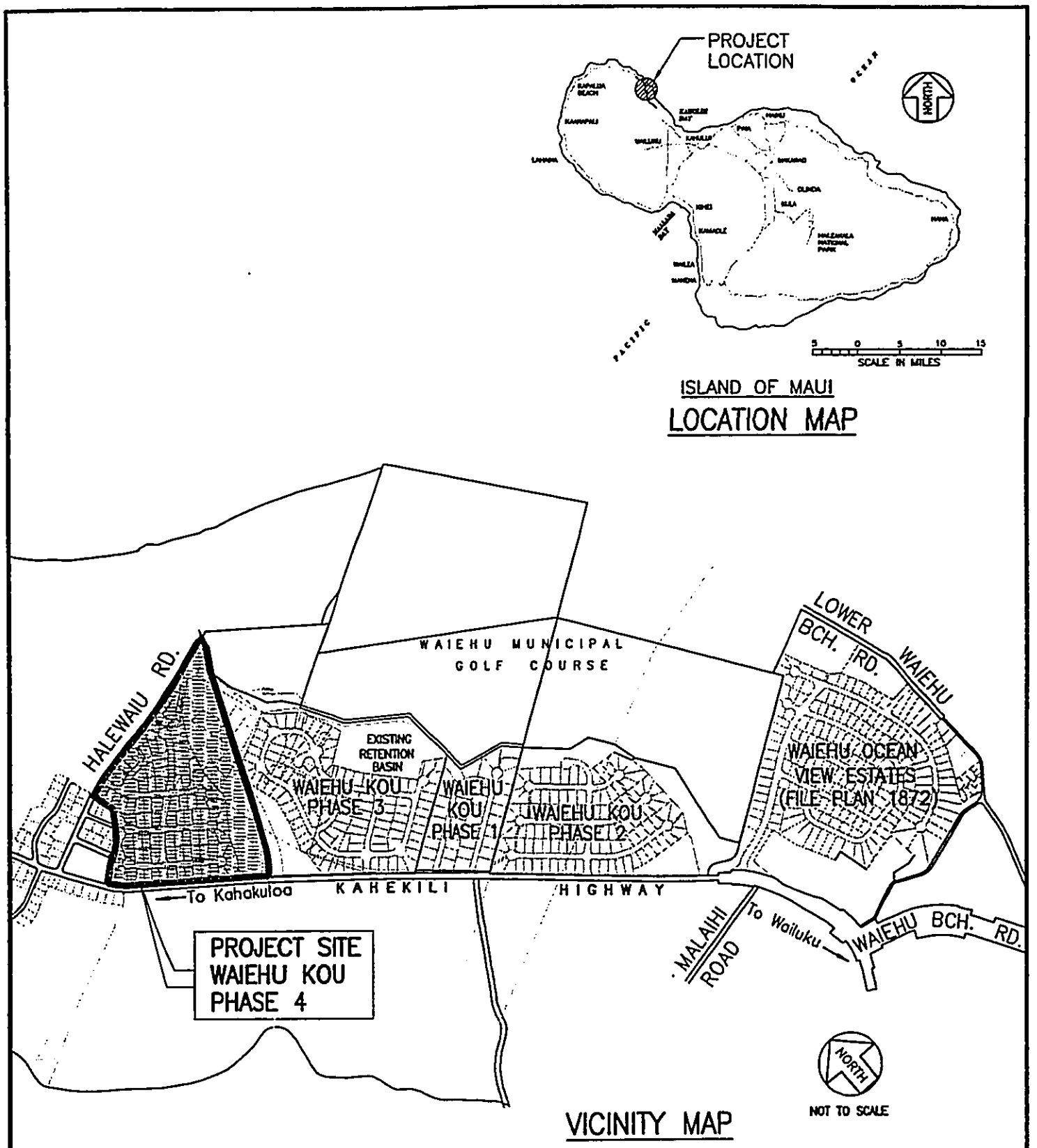
VII. CONCLUSION

The proposed improvements for this subdivision will be designed to produce no adverse effects to existing facilities and to neighboring and downstream properties. All improvements will be designed in accordance with the applicable regulatory agencies.

APPENDICES

APPENDIX A

EXHIBITS



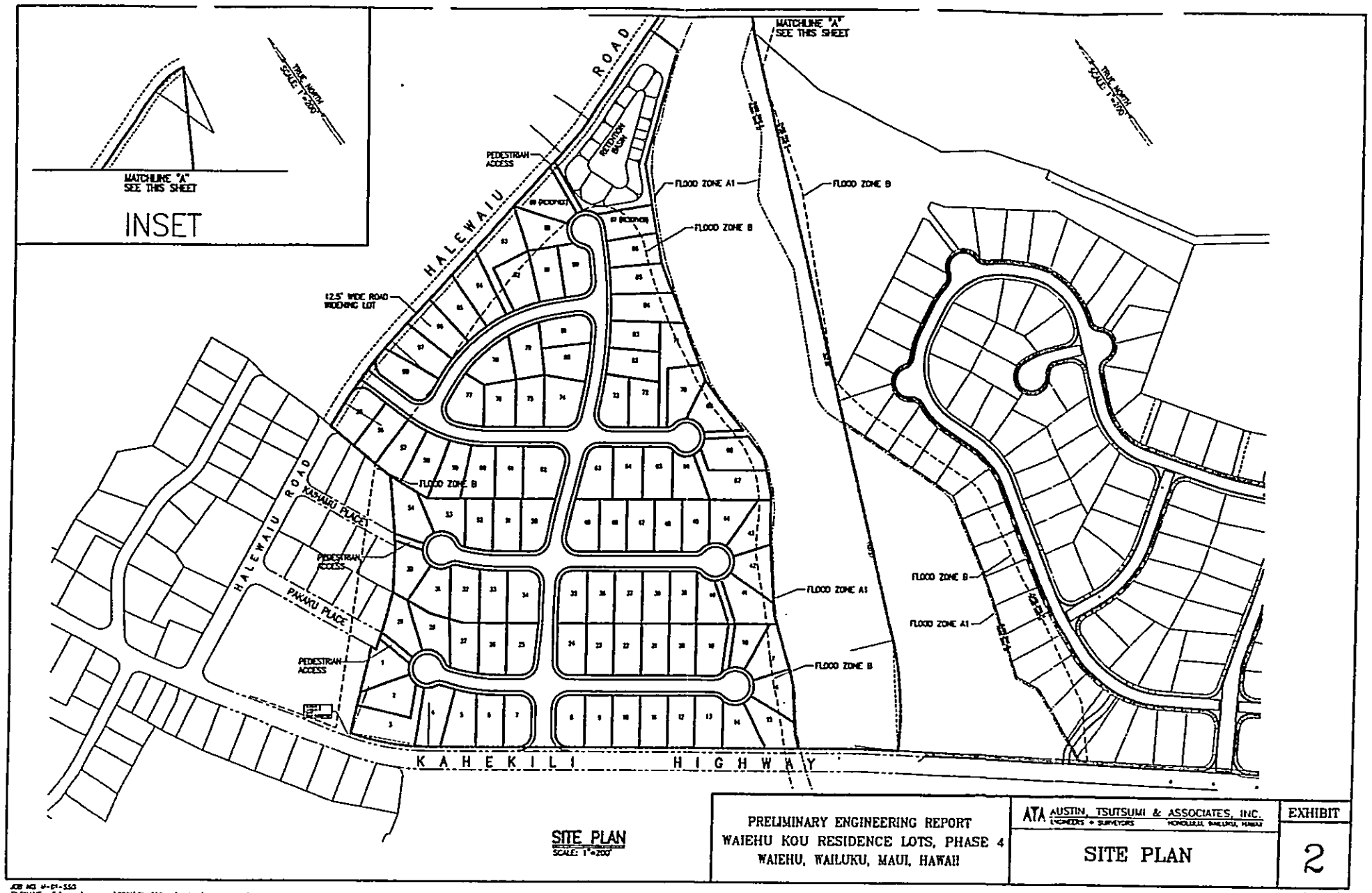
PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • Honolulu • Wailuku, Hawaii

VICINITY MAP & LOCATION MAP

EXHIBIT 1

JN: 01-550



SITE PLAN
SCALE: 1"=200'

PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII

SITE PLAN

EXHIBIT 2

JOB NO. M-01-553
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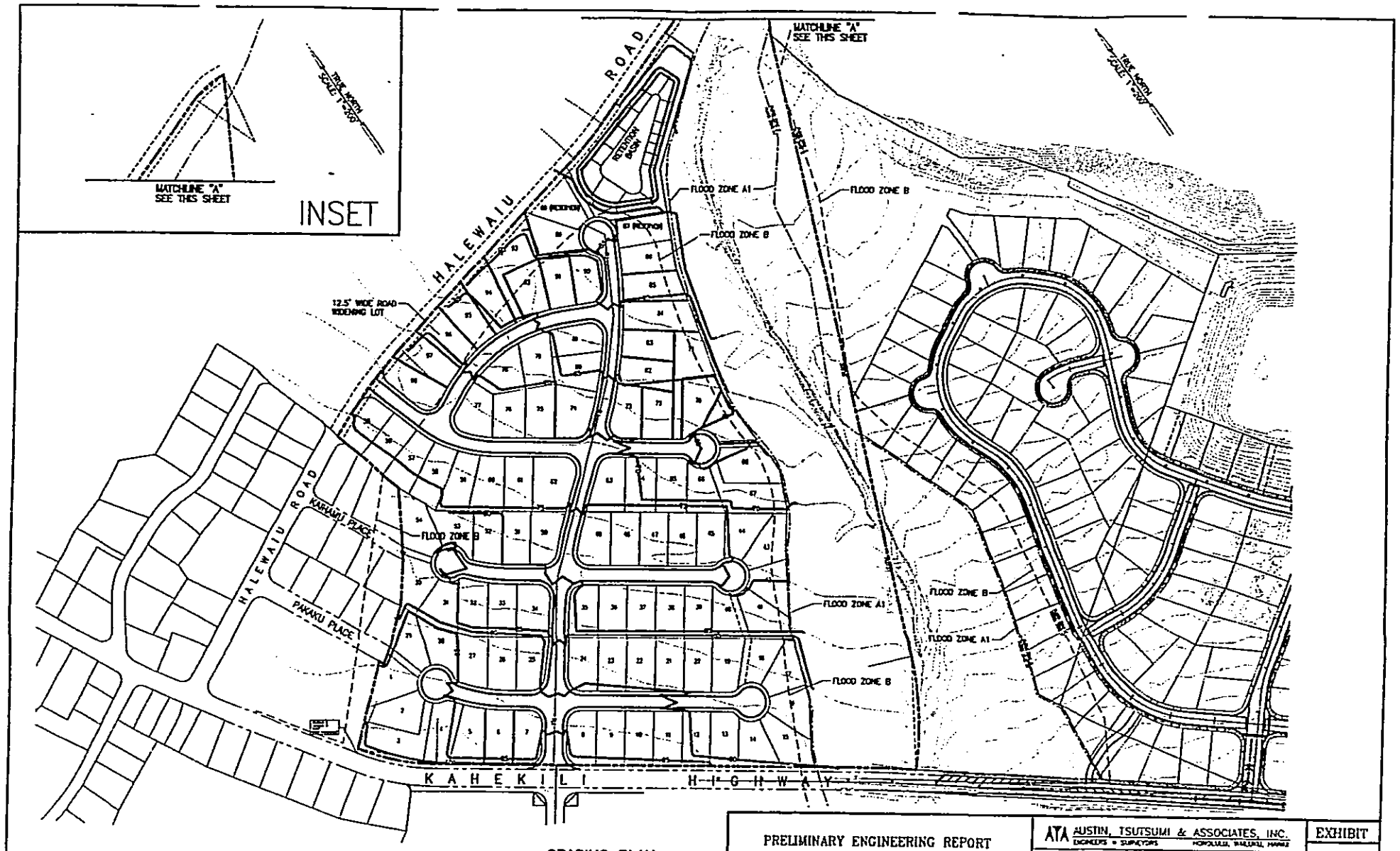
March, 2004



GRADING PLAN
SCALE: 1"=200'

PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII

PRELIMINARY GRADING PLAN

EXHIBIT 3

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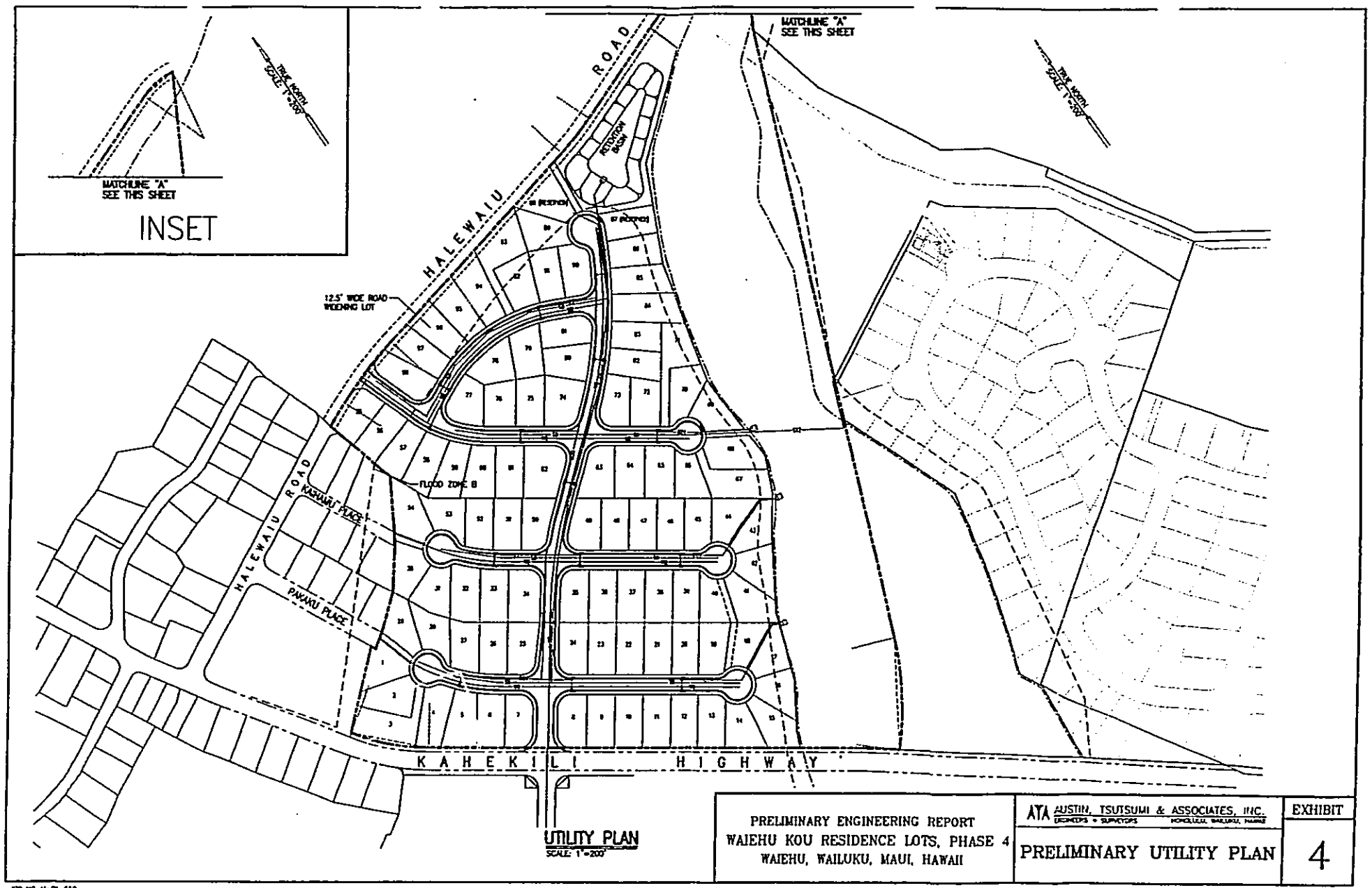
March, 2004



PRELIMINARY ENGINEERING REPORT WAIEHU KOU RESIDENCE LOTS, PHASE 4 WAIEHU, WAILUKU, MAUI, HAWAII	ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII PRELIMINARY UTILITY PLAN	EXHIBIT 4

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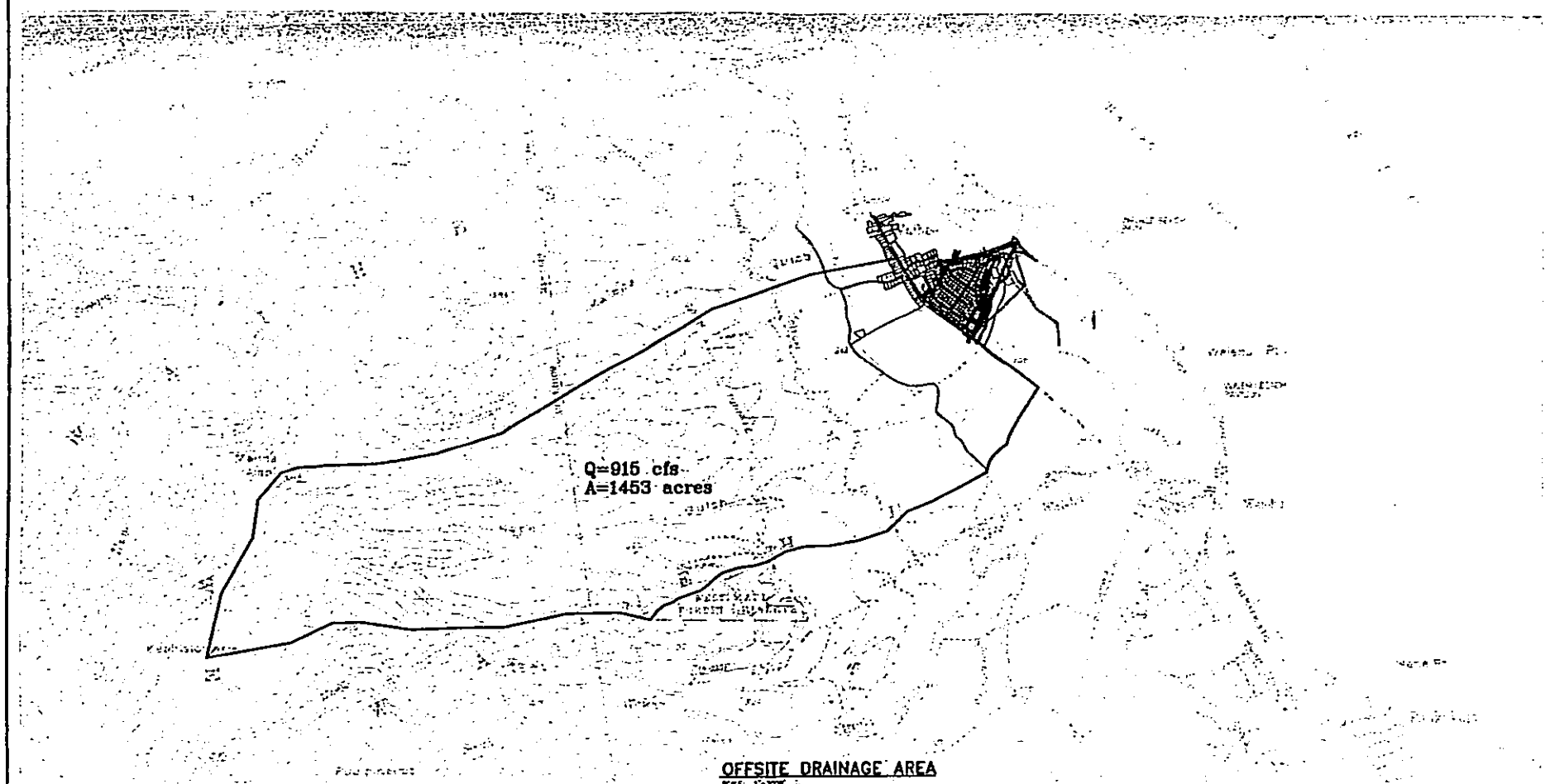
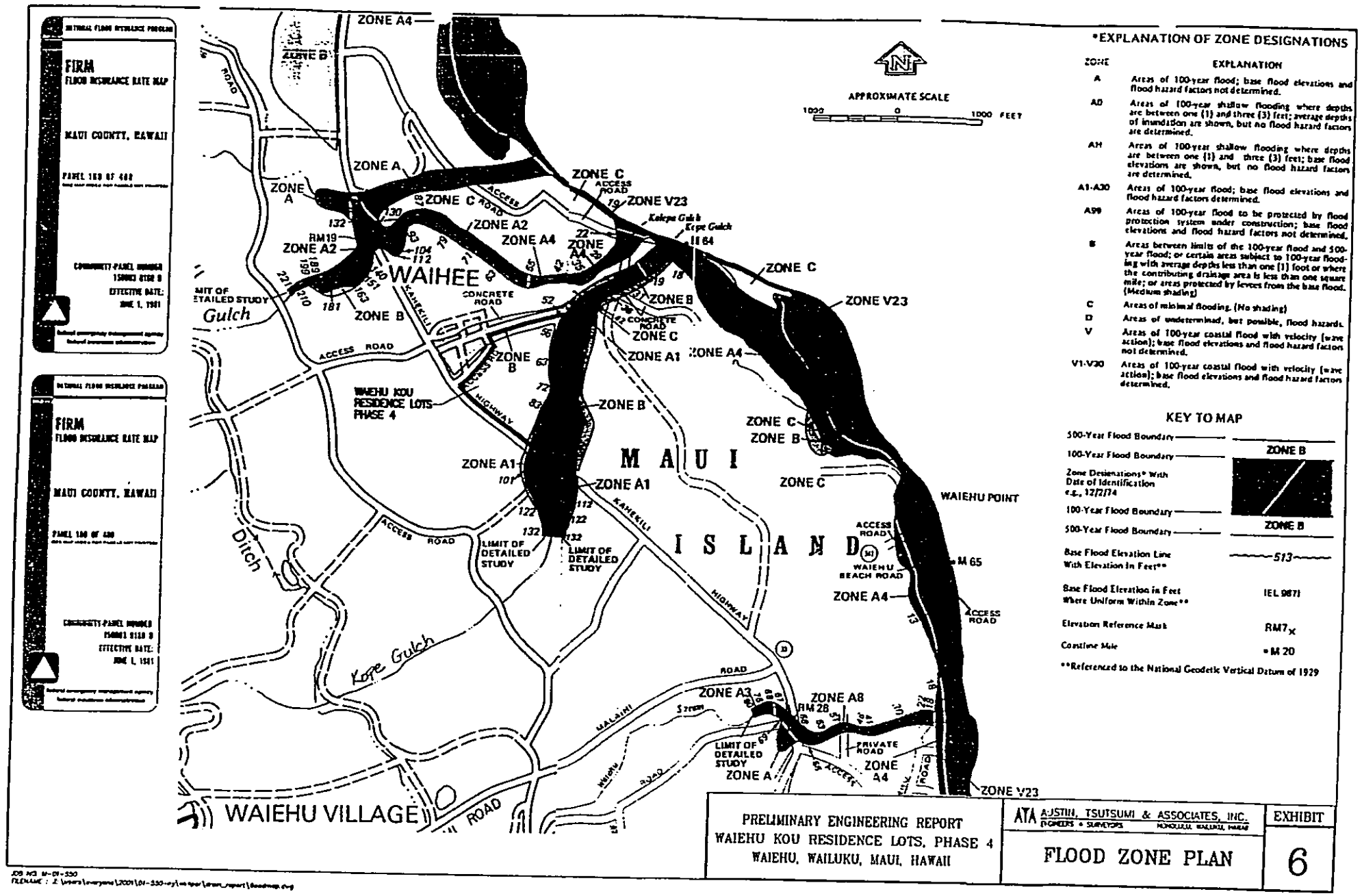
March, 2004



OFFSITE DRAINAGE AREA

PRELIMINARY ENGINEERING REPORT WAIEHU KOU RESIDENCE LOTS, PHASE 4 WAIEHU, WAILUKU, MAUI, HAWAII	ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. OFFSITE DRAINAGE AREA 50YR – 1HR	EXHIBIT 5


FIRM
FLOOD INSURANCE RATE MAP
MAUI COUNTY, HAWAII
PANEL 180 OF 480
EFFECTIVE DATE:
JUNE 1, 1981
FIRM
FLOOD INSURANCE RATE MAP
MAUI COUNTY, HAWAII
PANEL 180 OF 480
EFFECTIVE DATE:
JUNE 1, 1981
APPROXIMATE SCALE
1000 0 1000 FEET
ZONE A4
ZONE B
ZONE A
ZONE C
ACCESS ROAD
ZONE V23
ZONE C ROAD
ZONE A2
ZONE A4
Kakepa Gulch
Kepe Gulch
RM19
WAIHEE
CONCRETE ROAD
ACCESS ROAD
WAIEHU KOU RESIDENCE LOTS PHASE 4
HIGHWAY
KAHEKILI
MAUI
ISLAND
LIMIT OF DETAILED STUDY
Ditch
Kepe Gulch
WAIEHU VILLAGE
ROAD
MALAIHI
Stream
ZONE A3
ZONE A8
RM 28
PRIVATE ROAD
ZONE A4
WAIEHU POINT
WAIEHU BEACH ROAD
ZONE V23
*EXPLANATION OF ZONE DESIGNATIONS
ZONE
EXPLANATION
A
Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO
Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH
Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30
Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99
Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B
Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C
Areas of minimal flooding. (No shading)
D
Areas of undetermined, but possible, flood hazards.
V
Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30
Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.
KEY TO MAP
500-Year Flood Boundary
100-Year Flood Boundary
Zone Designations* With Date of Identification e.g., 12/2/74
ZONE B
100-Year Flood Boundary
500-Year Flood Boundary
ZONE B
Base Flood Elevation Line With Elevation In Feet**
513
Base Flood Elevation in Feet Where Uniform Within Zone**
(EL 987)
Elevation Reference Mark
RM7x
Coastline Mile
•M 20
**Referenced to the National Geodetic Vertical Datum of 1929
PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII
ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII
EXHIBIT
FLOOD ZONE PLAN
6
March, 2004

APPENDIX B

PRELIMINARY HYDROLOGY CALCULATIONS

HYDROLOGY COMPUTATIONS

Drainage Area	Area, a, (Acres)	Runoff Coefficient, c	Rainfall Intensity i (in/hr)	Length of Reach, L, (ft)	Slope, S (ft/ft)	Time of Concentration Tc, (min)	Runoff Discharge Q=cia, (cfs)	Accumulated Q, (cfs)	Remarks
	35.6	0.300	4.5	2,100	3.100	27.0	48.11		Onsite Pre-Developed Conditions, 50Yr-1Hr Storm
	35.6	0.460	5.4	2,100	3.100	16.0	88.43		Onsite Post-Developed Conditions, 50-Yr-1Hr. Storm

Reference: Rules for the Design of Storm Drainage Facilities in the County of Maui, DPWWM, County of Maui, November 1995.

WAIEHU KOU RESIDENCE LOTS, PHASE 4
PRELIMINARY ENGINEERING REPORT

JOB NO M-03-542

BY: MY/AN DATE: 3/04
CHKD: — DATE: -/-/-
SHT NO: 1 OF 1

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS SURVEYORS 1871 WILI PA LOOP, SUITE A, WAILUKU, HI. 96793

OFFSITE RUNOFF CALCULATIONS (50 Year – 1 Hour Storm)

Area

Total Area: **a = 1,453 acres**

Runoff Coefficient (c)

c = 0.30

Rainfall Intensity (i)

Recurrence Interval: 50 Yr – 1 Hr = 3.0 inches

Average site slope: 18.0%

Longest reach length: approximately 18,300 feet

Time of concentration: 2 hours

i = 2.1 inches / hour

Runoff (Q)

$Q = c \times i \times a$

Q = discharge, in cubic feet per second (cfs)
c = runoff coefficient
i = rainfall intensity, inches per hour
a = watershed area, in acres

Q_{50} = (0.30)(1453 acres)(2.1 inches / hour)

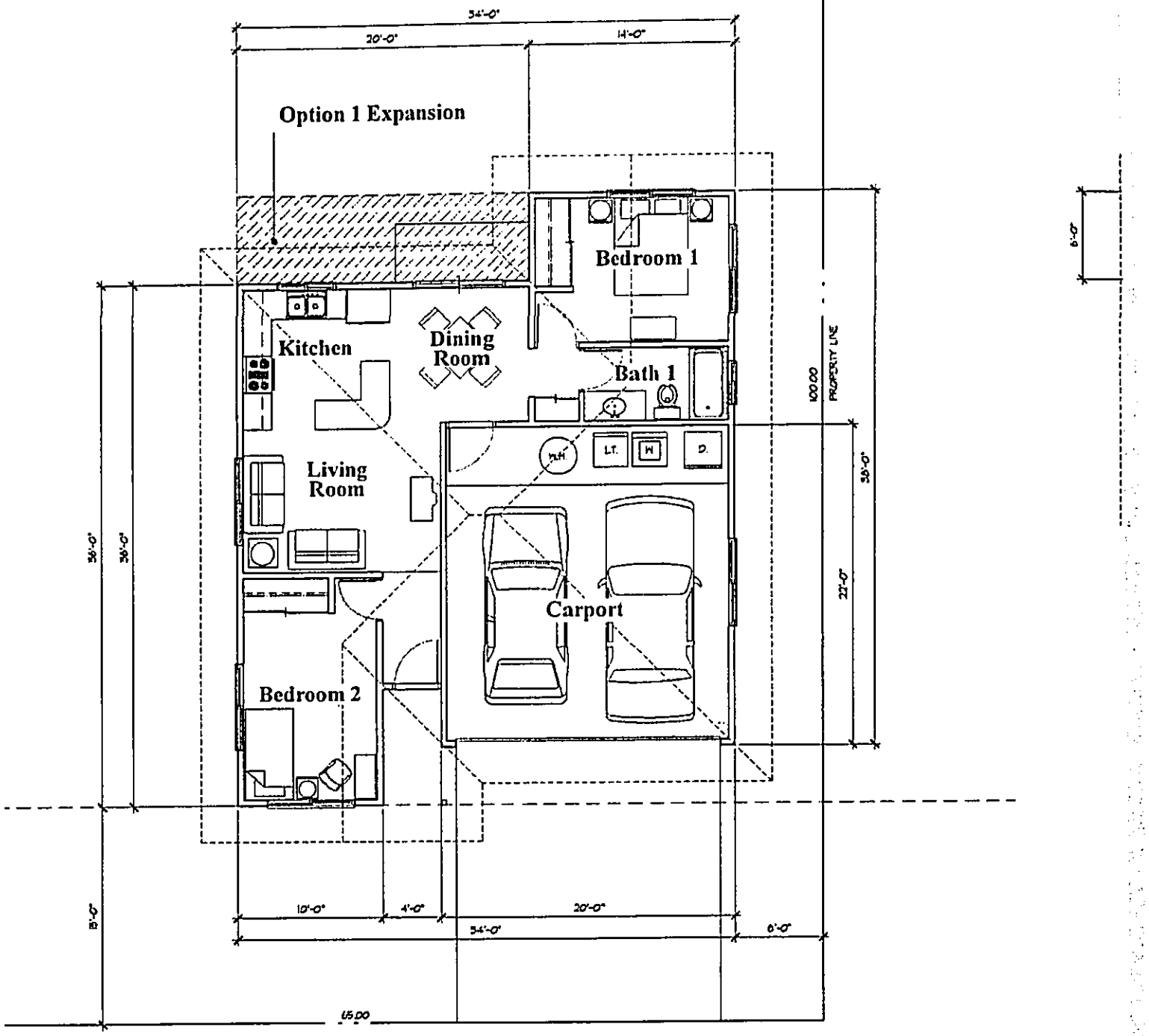
= 915 cfs

Reference: Rules for the Design of Storm Drainage Facilities in the County of Maui, Department of Public Works and Wastewater Management, County of Maui, 1995

Austin, Tsutsumi & Associates, Inc. • Civil Engineers • Surveyors
1871 Wili Pa Loop • Suite A • Wailuku, HI 96793 • (808) 244-8044

REDUCED IN
FILE

RECEIVED AS FOLLOWS



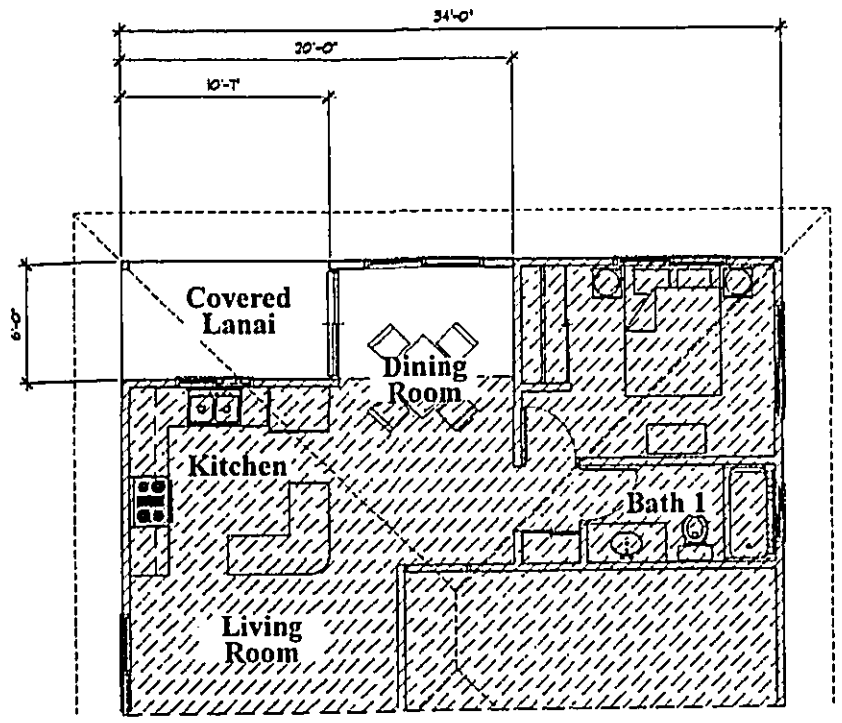
Source: GYA Architects, Inc.

Figure 5

Proposed Waiehu Kou 4 Subdiv
Model "A" (Ulu) Floor Plan

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS



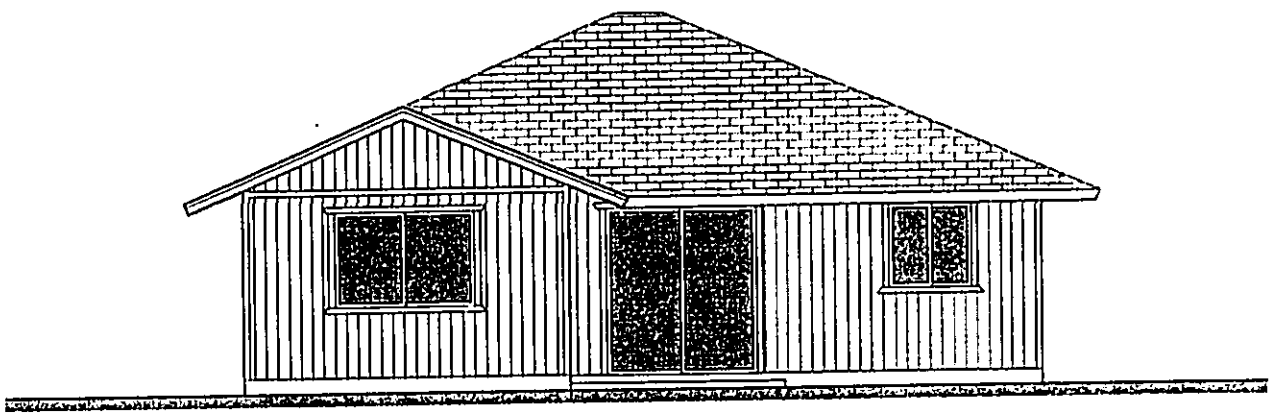
Option 1 Expansion

ubdivision
Plan

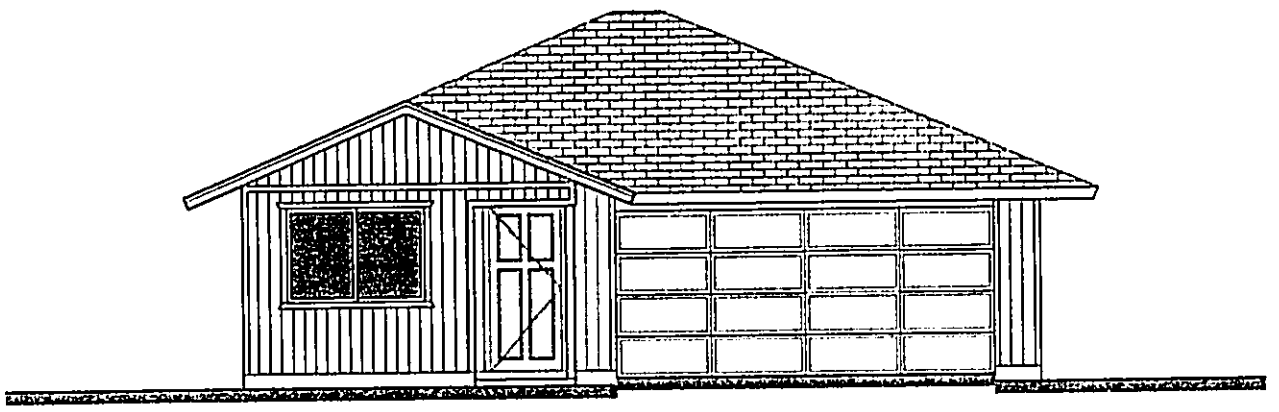
NOT TO SCALE

MUNEKIYO HIRAGA, INC.

RECEIVED AS FOLLOWS



Rear Elevation



Front Elevation

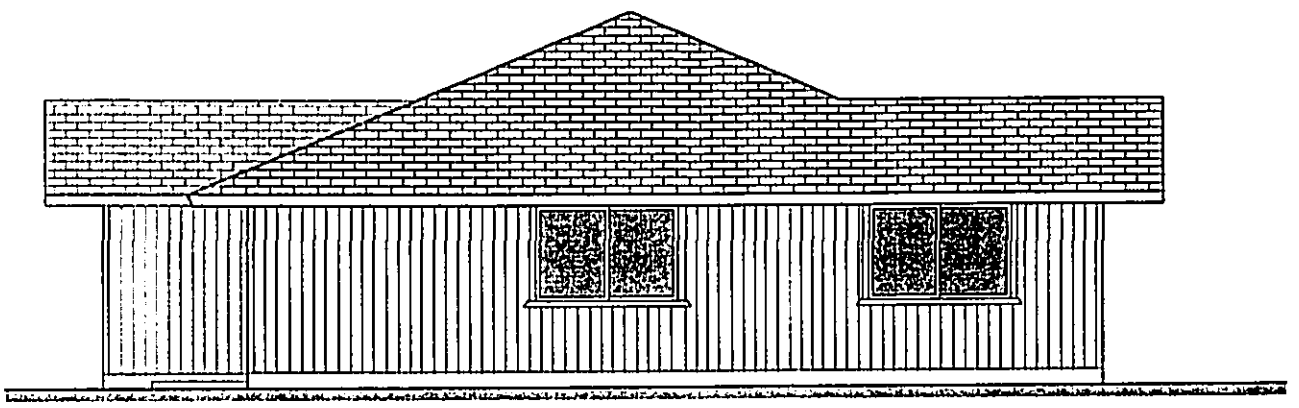
Source: GYA Architects, Inc.

Figure 6

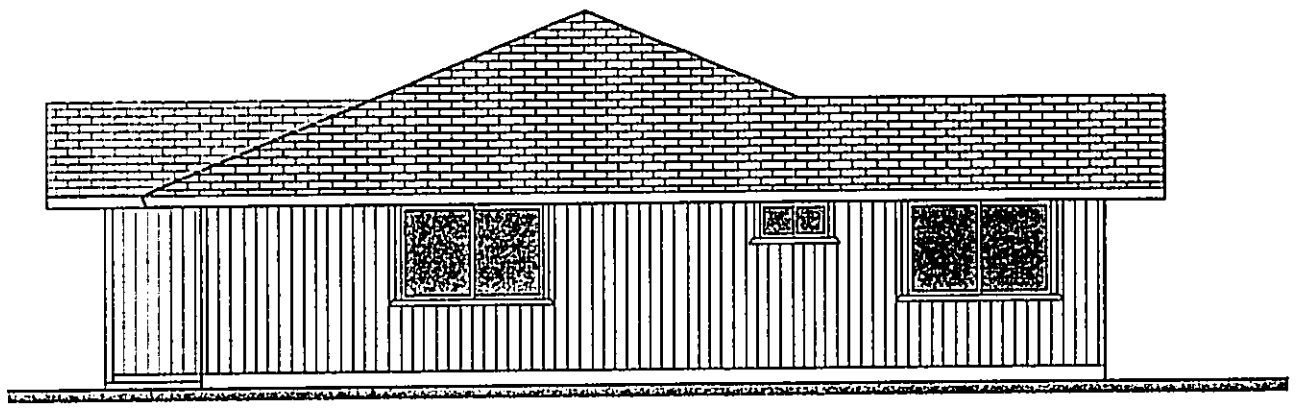
Proposed Waiehu K
Model "A" (Ulu

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS



Left Elevation



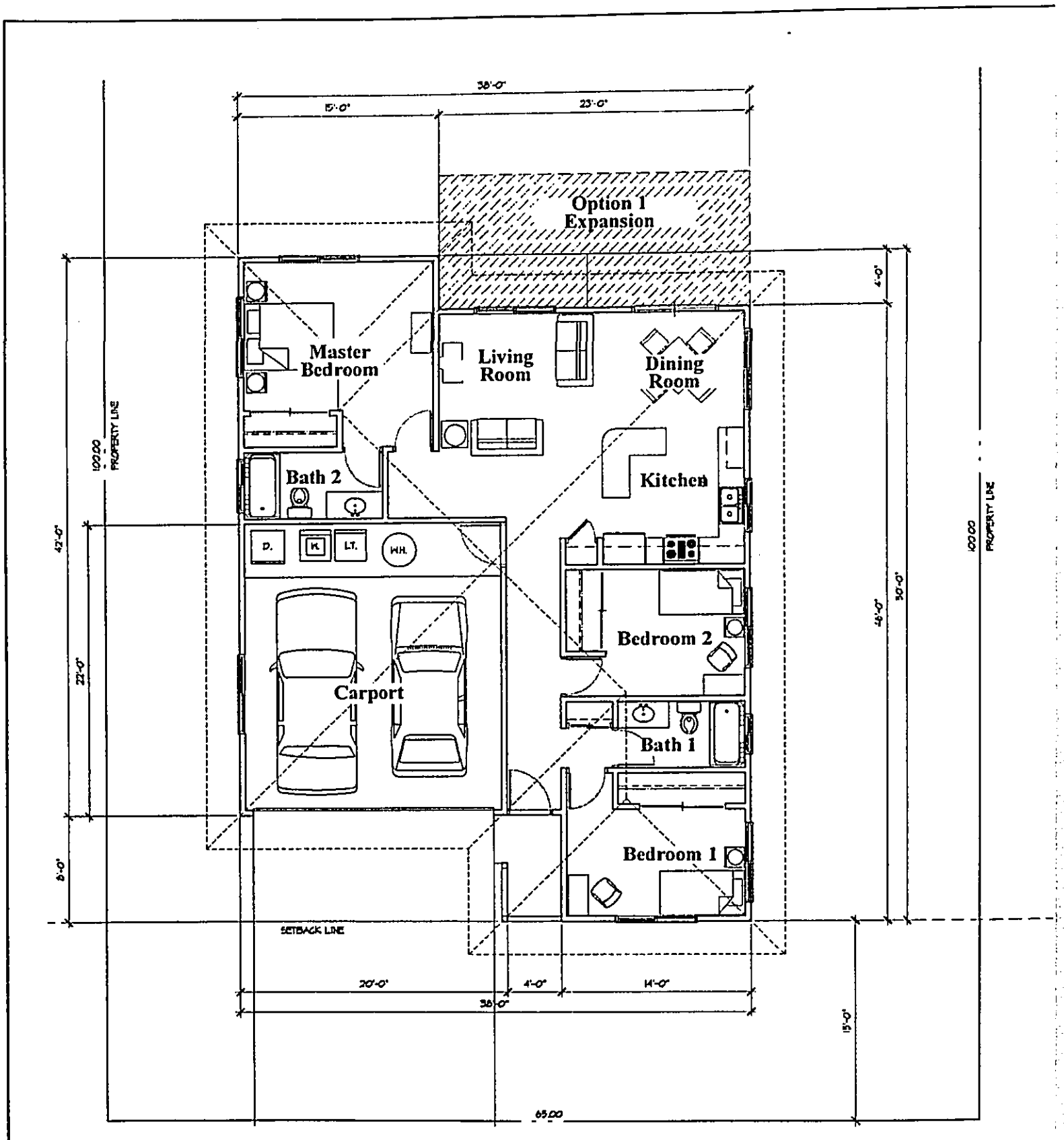
Right Elevation

ehu Kou 4 Subdivision
A" (Ulu) Elevations

NOT TO SCALE

MUNEKIYO HIRAGA, INC.

RECEIVED AS FOLLOWS



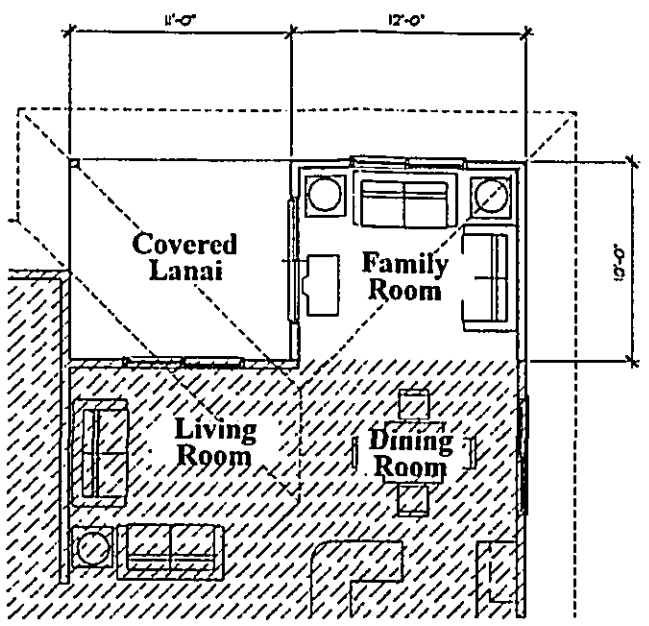
Source: GYA Architects, Inc.

Figure 7

Proposed Waiehu Kou 4 Subdivi
Model "B" (Kamani) Floor Plan

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS



Option 1 Expansion

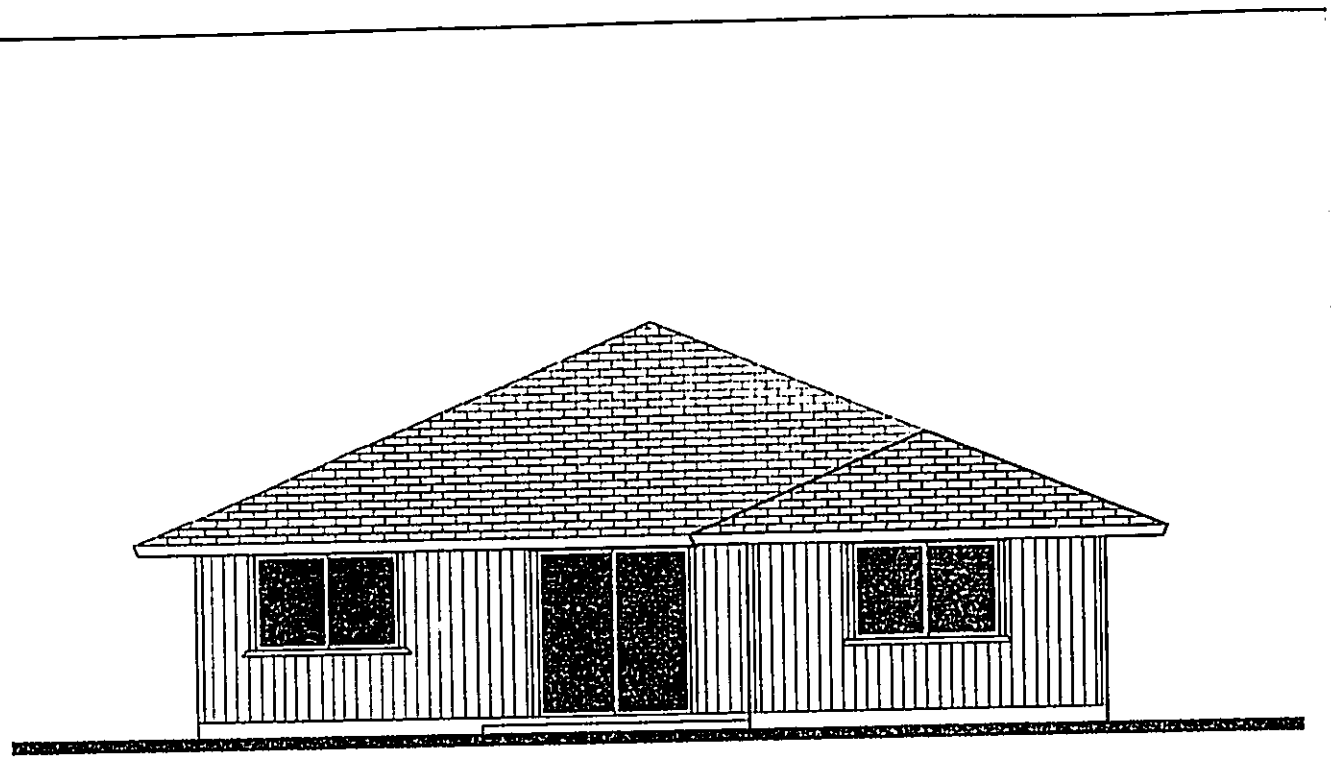
100.00 PROPERTY LINE

ubdivision
r Plan

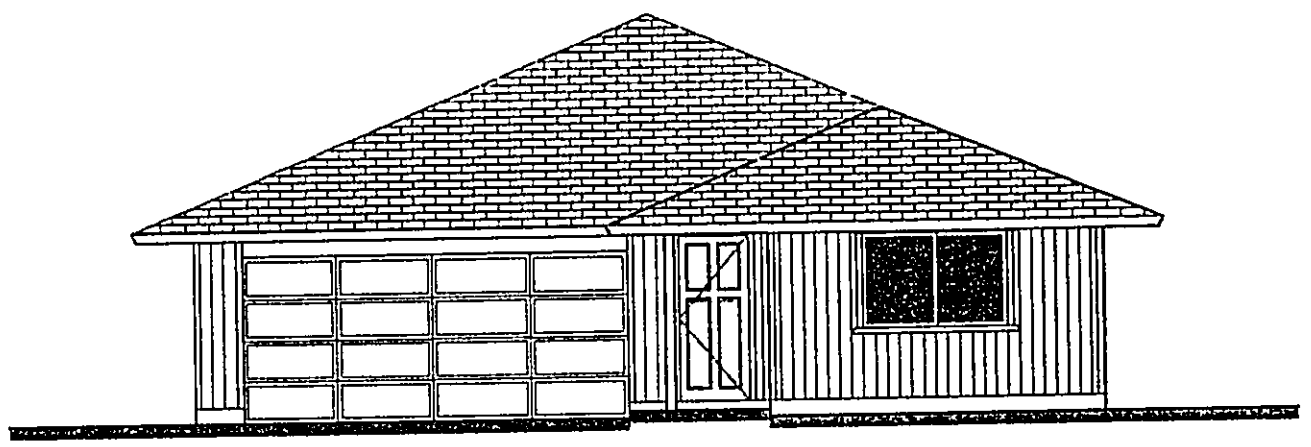
NOT TO SCALE

MUNEKIYO HIRAGA, INC.

RECEIVED AS FOLLOWS



Rear Elevation



Front Elevation

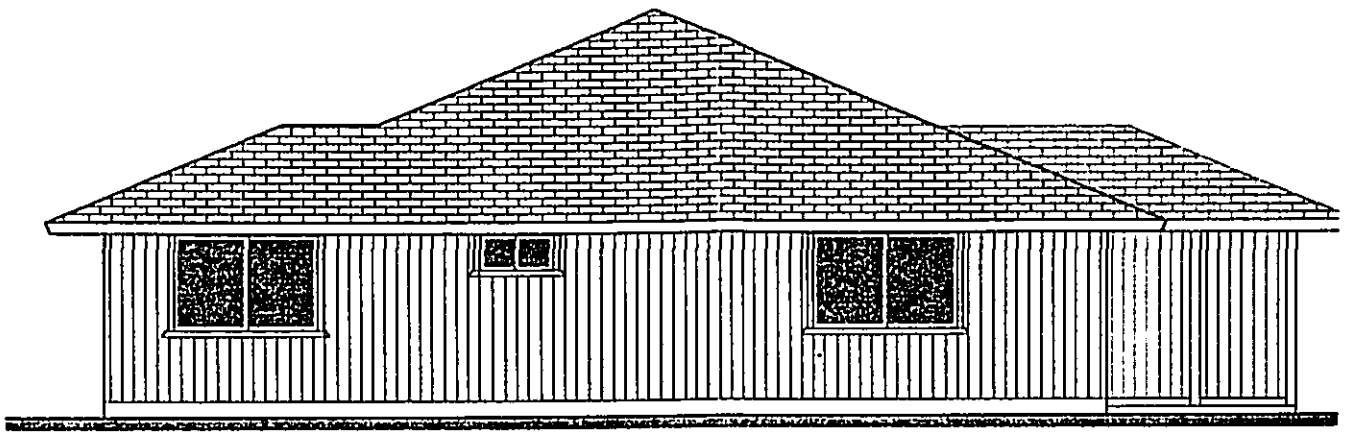
Source: GYA Architects, Inc.

Figure 8

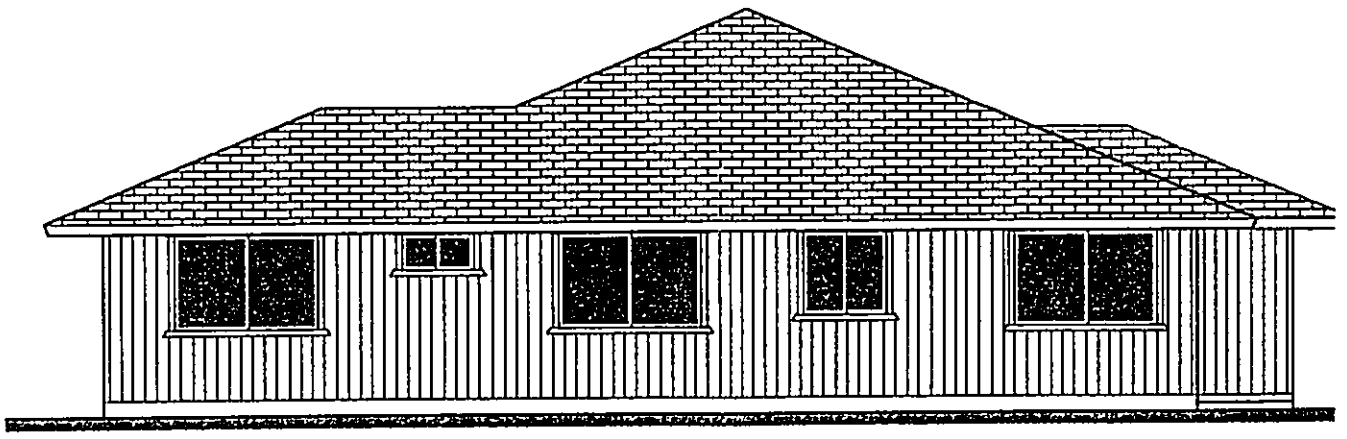
Proposed Waiehu
Model "B" (Ka

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS



Left Elevation



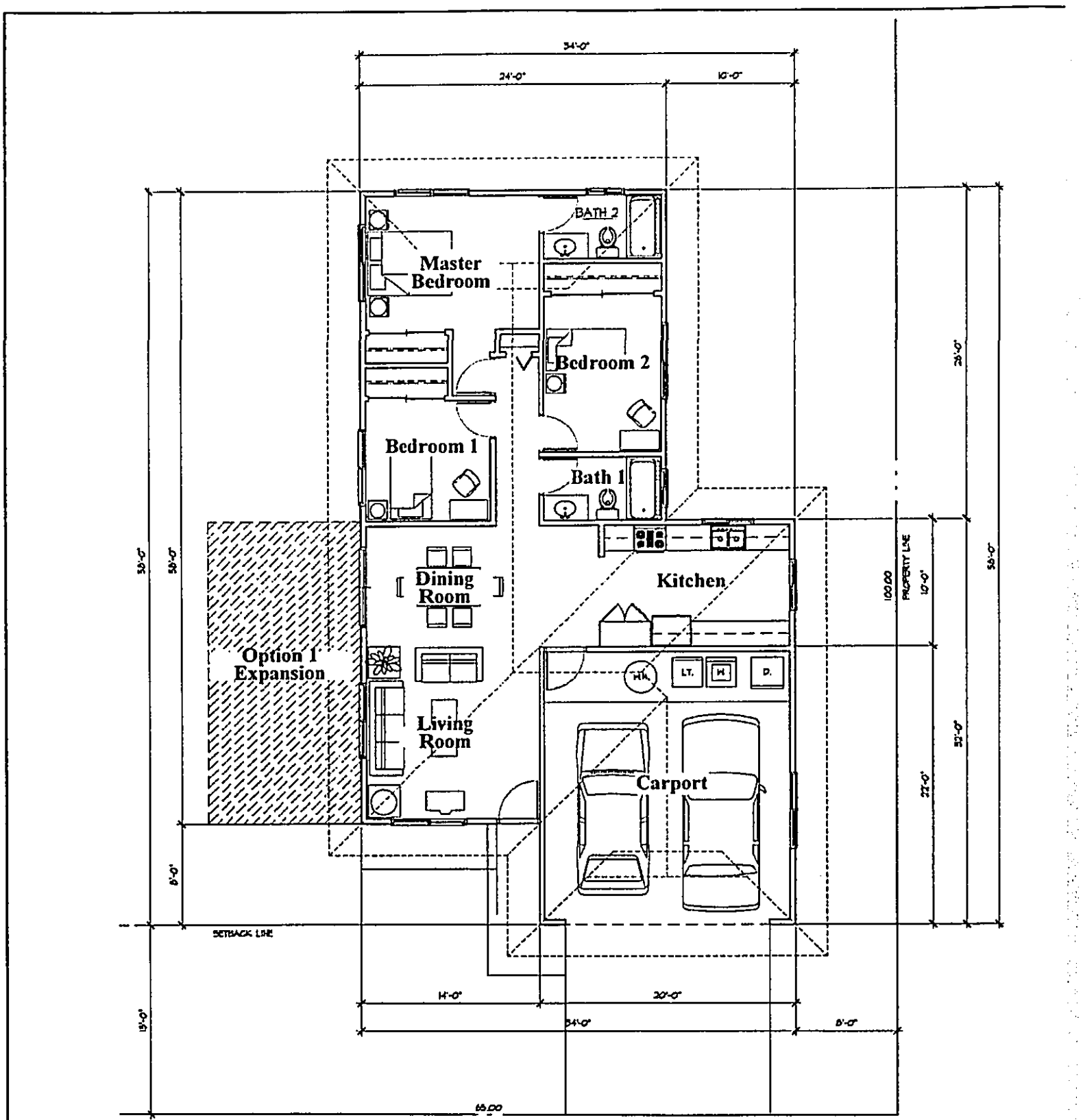
Right Elevation

iehu Kou 4 Subdivision
3" (Kamani) Elevations

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

RECEIVED AS FOLLOWS



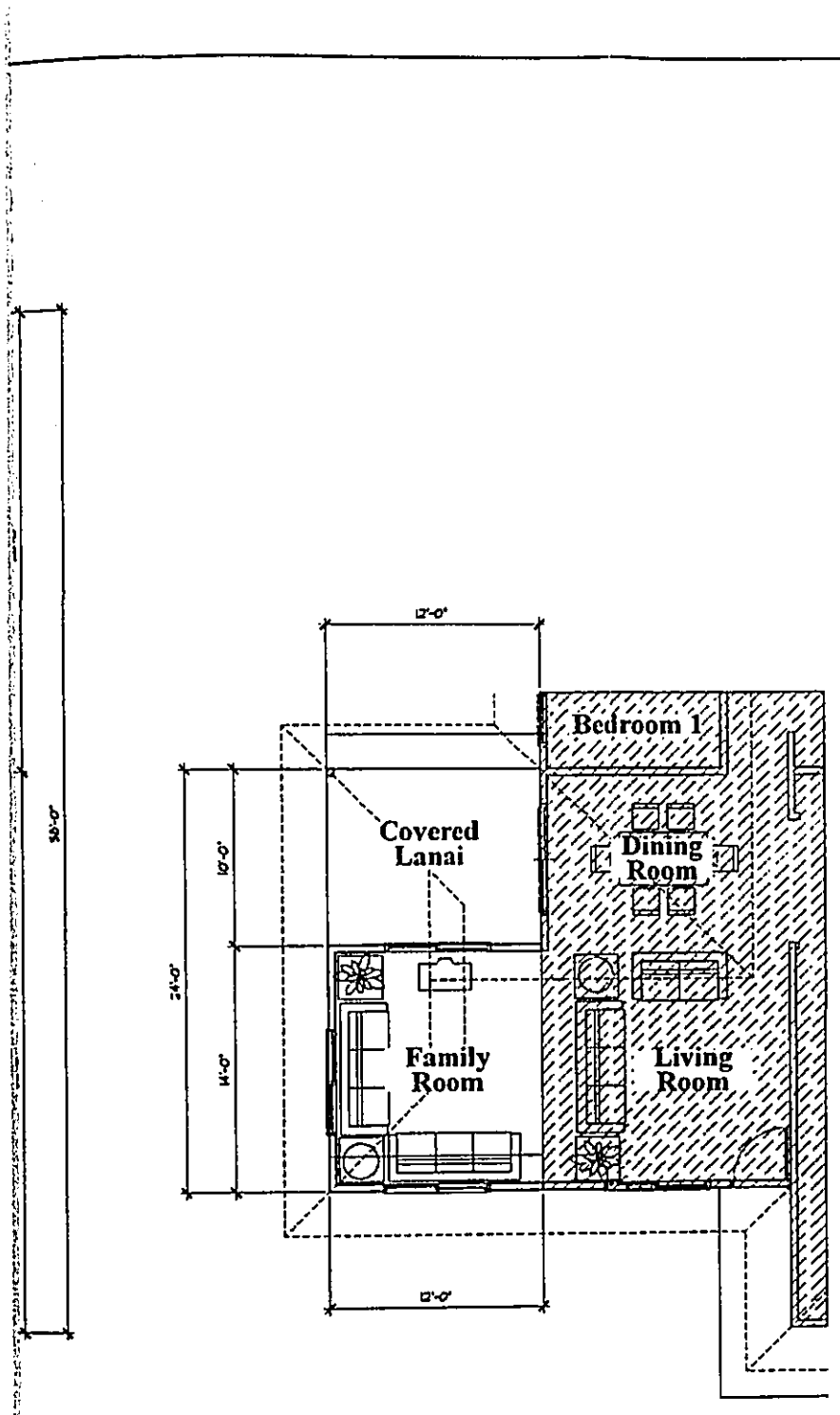
Source: GYA Architects, Inc.

Figure 9

Proposed Waiehu Kou 4 Subdiv
Model "C" (Ohia) Floor Plan

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS

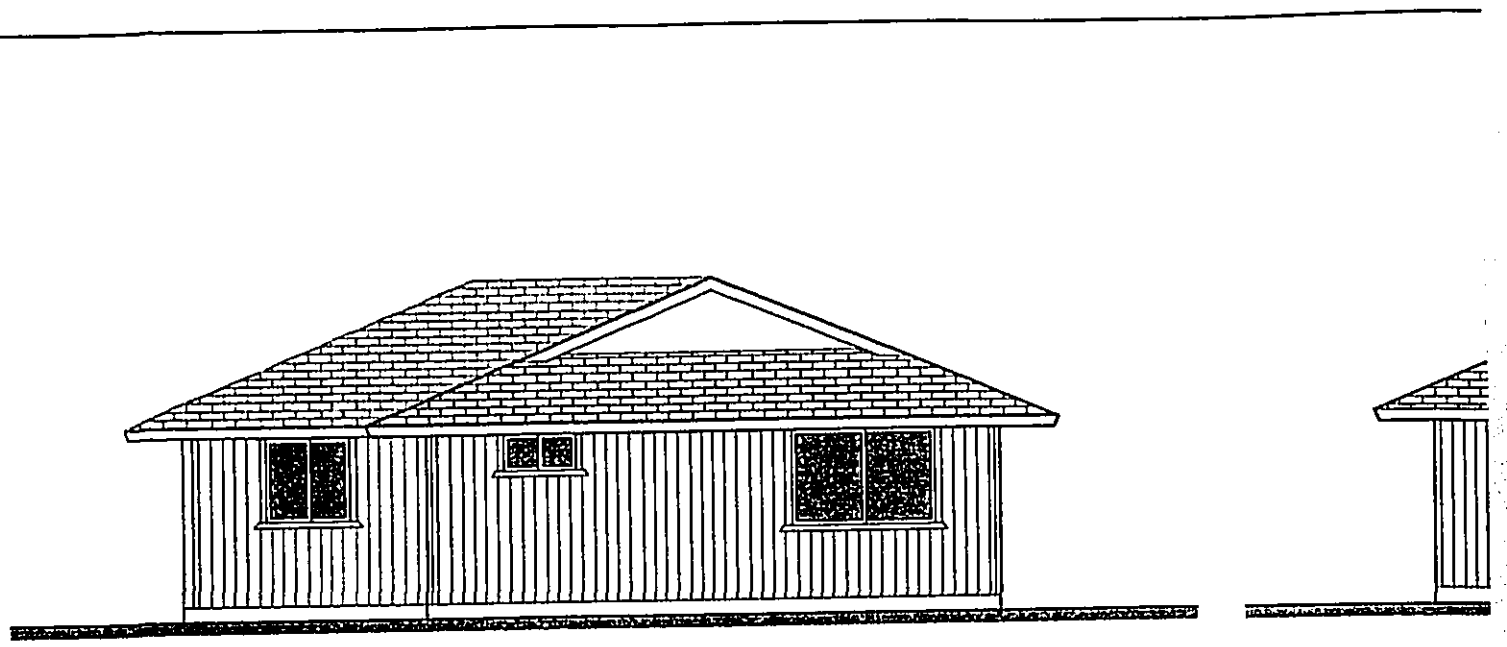


Subdivision Plan

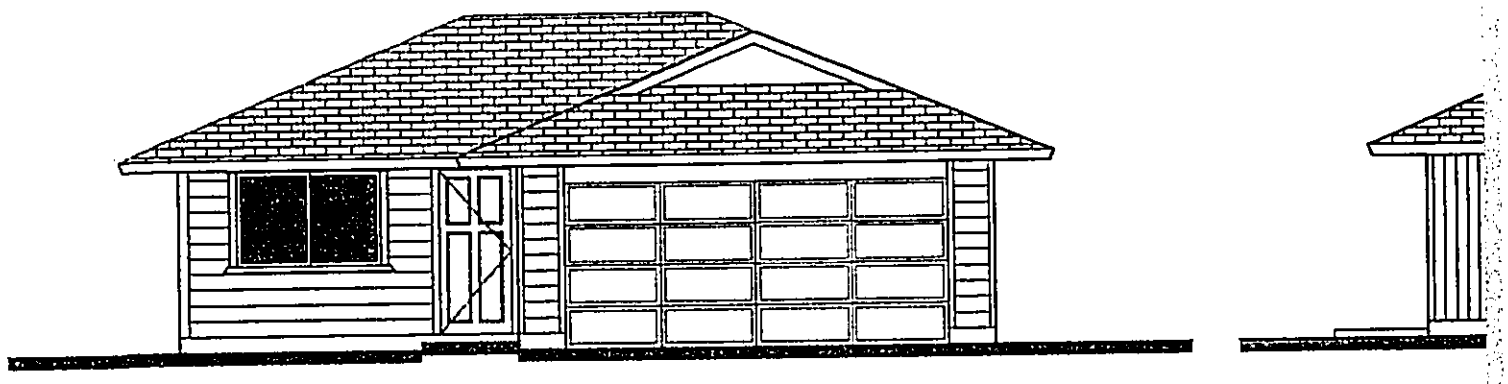
NOT TO SCALE

MUNEKIYO HIRAGA, INC.

RECEIVED AS FOLLOWS



Rear Elevation



Front Elevation

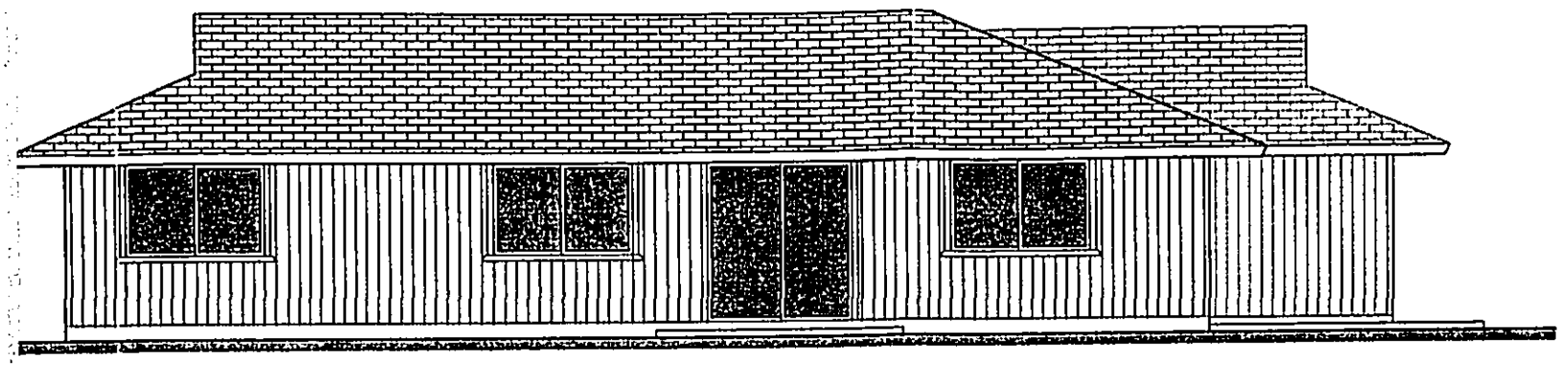
Source: GYA Architects, Inc.

Figure 10

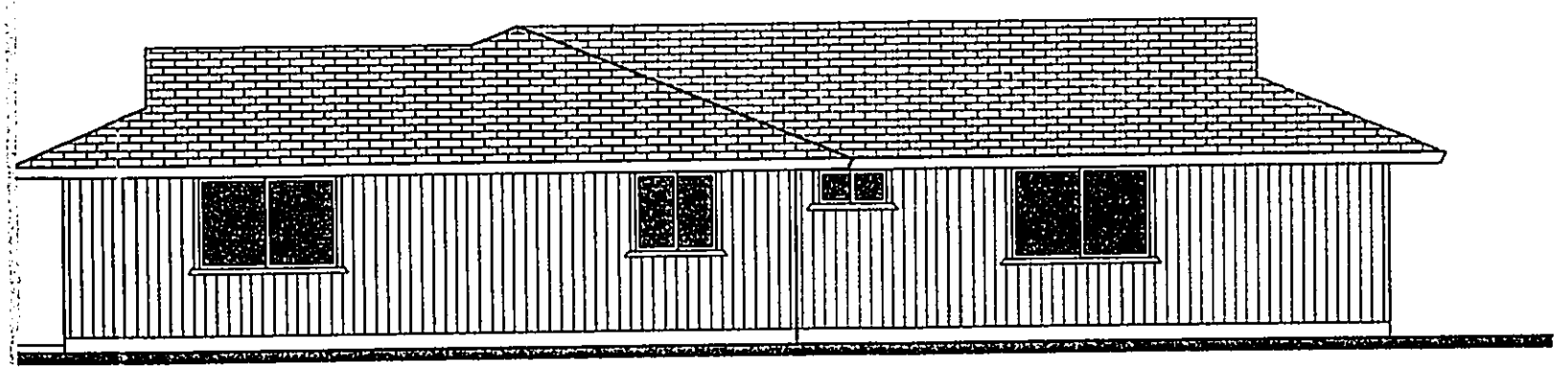
Proposed Waiehu K
Model "C" (Oh

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS



Left Elevation



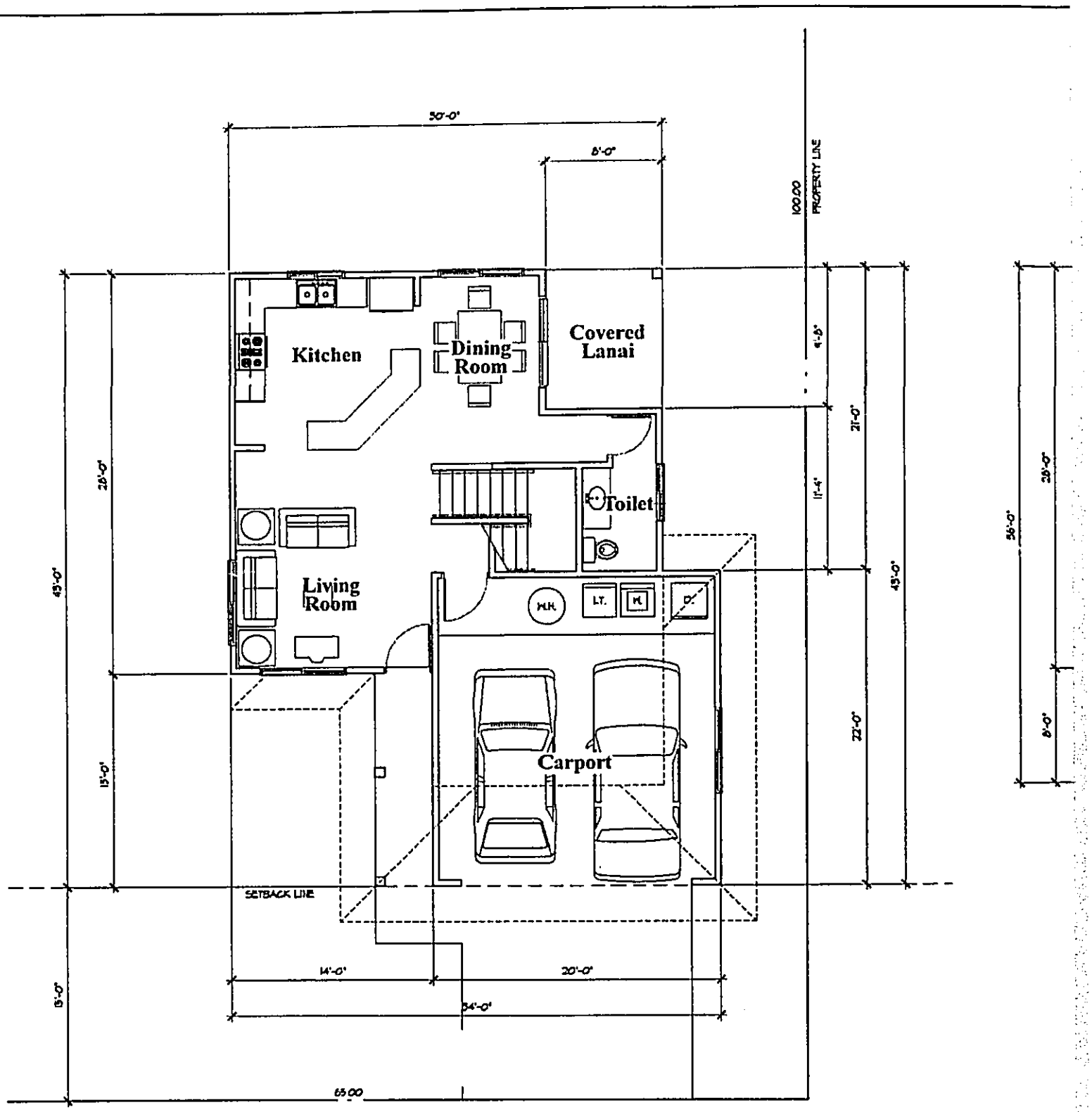
Right Elevation

hu Kou 4 Subdivision
" (Ohia) Elevations

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

RECEIVED AS FOLLOWS



First Floor Plan

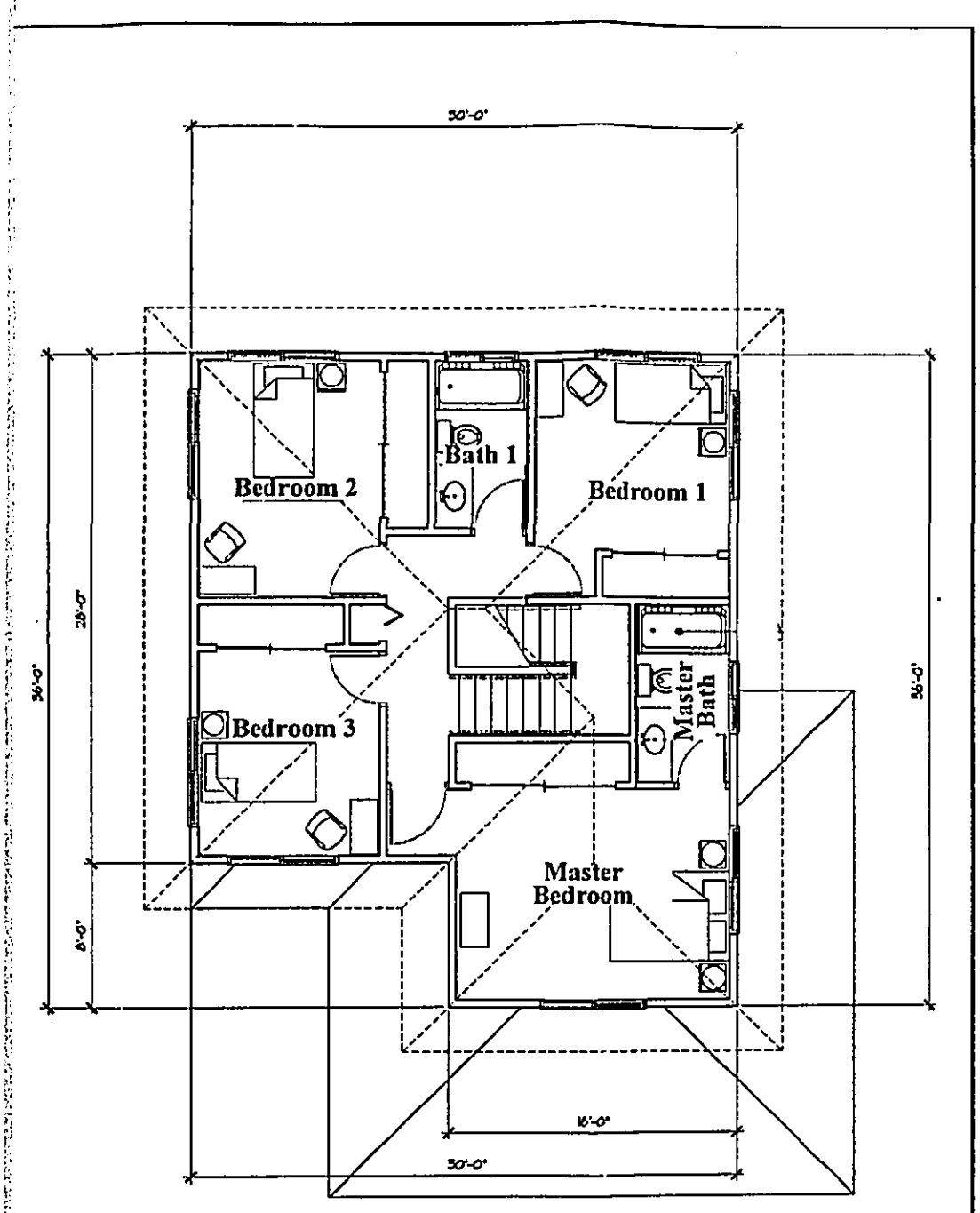
Source: GYA Architects, Inc.

Figure 11

Proposed Waiehu Kou 4 Subdivi
Model "D" (Koa) Floor Plan

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS



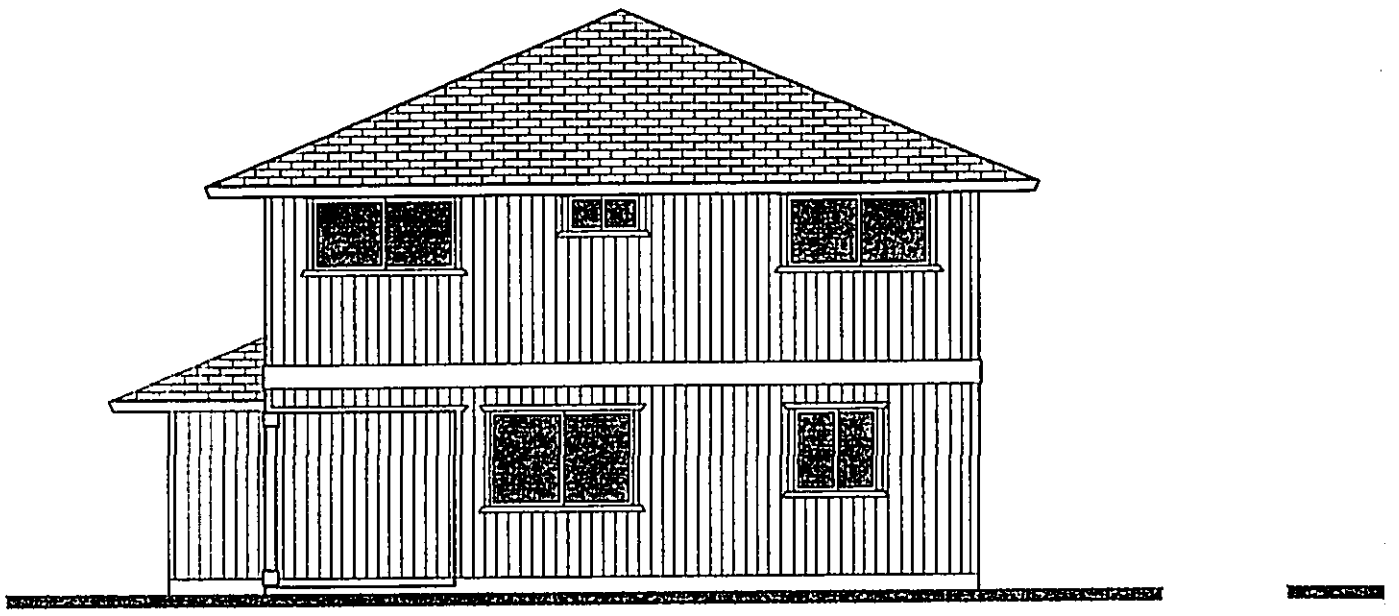
Second Floor Plan

ıbdivision
lan

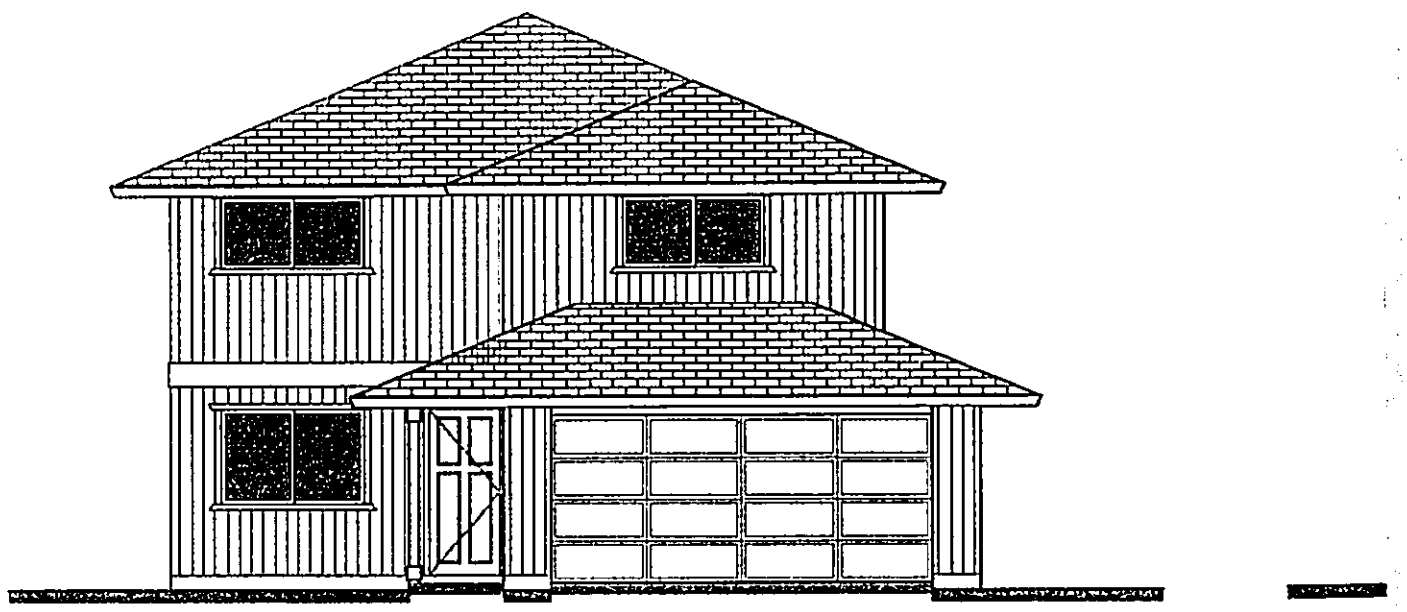
NOT TO SCALE

MUNEKIYO HIRAGA, INC.

RECEIVED AS FOLLOWS



Rear Elevation



Front Elevation

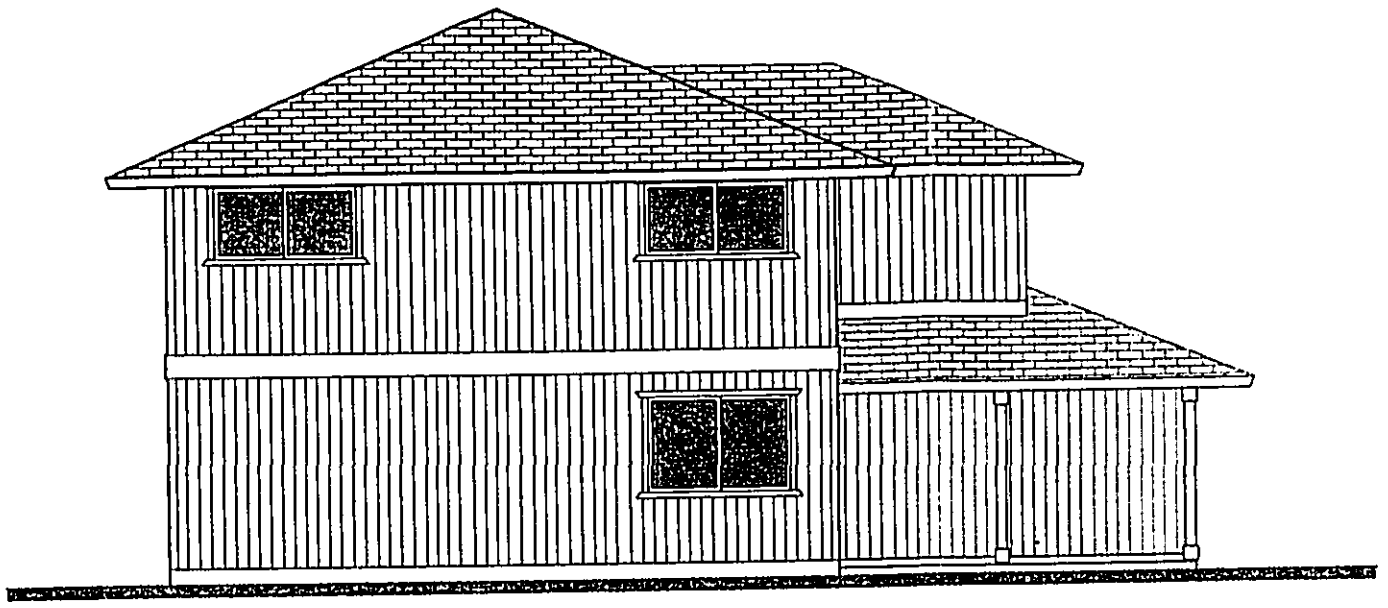
Source: GYA Architects, Inc.

Figure 12

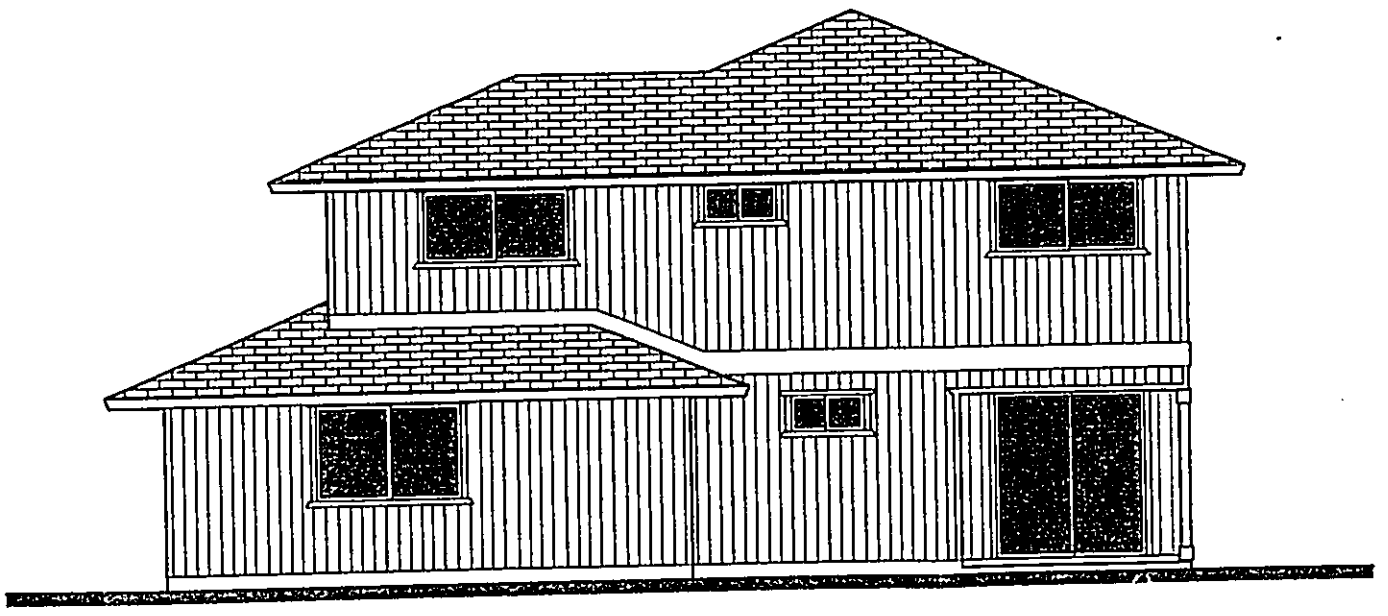
Proposed Waiehu
Model "D" (K

Prepared for: WK3, LLC and Department of Hawaiian Home Lands

RECEIVED AS FOLLOWS



Left Elevation



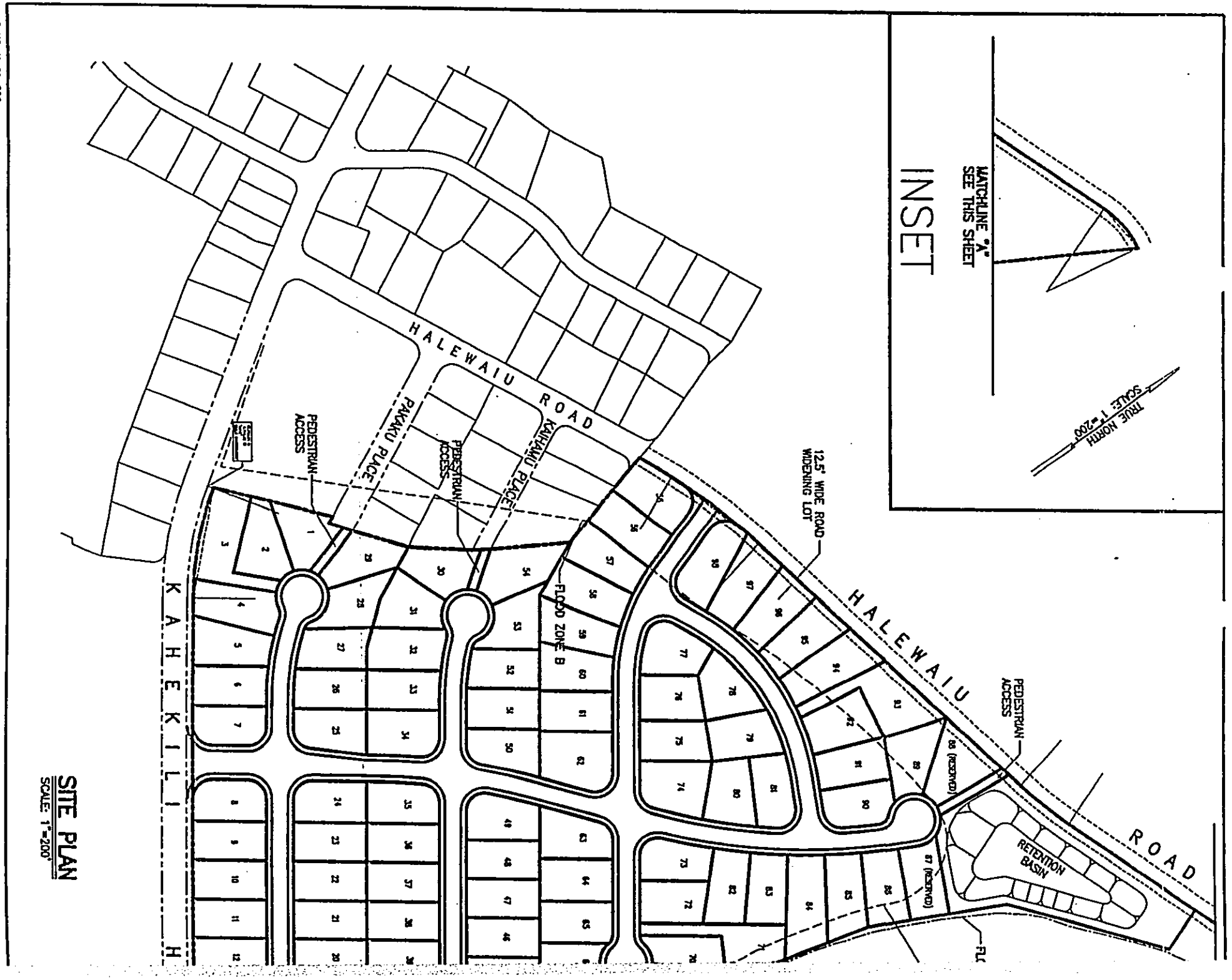
Right Elevation

iehu Kou 4 Subdivision
'D" (Koa) Elevations

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

RECEIVED AS FOLLOWS



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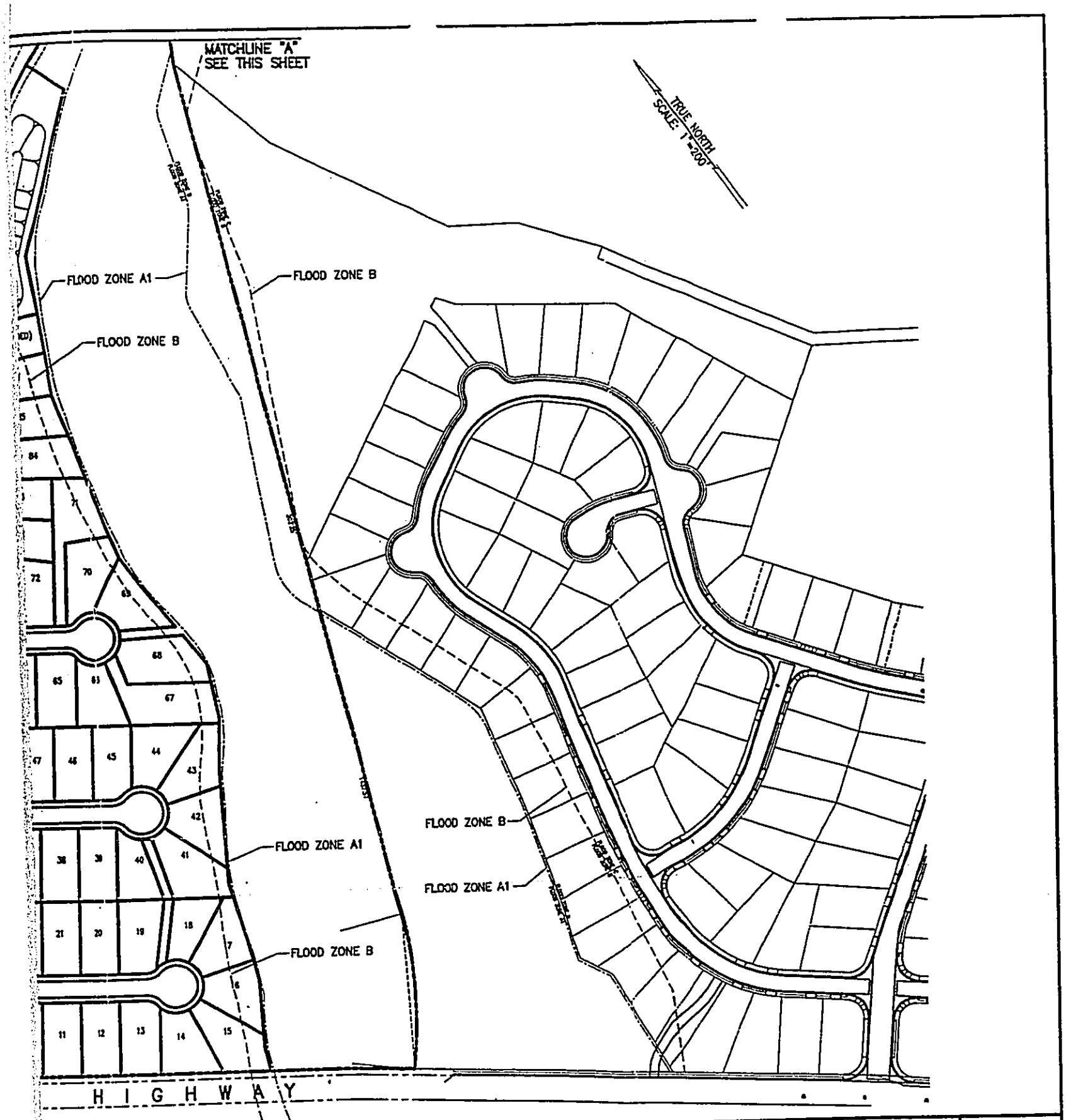

PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII

SITE PLAN

EXHIBIT 2

March, 2004

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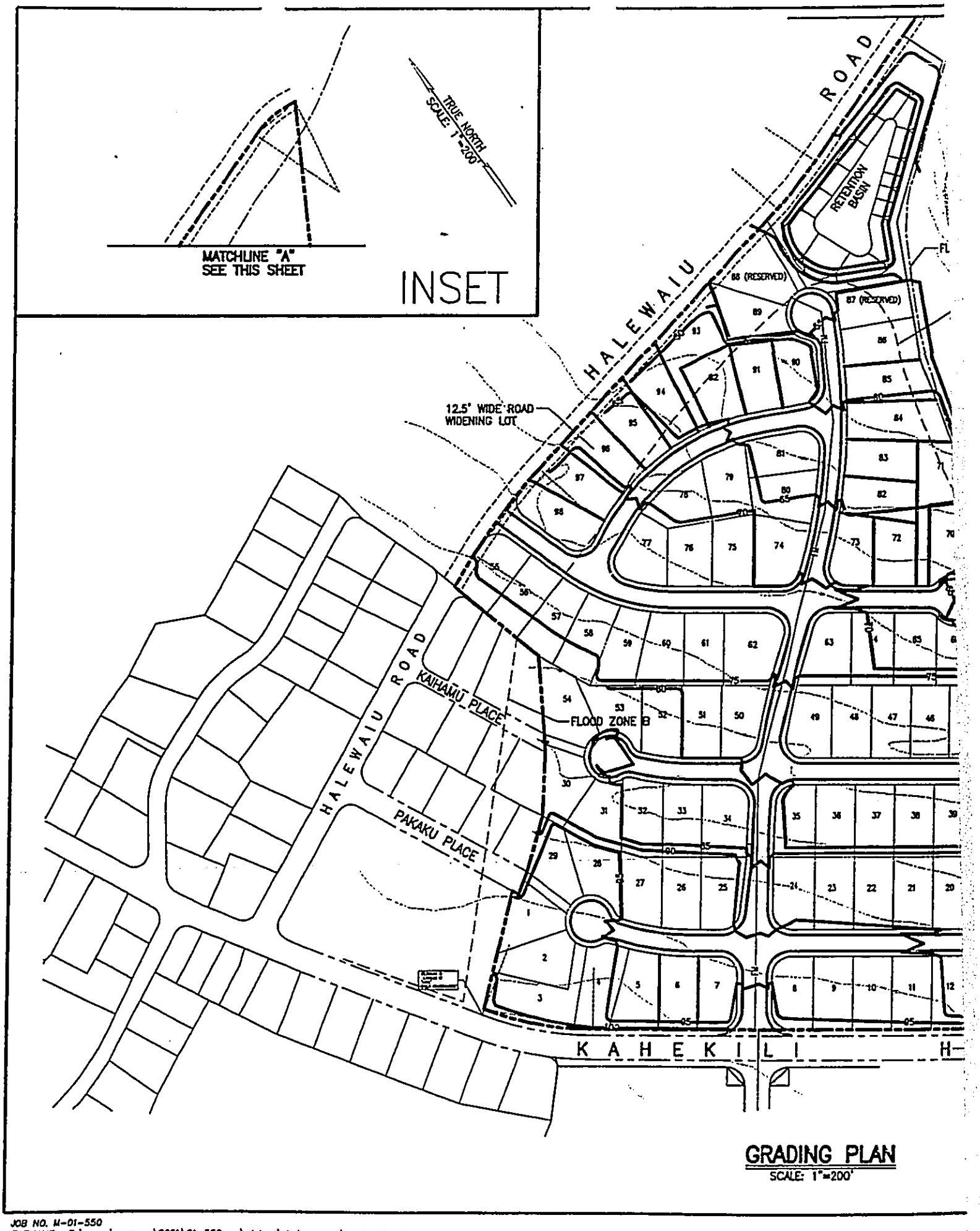
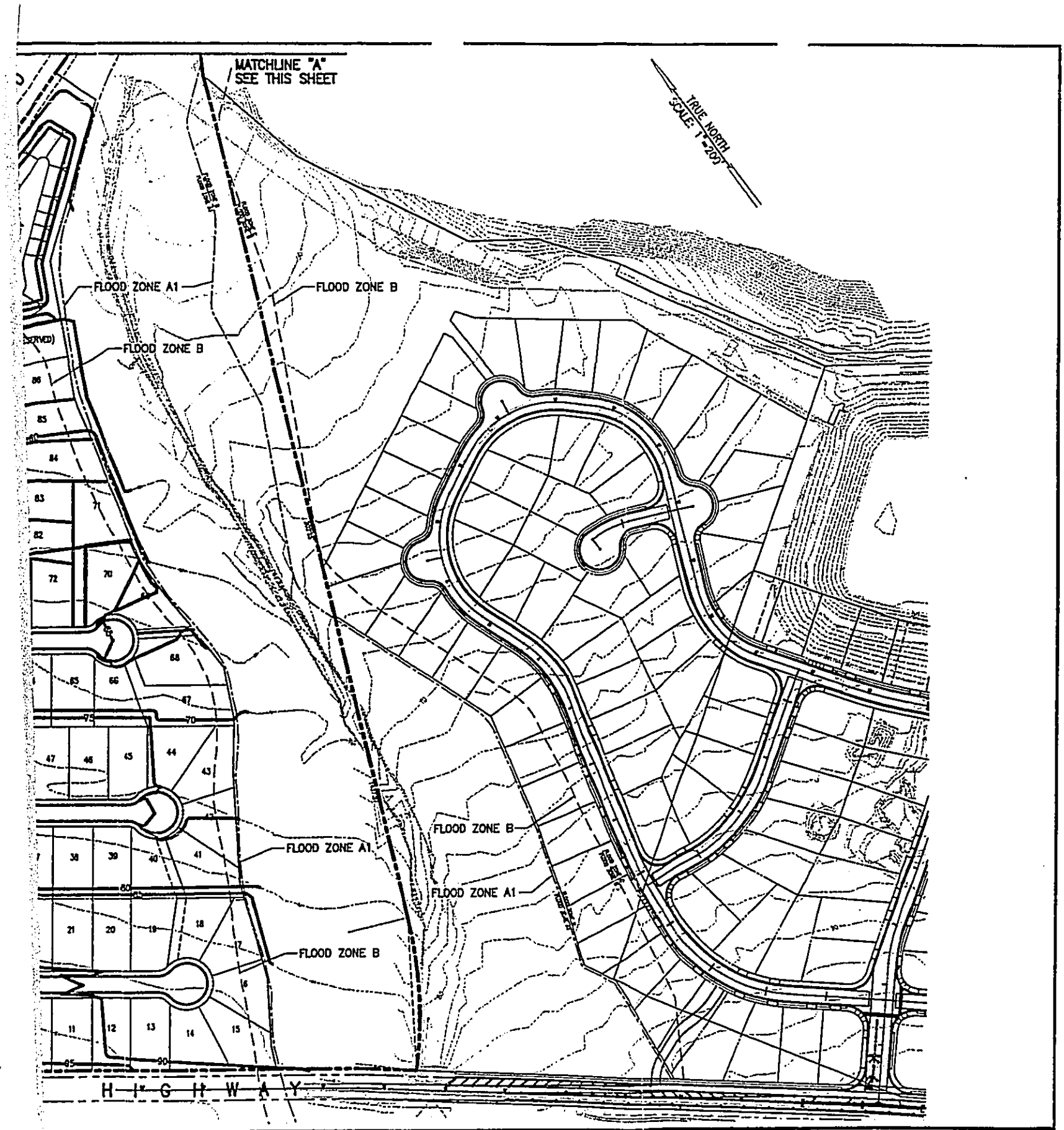


GRADING PLAN
SCALE: 1"=200'

JOB NO. M-01-550
FILENAME : Z:\users\everyone\2001\01-550-ny\wk4per\drain_report\grade-plan.dwg

RECEIVED AS FOLLOWS



PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII

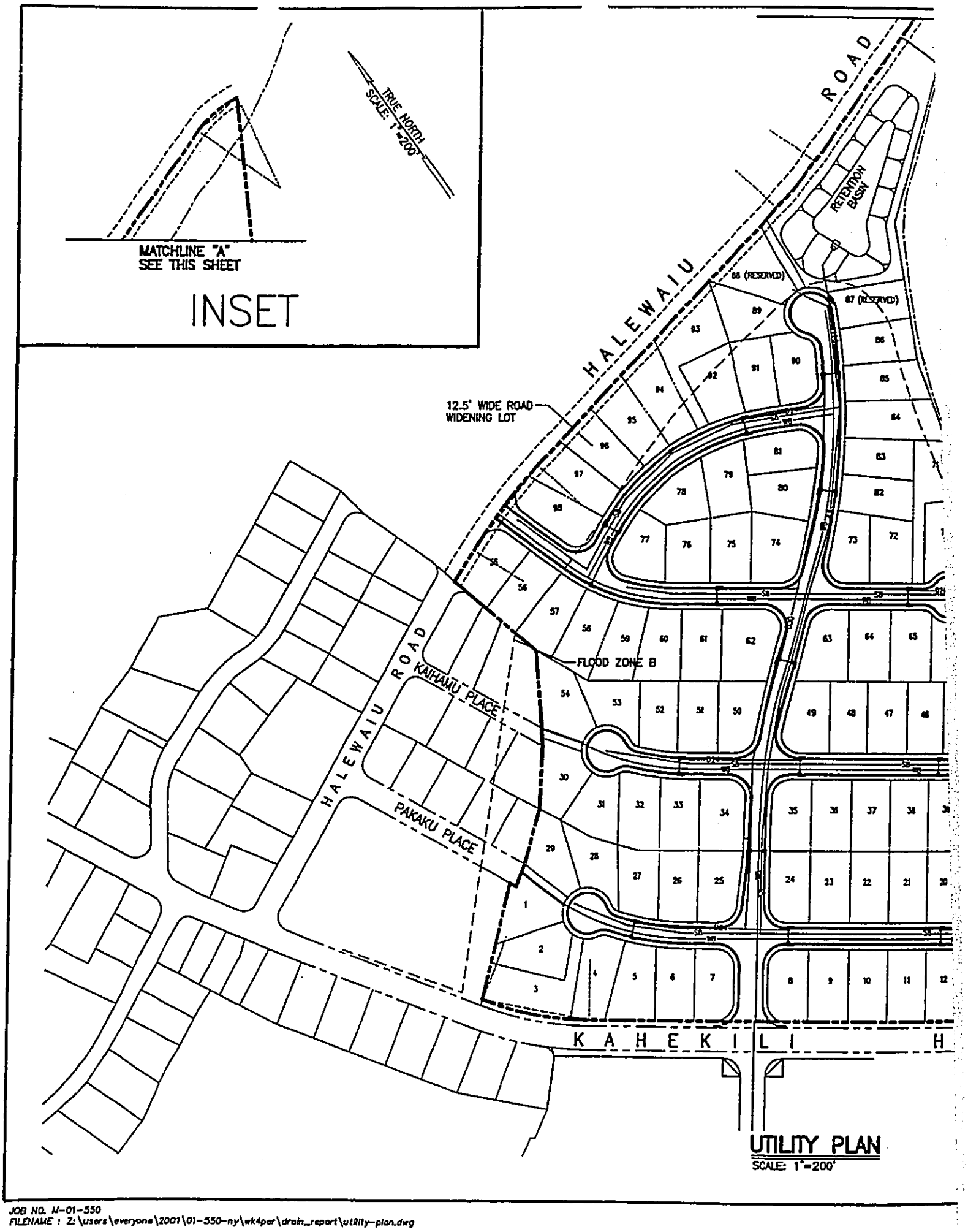
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII

PRELIMINARY GRADING PLAN

EXHIBIT 3

March, 2004

RECEIVED AS FOLLOWS



JOB NO. M-01-550
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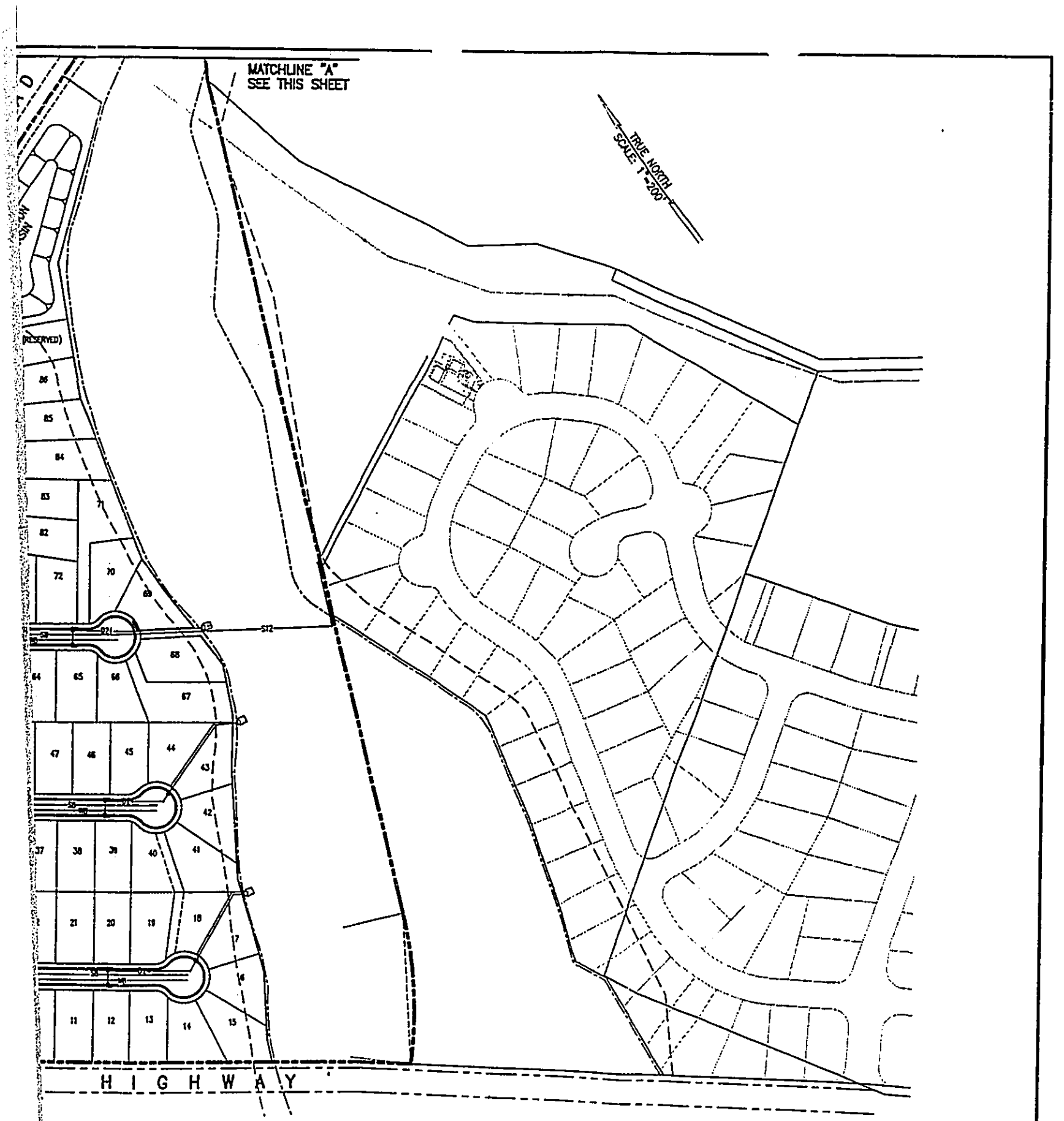


PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII

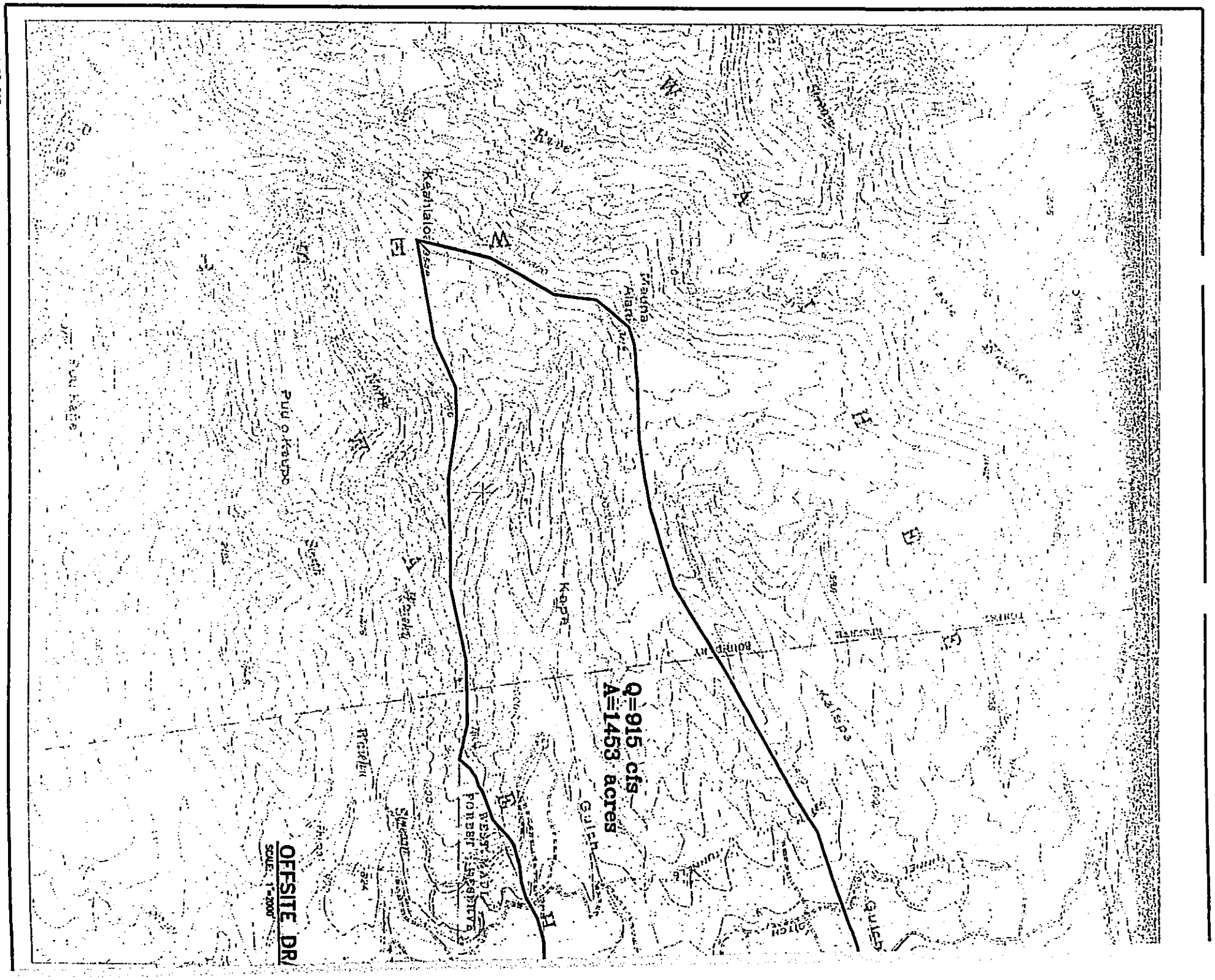
AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII

PRELIMINARY UTILITY PLAN

EXHIBIT 4

March, 2004

RECEIVED AS FOLLOWS



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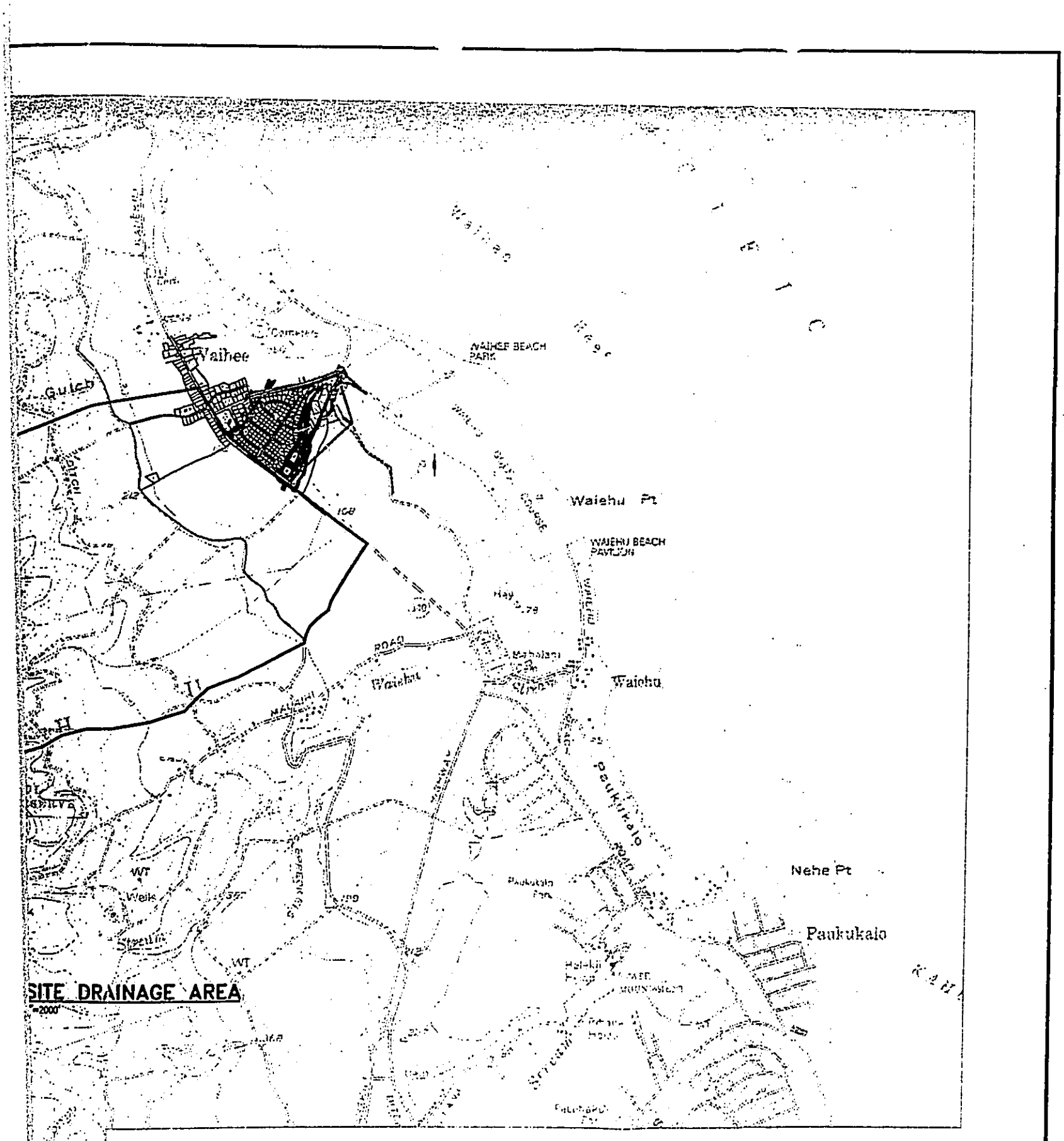


PRELIMINARY ENGINEERING REPORT WAIEHU KOU RESIDENCE LOTS, PHASE 4 WAIEHU, WAILUKU, MAUI, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU, HILO, WAILUKU, HAWAII **OFFSITE DRAINAGE AREA** **50YR – 1HR**	EXHIBIT 5

March, 2004

RECEIVED AS FOLLOWS

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 150 OF 480
SEE MAP INDEX FOR PANELS NOT PRINTED

COMMUNITY-PANEL NUMBER
150003 0150 B
EFFECTIVE DATE:
JUNE 1, 1981

federal emergency management agency
federal insurance administration

NATIONAL FLOOD INSURANCE PROGRAM

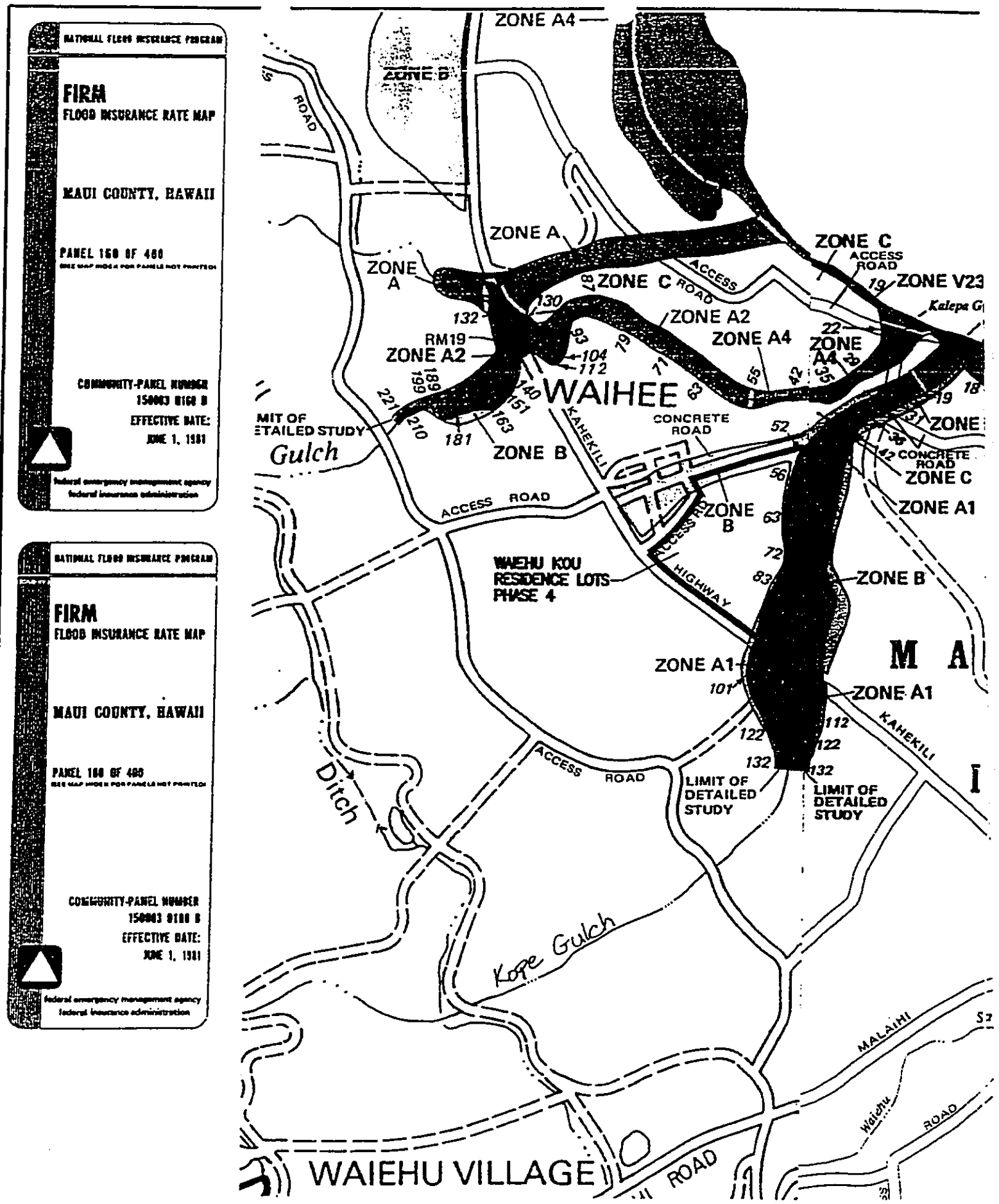
FIRM
FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 160 OF 480
SEE MAP INDEX FOR PANELS NOT PRINTED

COMMUNITY-PANEL NUMBER
150003 0160 B
EFFECTIVE DATE:
JUNE 1, 1981

federal emergency management agency
federal insurance administration



JOB NO. M-01-550
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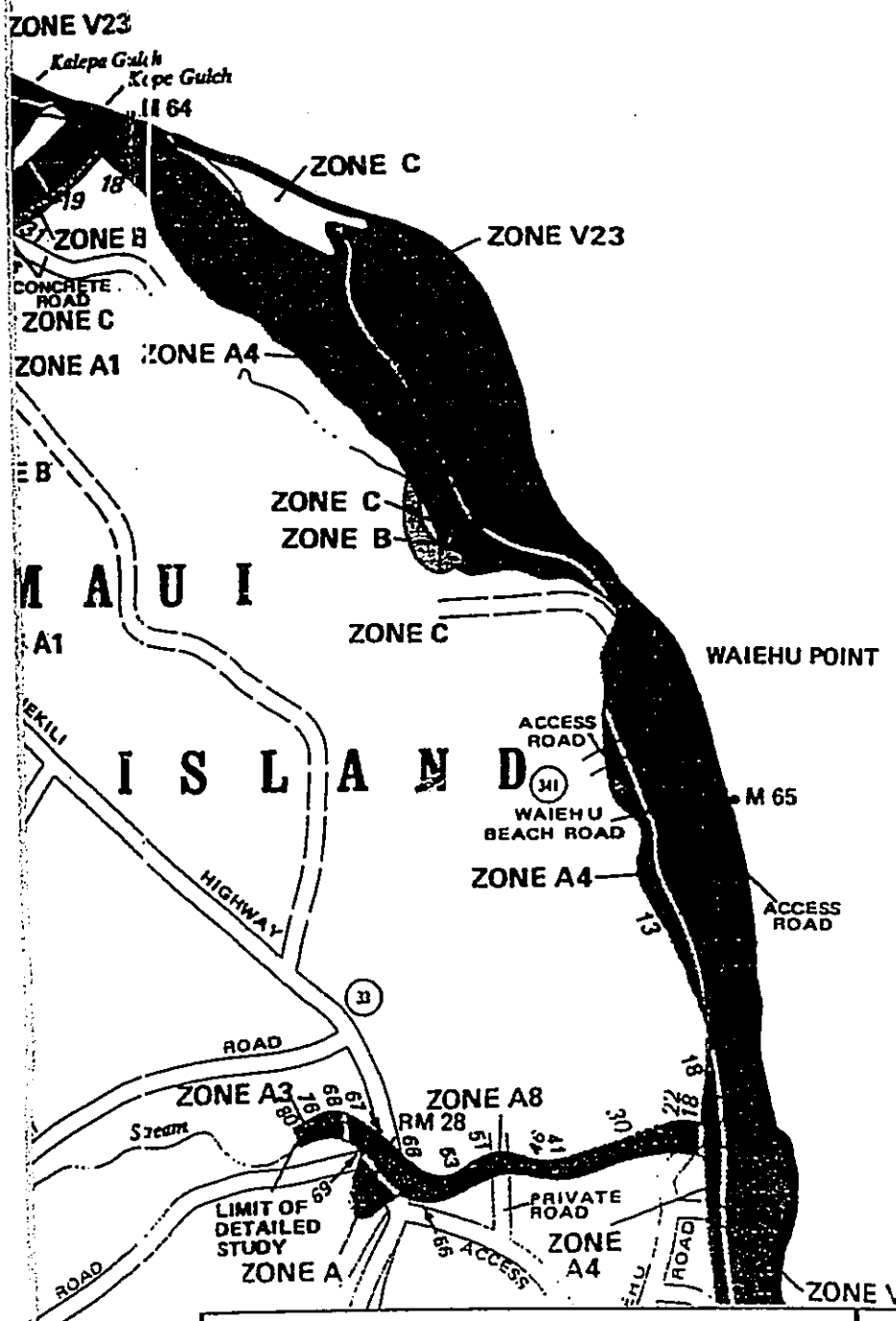
RECEIVED AS FOLLOWS

APPROXIMATE SCALE

1000 0 1000 FEET



*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
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B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

KEY TO MAP

500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations* With Date of Identification e.g., 12/2/74

ZONE B

ZONE B

100-Year Flood Boundary

500-Year Flood Boundary

Base Flood Elevation Line With Elevation In Feet** 513

Base Flood Elevation in Feet Where Uniform Within Zone** (EL 987)

Elevation Reference Mark RM7 ×

Coastline Mile • M 20

**Referenced to the National Geodetic Vertical Datum of 1929

PRELIMINARY ENGINEERING REPORT
WAIEHU KOU RESIDENCE LOTS, PHASE 4
WAIEHU, WAILUKU, MAUI, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS HONOLULU, WAILUKU, HAWAII

FLOOD ZONE PLAN

EXHIBIT 6

March, 2004