

Draft Environmental Assessment

PROPOSED WAIEHU MAUKA AFFORDABLE HOUSING PROJECT (TMK No. 3-3-001:016(por.) and 102)

Prepared for:

Lokahi Pacific

Approving Agency:

**County of Maui
Department of Housing and Human Concerns**

October 2009



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Executive Summary

Project Name: Waiehu Mauka Affordable Housing Project

Type of Document: Draft Environmental Assessment

Legal Authority: Chapter 343, Hawaii Revised Statutes

Anticipated Determination: Finding of No Significant Impact (FONSI)

Applicable Environmental Assessment review “Trigger”: Proposed Use of County Lands and Funds

Location: Maui Island
Wailuku
TMK No. 3-3-001:016(por.) and 102

Landowner: Parcel 102: Goodfellow Brothers, Inc. and Lokahi Pacific

Parcel 016 (por.): Kehalani Holdings Company, Inc.
(Access easement)

Applicant: Lokahi Pacific

Approving Agency: Department of Housing and Human Concerns
200 South High Street
Wailuku, Hawaii 96793
Contact: Lori Tshako, Director
Phone: (808) 270-7805

Consultant: Munekiyo & Hiraga, Inc. (under contract to Lokahi Pacific)
305 High Street, Suite 104
Wailuku, Hawaii 96793
Contact: Carol Matasci, Planner
Phone: (808) 244-2015

Project Summary: Lokahi Pacific, in partnership with Pacific Rim Land, Inc., a subsidiary of Goodfellow Brothers, Inc., proposes to develop the Waiehu Mauka Affordable Housing project which involves the construction of 100 multi-family units housed in 20 buildings and six (6) single-family residential lots on an 8-acre parcel of unimproved land.

The multi-family units will be made affordable to households earning up to 120 percent of the area median income category. Access to the affordable units will be provided via Kahekili Highway at the property's western boundary. The project's six (6) single-family residential lots range from approximately 11,000 to 24,000 square feet in size and will be sold at market price. Access to the six (6) lots will be provided via an extension of Haunani Street in the Waiehu Heights Subdivision.

Parcel 102 is currently vacant and undeveloped. It was formerly used for the storage of excess construction materials during the development of the Waiehu Heights Subdivision, and has since been cleared and partially graded. Parcel 016 contains an easement providing access to Parcel 102. Parcel 102 (subject property) is located within the limits of the State Land Use "Agricultural" district. The Wailuku-Kahului Community Plan designates the subject property for "Single-Family" use, while the underlying county zoning is "Interim". The subject property is not located within the limits of Maui's Special Management Area.

Lokahi Pacific is pursuing the project to respond to the demand for affordable housing on the island of Maui. The proposed action will increase the supply of affordable housing, at a time when housing is expensive and in short supply on Maui. The total cost of the project is estimated at \$22 million for the condos and rentals, and \$335,550 for the single-family lots.

I. PROJECT OVERVIEW

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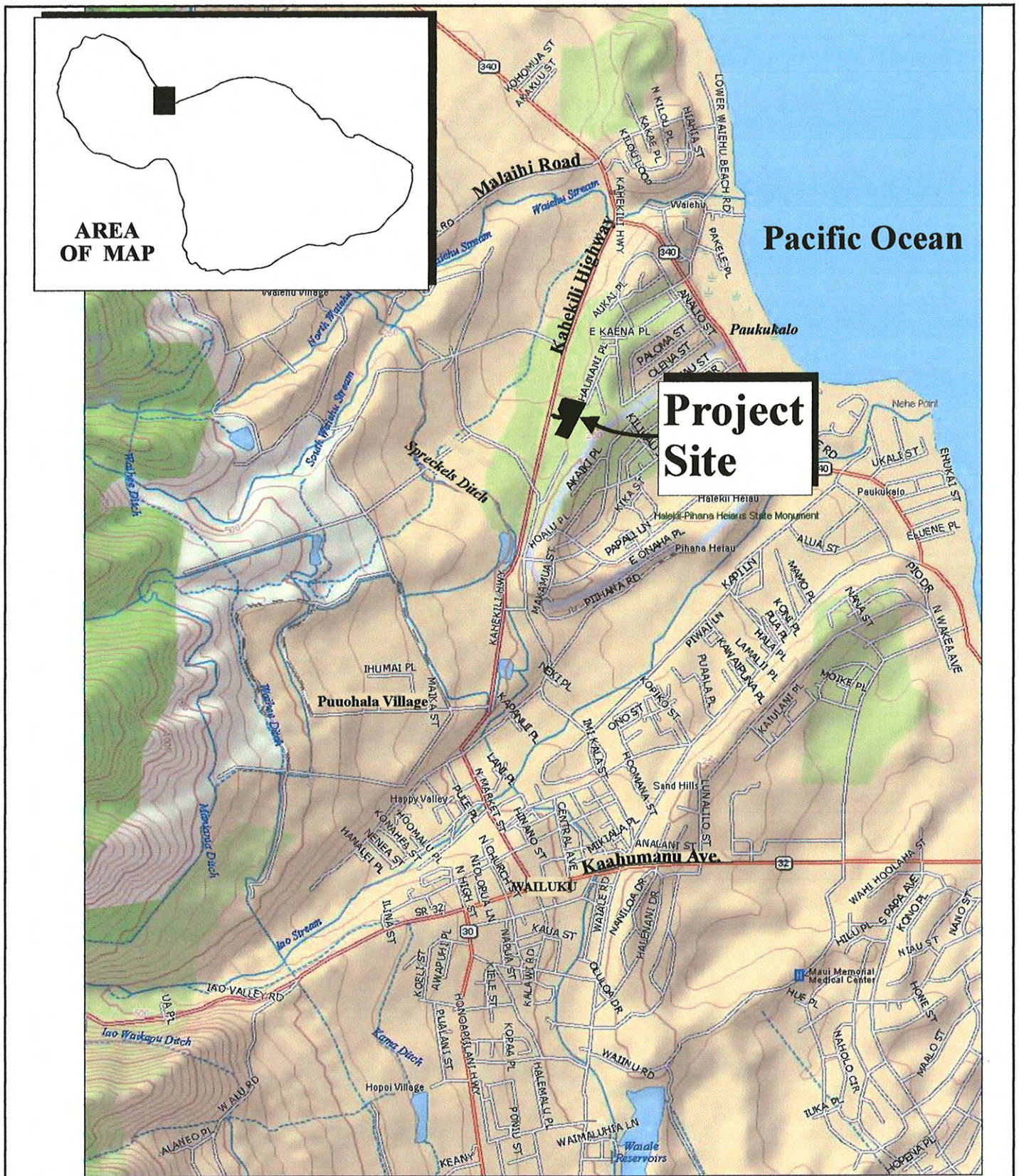
A. PROJECT LOCATION, CURRENT LAND USE, AND OWNERSHIP

Lokahi Pacific, an independent, private non-profit housing and community development organization, in partnership with Pacific Rim Land, Inc., proposes to develop the Waiehu Mauka Affordable Housing project on an approximately 8-acre parcel in Wailuku, Maui. See **Figure 1**. The Waiehu Mauka Affordable Housing project is located along Kahekili Highway on property identified by Tax Map Key (TMK) 3-3-001:102 (hereafter referred to as “subject parcel”). TMK 3-3-001:016 (por.) provides access to the subject parcel from Kahekili Highway. See **Figure 2**. The project area is in close proximity to the urban core of Wailuku.

The subject parcel is currently vacant and undeveloped. It was formerly used for the storage of excess construction materials during the development of the Waiehu Heights Subdivision, and has since been cleared and partially graded. The parcel is designated “Agricultural” by the State Land Use Commission, “Single-Family” by the Wailuku-Kahului Community Plan, and “Interim” by Maui County Zoning.

Surrounding the project site are other areas of single-family residential housing, including the Waiehu Terrace and Waiehu Heights Subdivisions to the east. The subject property abuts Haunani Street which provides access to the Waiehu Heights Subdivision.

The subject property is currently owned in part by Goodfellow Brothers, Inc. and James Stephen Goodfellow, Trustee of the James Stephen Goodfellow and Denise B. Goodfellow Main Trust. Goodfellow Brothers, Inc. and James Stephen Goodfellow have entered into a co-development agreement with Lokahi Pacific for the project, and have conveyed a 77 percent interest in the property to Lokahi Pacific via a conditional deed. The affected portion of Parcel 016 is owned by Kehalani Holdings Company, Inc. While the proposed project is located on Parcel 102, the existing access roadway from Kahekili Highway to the multi-family units is located on Parcel 016. Goodfellow Brothers, Inc. and Lokahi Pacific have



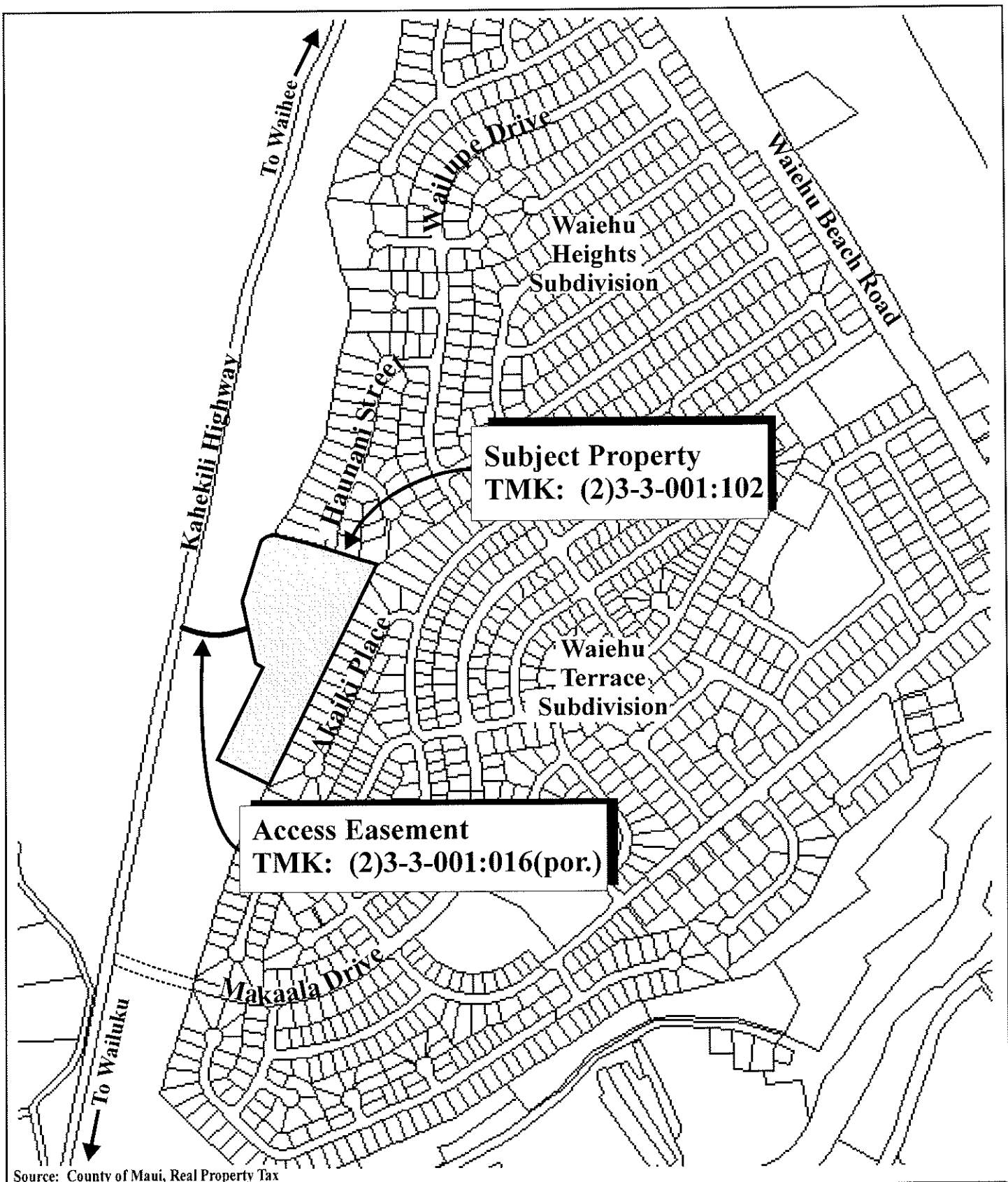
Source: DeLorme, DeLorme Topo USA

Figure 1

Proposed Waiehu Mauka Affordable Housing Project Regional Location Map

NOT TO SCALE





Source: County of Maui, Real Property Tax

Figure 2

Proposed Waiehu Mauka
Affordable Housing Project
Site Location Map

NOT TO SCALE



an access easement on Parcel 016.

B. PROPOSED ACTION

The proposed project involves the development of 42 multi-family rental units housed in seven (7) apartment buildings and 58 townhouse units for sale housed in thirteen (13) buildings. All buildings will be two (2) stories in height, approximately 28 to 29 feet. The rental units will be made affordable to households earning 50 percent of the County of Maui's annual median income or below, while the townhouse units will be offered for sale to households earning from 51 to 120 percent of the annual median income. The project's six (6) single-family residential lots will be sold at market price. Access to the 100 affordable multi-family units will be provided via Kahekili Highway at the property's western boundary via an access easement on TMK (2)3-3-001:016(por.). Access to the six (6) single-family lots will be via an extension of Haunani Street in the Waiehu Heights Subdivision. See **Figure 3**.

Rental units offered will range from a one-bedroom/one-bathroom apartment unit to a two-bedroom/one-bathroom apartment unit. The rental unit sizes will range between 619 square feet (s.f.) for a one-bedroom unit and 843 s.f. for a two-bedroom unit. Each second-floor apartment includes a lanai, which adds approximately 66 square feet. There will be 28 one-bedroom units and 14 two-bedroom units. See **Appendix "A"**.

Development of the rental units will also involve the construction of an onsite laundry building and a meeting hall. Refer to **Figure 3**.

Townhouse units offered for sale will range from a three-bedroom/two bathroom unit to a four-bedroom/two-bathroom unit. The townhouses will range between 1,096 s.f. for a three-bedroom unit and 1,313 s.f. for a four-bedroom unit. Each second-floor unit includes a lanai, which adds approximately 110 square feet. There will be 52 three-bedroom units and six (6) four-bedroom units. See **Appendix "A"**.

Affordable housing distribution for the project site is summarized in **Table 1**. Maintenance fees for the condo units are proposed to be \$444 per month for the four-bedroom units and \$333 per month for the three-bedroom units. These figures include the costs of water service and common area expenses.

KEY

Lokahi Waiehu Mauka Condos

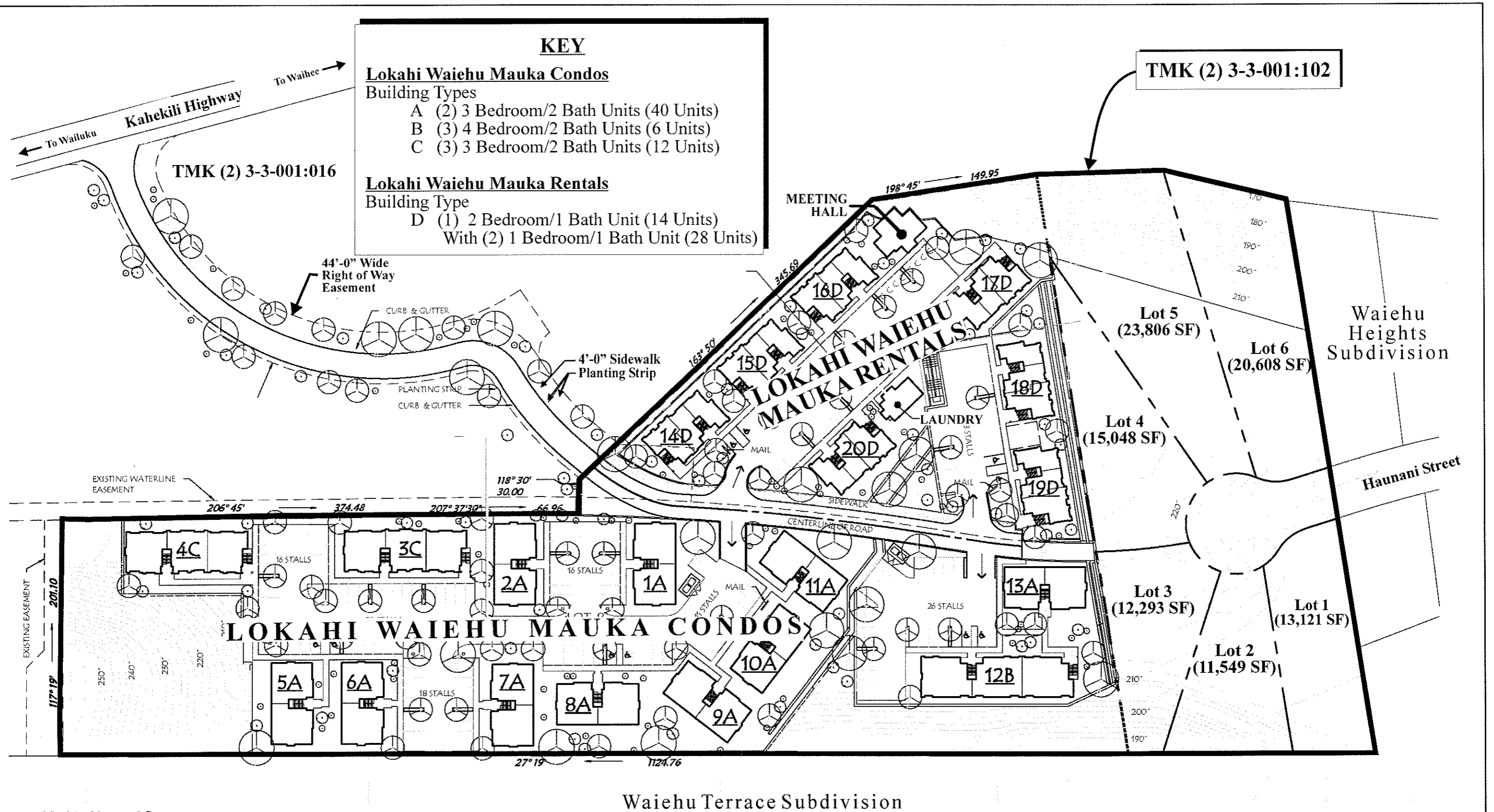
Building Types

- A (2) 3 Bedroom/2 Bath Units (40 Units)
- B (3) 4 Bedroom/2 Bath Units (6 Units)
- C (3) 3 Bedroom/2 Bath Units (12 Units)

Lokahi Waiehu Mauka Rentals

Building Type

- D (1) 2 Bedroom/1 Bath Unit (14 Units)
With (2) 1 Bedroom/1 Bath Unit (28 Units)



Source: Maui Architectural Group

Figure 3

Proposed Waiehu Mauka Affordable Housing Project
Site Plan

NOT TO SCALE



Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

Table 1. Affordable Housing Distribution

FOR SALE UNITS				
Target Income Group	Product Type	No. of Units	Sales Price Range^{1,2}	
101-120% AMI Moderate	4- bedroom	3	\$381,915 to \$416,645	
81-100% AMI Below Moderate	4- bedroom	3	\$312,455 to \$347,185	
RENTAL UNITS				
101-120% AMI Moderate	3- bedroom	6	\$332,100 to \$362,300	
81-100% AMI Below Moderate	3- bedroom	24	\$271,700 to \$301,900	
51-80% AMI Low	3- bedroom	22	\$181,200 to \$241,500	
Target Income Group	Product Type	No. of Units	County Affordable Rent Guidelines³	Lokahi Pacific Proposed Rents⁴
≤50% AMI Very Low	2-bedroom	14	\$848	\$792
	1-bedroom	28	\$707	\$668
TOTAL AFFORDABLE UNITS		100		
¹ Sales/Rental Price Range based on 2009 County of Maui Affordable Sales Price Guidelines effective March 20, 2009. ² Sales Price based on prevailing interest rate of 5.875% per County. ³ County Affordable Rents based on 30% of gross monthly income and do not include utilities. ⁴ Lokahi Pacific proposed monthly rents based on HOME Program rent structure and include water/sewer and an allowance for electricity.				

All multi-family rental and ownership units with two (2) or more bedrooms will be provided with two (2) parking stalls. Multi-family units with one (1) bedroom will be provided with one (1) assigned parking stall. Overall, a total of 188 parking stalls will be provided in the development, of which ten (10) are ADA accessible. Proposed site improvements include site grading and utilities installation covering onsite water, sewer, and drainage systems. The onsite drainage system will consist of grated drain inlets to collect runoff and unperforated pipes to convey runoff to the onsite subsurface retention basins. Electrical, telephone, and

cable utility systems will be placed underground. The driveway access and parking lot will be constructed to County standards.

C. PROJECT NEED

Although the local economy has been slowing, demand for affordably priced housing remains steady. Sales information for multi-family homes in the Central Maui area indicates that the demand for homes is strong, with continuing strength in demand anticipated for a variety of housing types for families in different income categories. Inventory for a variety of housing types, however, continues to be limited.

In addition to for-sale units, there is also a demand for multi-family rental units since more people are unable to meet the financial qualifications for purchase. In light of the current and projected market conditions and prices, the proposed project is considered to provide a significant community benefit by offering residents a new opportunity to secure affordable housing.

The proposed action is in keeping with Lokahi Pacific's mission to improve the quality of life, both economically and socially, for residents of the County of Maui.

D. AFFORDABLE HOUSING PROGRAM

The proposed project will provide affordable multi-family units for rental and purchase to qualified individuals and families in accordance with affordability criteria set forth by the County of Maui for Section 201H-38 Hawaii Revised Statutes (HRS) projects. At interest rates prevailing at the time of filing of this application, the units would be affordable to those families who earn up to 120 percent of the County of Maui median income category.

The Waiehu Mauka Affordable Housing project is proposed as a 94 percent affordable housing project (100 of the 106 units and lots will be affordable). Lokahi Pacific will meet the affordability criteria set forth by the County of Maui for Section 201H-38, HRS projects. Thus, 94 percent of the units will be affordable to families having an income up to 120 percent of the County median income.

Rental prices will be based on the Department of Housing and Human Concerns' Affordable Rent Guidelines for the County of Maui and the HOME Program Rent Schedule. The base monthly rents for the one-bedroom and two-bedroom units are estimated not to exceed \$668

and \$792, respectively, in accordance with the HOME Program. The estimated base rents include water and sewer services, as well as an allowance for electricity. Management of the property is anticipated to be provided by Lokahi Pacific.

The proposed sales prices for the townhouse units have been preliminarily set at \$181,200 to \$416,645 based on 2009 County of Maui Affordable Sales Price Guidelines. At interest rates prevailing at the time of the filing of the Section 201H-38, HRS application and at the preliminary prices noted herein, the townhouse units would be affordable to families falling between 51 and 120 percent of median income categories. Prices are subject to actual interest rates and County median family income data at the time of project implementation.

The rental units will be owned and managed by Lokahi Pacific. The for-sale townhouse units are proposed to follow an affordability plan similar to that of the HOME Program and County of Maui with the affordability period running with the term of the first mortgage (30 years); however, in the event of default, sale or refinancing with cash out for non-home improvement, education or medical purposes, the minimum period of affordability would be 15 years. The proposed affordability plan would include the following restrictions: primary homeowner occupancy, equity sharing, repayment of down payment assistance, first option to re-purchase at pre-determined calculated rate to Lokahi Pacific for re-sale to another qualified family. Through this plan, Lokahi Pacific will bear the burden of monitoring its affordable ownership units on a long-term basis.

Lokahi Pacific plans to continue its working relationship and partnership with Women Helping Women, Aloha House, and the Maui AIDS Foundation to assist their clients who generally fall in the Very Low Income category. Through this partnership, each non-profit will be able to purchase some of the three-bedroom condos to be utilized in assisting their clients with transitional housing while maintaining them as affordable in perpetuity.

E. ENTITLEMENTS REQUIRED

The Waiehu Mauka Affordable Housing project is proposed to be developed to meet the criteria for a Section 201H-38, HRS project by the County of Maui's Department of Housing and Human Concerns. Section 201H-38, HRS promotes the delivery of affordable housing by allowing the exemption of endorsed projects from:

"...all statutes, ordinances, charter provisions, and rules of any governmental agency relating to planning, zoning, construction

standards for subdivisions, development and improvement of land, and the construction of units thereon.”

The proposed project will be a 94 percent affordable housing project. As such, a Section 201H-38, HRS application will be filed with the Maui County Council to seek exemptions for the affordable component of the project from the Community Plan Amendment and Change in Zoning processes, as well as County development related code requirements to support the timely implementation of the project, without compromising public health, safety, or welfare considerations. Proposed exemptions are presented in **Appendix "B"**.

The current State Land Use designation for the plan area is “Agricultural”. Concurrent with the County’s 201H-38 processing, a petition for a State Land Use Commission (SLUC) District Boundary Amendment (DBA) from the “Agricultural” to “Urban” Districts will be processed. The SLUC petition will encompass the entire 8-acre project area and follow the provisions of Section 15-15-97 of the Land Use Commission Rules, pertaining to Section 201H-38, HRS processing. The Wailuku-Kahului Community Plan designates the subject property for “Single-Family” use, while the underlying county zoning is “Interim”.

F. CHAPTER 343, HAWAII REVISED STATUTES REQUIREMENT

The proposed project will involve driveway connections to a portion of Kahekili Highway and Haunani Street (County of Maui roadways), utility connections to County of Maui facilities, and Federal grant funding passed through the County of Maui and administered by the Department of Housing and Human Concerns. Funding will also be acquired through the County Affordable Housing Fund. As such, the proposed action will involve the use of County of Maui lands and funds, which are triggers for the preparation and processing of an environmental analysis pursuant to Chapter 343, Hawaii Revised Statutes (HRS). Based on the scope of the proposed project, this Draft Environmental Assessment (DEA) is being prepared in accordance with Chapter 200 of Title 11, Department of Health Administrative Rules, Environmental Impact Statement Rules. This DEA is intended to cover any use of County lands and funds, for purposes including, but not limited to, any roadway, infrastructure, utility system, or other improvement relating to the development of the project or to Kahekili Highway and Haunani Street. Based on discussions with the County of Maui, Department of Housing and Human Concerns, and the Department of Public Works, it has been determined that the approving agency for the environmental assessment is the County of Maui, Department of Housing and Human Concerns.

G. IMPLEMENTATION TIME FRAME

The implementation of the Waiehu Mauka Affordable Housing Project plan will commence after the required permits are secured and sufficient funds have been received. Assuming all necessary approvals and entitlements are obtained, construction is expected to begin in 2010 and take between 18 and 24 months to complete.

**II. DESCRIPTION OF
EXISTING CONDITIONS,
POTENTIAL IMPACTS,
AND PROPOSED
MITIGATION MEASURES**

II. DESCRIPTION OF EXISTING CONDITIONS, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

a. Existing Conditions

The site of the proposed Waiehu Mauka Affordable Housing Project is located in Waiehu, Maui, a rural residential area located north of Wailuku Town, and just south of Waihee. The project site itself is 0.7 mile north of Wailuku Town via Kahekili Highway. It lies approximately 0.5 mile west of the Pacific Ocean shoreline. The subject property is currently accessed from Kahekili Highway via an access easement through Parcel 016. The Waiehu-Waihee area, together with the project site, is surrounded by lands formerly cultivated in sugar and macadamia orchards by Wailuku Agribusiness Company, Inc.

The project site borders Kahekili Highway to the east, Waiehu Terrace Subdivision to the west, and the Waiehu Heights Subdivision to the south. The subject property abuts Haunani Street, which provides access to the Waiehu Heights Subdivision.

The Spreckels Ditch is located east of the project site, mauka (westward) of Kahekili Highway. This waterway crosses Kahekili Highway approximately 2,000 feet from the project driveway. Refer to **Figure 1**.

Ka Home Ma Ha Mau cemetery and the Oceanview Estates single-family subdivision are located north of the project site. Further north are the County-managed Waiehu Beach Park and Waiehu Golf Course. Malaihi Road also lies north of the subject property and runs mauka (southwest), traversing into a single-family, rural residential neighborhood with some farming. Waiehu Kou, a Department of Hawaiian Home Lands project,

borders Kahekili Highway leading to the rural village of Waihee, 0.4 mile north of the property site.

The subject parcel is vacant, but was formerly utilized for the mining of sand by Hawaiian Cement and the stockpiling of material during the construction of the Waiehu Heights subdivision. Vegetation, including small trees, shrubs, and tall grasses, can be found at the project site. The project site is in a transitional area, on the outskirts, but still near the urban area of Wailuku and in close proximity to single-family subdivisions. Thus, the project would complement the existing residential character of the area.

b. Potential Impacts and Proposed Mitigation Measures

The proposed action is intended to provide affordably priced homes to address the need for increased housing inventory for Maui's residents. The project site is located in Waiehu, in close proximity to Wailuku Town, Waihee Village and existing single-family residential subdivisions. Single-family residential units are found at Oceanview Estates, and the adjacent Waiehu Heights and Waiehu Terrace Subdivisions.

Access to the project's affordable units is provided via Kahekili Highway at the property's western boundary. The six (6) market lots will be accessed via an extension of Haunani Street in the Waiehu Heights subdivision.

The development of residential uses at the project site is consistent with existing residential uses in the area. The use of the property for the proposed affordable housing project would be functionally compatible with surrounding uses.

2. Climate

a. Existing Conditions

Like most areas of Hawaii, Maui's climate is relatively uniform year-round. Characteristic of Hawaii's climate, the plan area 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 (Maui County Data Book, 2007).

b. Potential Impacts and Proposed Mitigation Measures

The proposed action is not anticipated to alter local climatic conditions.

3. Topography and Soil Characteristics

a. Existing Conditions












Underlying the project site are soils belonging to the Pulehu-Ewa-Jaucus association. See **Figure 4**. The Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii characterizes the soils of the Pulehu-Ewa-Jaucas association as consisting of well-drained and excessively drained, medium-textured, moderately fine-textured, and coarse-textured soils on alluvial fans and in basins on the island of Maui, mainly in Central Maui. These soils are nearly level to moderately sloping. The association makes up about 4 percent of the island.

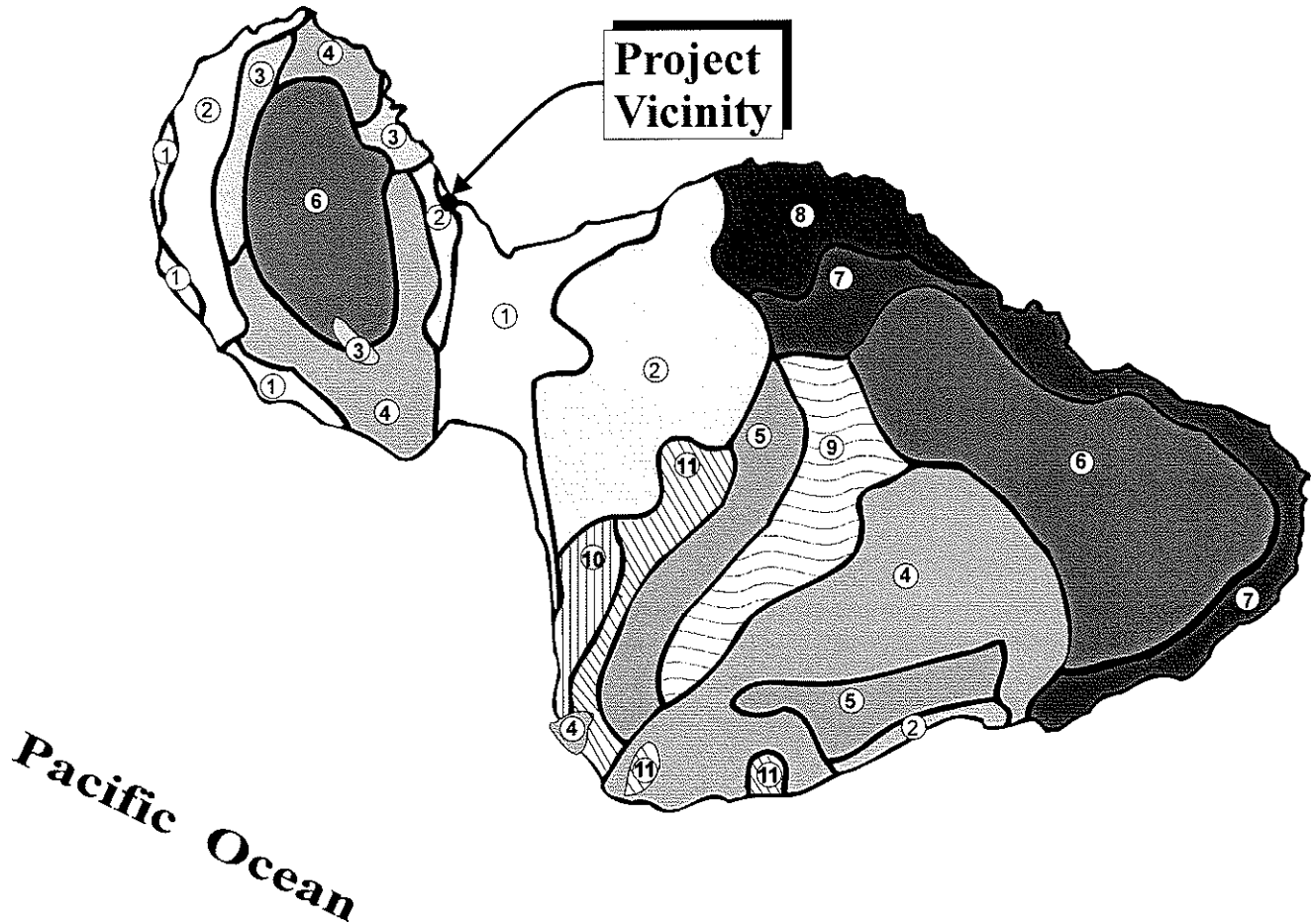
The specific soil type underlying the project site is Puuone Sand, 7 to 30 percent slopes (PZUE). See **Figure 5**. Puuone sand is found on sandhills near the ocean. In a representative profile, the surface layer is grayish-brown, calcareous sand about 20 inches thick. This is underlain by grayish-brown, cemented sand. The soil is moderately alkaline in the surface layer. Permeability is moderately rapid above the cemented layer. Runoff is slow, and the hazard of wind erosion is moderate to severe.

b. Potential Impacts and Proposed Mitigation Measures

Site work for the proposed improvements of the subject property, which is currently occupied by grass vegetation, kiawe, and haole koa will involve

LEGEND

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



Map Source: USDA Soil Conservation Service

Figure 4

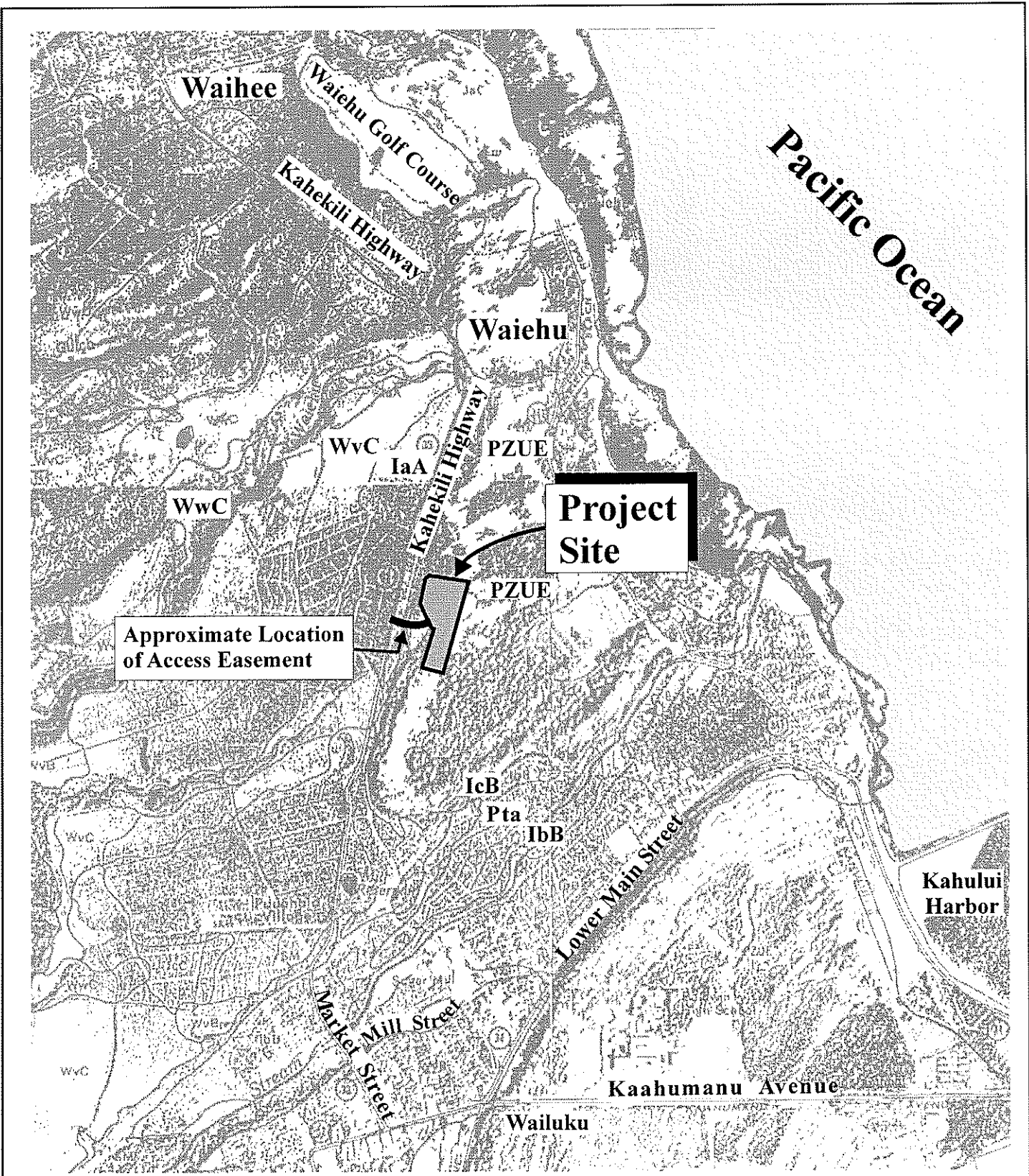
Proposed Waiehu Mauka
Affordable Housing Project
Soil Association Map

NOT TO SCALE



Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.



Source: USDA, Soil Conservation Service

Figure 5

Proposed Waiehu Mauka
Affordable Housing Project
Soil Classification Map

NOT TO SCALE



clearing, grubbing, and grading. To the extent practicable, finished contours will follow existing grades to minimize earthwork costs and maintain existing drainage patterns. To prevent soil erosion during site work, the applicant will implement Best Management Practices (BMPs), which include, but are not limited to, the installation of a dust control fence, silt fence, gravel bag berms or other sediment-trapping devices; diversion of storm runoff from graded areas through use of sand bag berms or lined temporary swales; and paving and grassing of exposed areas and permanently landscaping as soon as grading is completed. In addition, Best Management Practices (BMPs) shall be in compliance with Section 20.08.035 of the Maui County Code (Ord. No. 2584) and “Construction Best Management Practices (BMPs) for the County of Maui” of the Department of Public Works and Waste Management, May 2001.

To minimize soil erosion, the contractor will be required to submit a soil erosion control plan prior to issuance of a grubbing and grading permit. Because the graded area will be larger than 1.0 acre, the applicant will obtain a National Pollutant Discharge Elimination System (NPDES) General Permit Coverage Authorizing Discharges of Storm Water, prior to commencement of construction activity, as required.

While terrain will be locally modified to meet site design requirements, the proposed improvements are not anticipated to adversely alter topographic characteristics in the vicinity.

4. Agriculture

a. Existing Conditions

(1) Land Capability Grouping National Resources Conservation Service (NRCS) Rating

The 1972 Land Capability Grouping by the U.S. Department of Agriculture NRCS rates soils according to eight (8) levels, ranging from the highest classification level “I” to the lowest “VIII”.

The project site soils are rated Class VIIe. Class VII soils have very severe limitations that make them unsuited to cultivation that restrict

their use largely to pasture or range, woodland, or wildlife habitat. The subclassification “e” indicates that the soils are severely limited by risk or erosion.

(2) **Agricultural Lands of Importance in the State of Hawaii (ALISH)**

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 Important” agricultural land, with the remaining non-classified 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 Important” agricultural lands include those that have not been rated as “Prime” or “Unique”.

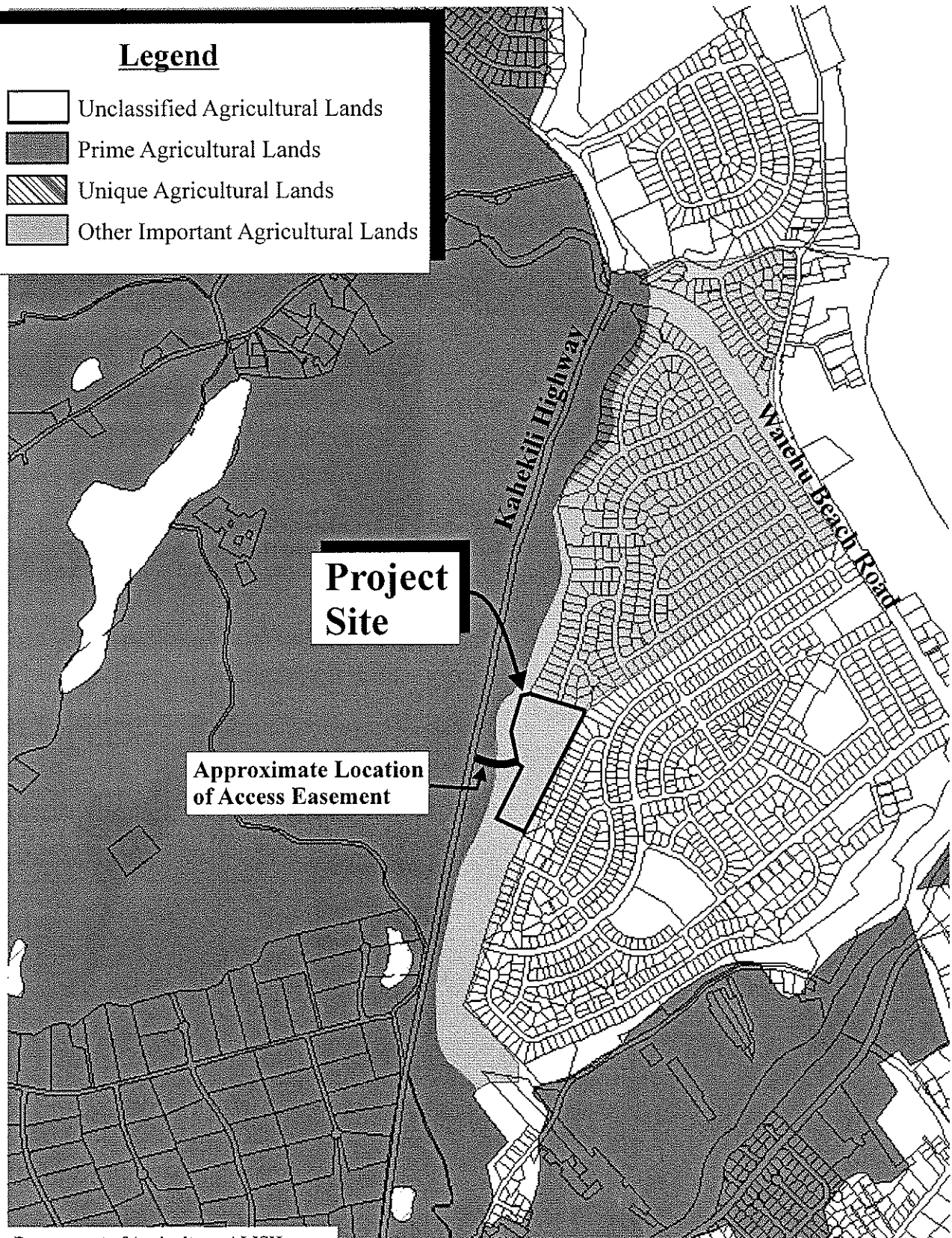
As reflected by the ALISH map for the Wailuku-Kahului region, the proposed project is comprised of lands that have been defined as “Other Important” agricultural lands. See **Figure 6**.

(3) **Overall Productivity Rating**

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 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 project is located on lands designated as E58. These are non-irrigated, excessively-drained lands with a non-stony, medium textured soil.

Legend

- Unclassified Agricultural Lands
- Prime Agricultural Lands
- Unique Agricultural Lands
- Other Important Agricultural Lands



Source: Department of Agriculture, ALISH

Figure 6



Proposed Waiehu Mauka Affordable Housing Project Agricultural Lands of Importance to the State of Hawaii

NOT TO SCALE

b. Potential Impacts and Proposed Mitigation Measures

The project site is vacant, undeveloped and covered primarily with non-native plant species. There are no agricultural activities occurring on the property, nor are there any active agricultural crop production activities on the immediate adjacent lands. The property was once vegetated with a variety of low growing shrubs and grasses, and used for the grazing of plantation mules and livestock. In light of the parcel's geographic proximity to urban residential uses, and the "Single-Family" land use designation for the parcel, as reflected in the Wailuku-Kahului Community Plan, the proposed use of the property for agricultural use is not considered feasible, and impacts to agricultural productivity are not considered detrimental. The subject property is a pocket of agricultural land surrounded by urban uses.

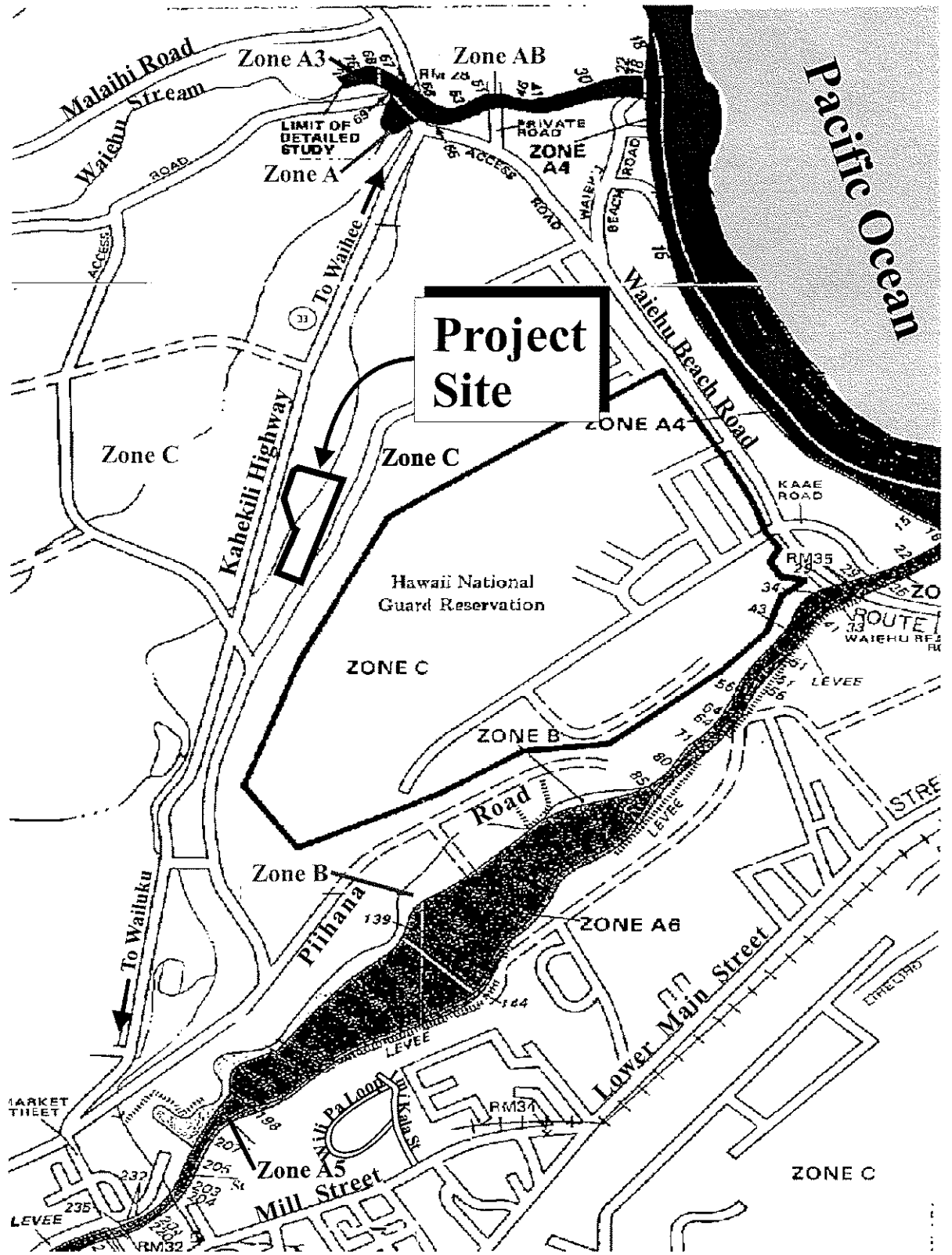
5. Flood and Tsunami Hazards

a. Existing Conditions

As indicated by the Flood Insurance Rate Map (FIRM) for the area, the subject property is located in Zone C, which denotes an area of minimal flooding and low flood risk. See **Figure 7**. Specifically, the Federal Emergency Management Agency (FEMA) describes areas in Flood Zone C as follows

Areas outside the 1-percent annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1% annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1% annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone. Insurance purchase is not required in these zones.

In addition, the project is situated in a location which is outside of the tsunami inundation area.



Project Site

Source: FIRM Panels 150003 0180B, 150003 0190A

Figure 7

Proposed Waiehu Mauka
Affordable Housing Project
Flood Insurance Rate Map

NOT TO SCALE



b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not located within a Flood Hazard district. Moreover, because the project is located outside of the tsunami inundation area, there are no threats to the surrounding areas from coastal wave action. No adverse impacts with regards to flood and tsunami hazards are anticipated.

6. Flora and Fauna

a. Existing Conditions

Vegetation in the region is generally characterized by introduced grass species and hardy weeds. A biological survey was conducted at the project site by Robert Hobdy in May 2008. See **Appendix “C”**. Vegetation on the properties include grasses, weeds, shrubs, and trees. Plant species common to the property include Natal Red Top (*Melinis Repens*), Guinea Grass (*Panicum Maximum*), Florida Beggarweed (*Ossmodium tortuosum*) and Koa Haole (*Louciena Leucocephala*).

A total of 46 plant species were recorded during the survey of the properties. Of the 46 species, the Uhaloa (*Waitheria Indica*) and Ilima (*sida fallax*) were native. The remaining 44 species are non-native to Hawaii and are of no special environmental interest or concern.

Terrestrial fauna in the region include introduced species, such as cats, mice, rats, and mongoose. Some of the avifauna introduced to the area include the Spotted Dove, Zebra Dove, Northern Cardinal, Red-Crested Cardinal, and Mynah. Refer to **Appendix “C”**.

There are no known rare, endangered, or threatened species of flora and fauna located within or in the vicinity of the project site.

b. Potential Impacts and Proposed Mitigation Measures

There are no rare, federally threatened, or endangered species of plants on the property. While the proposed project is not expected to have a significant negative impact on the botanical resources in this region, it is

recommended that native plants be incorporated into the landscape planting design.

The biological survey report indicates that there are no known rare or federally endangered or threatened species of fauna or avifauna in the vicinity of the project site. A special effort was made to look for any occurrence of the Native Hawaiian Hoary Bat by making an evening survey on the property. While no evidence of such activity was observed, protection measures will be in place during construction at the project during the pup-rearing season of April to August to avoid any potential impacts to the Hawaiian Hoary Bat.

Although no seabirds were identified during the biological survey, precautionary measures will be put in place to minimize impacts to them. In the event that night construction will need to be conducted, outdoor lights will be shielded to minimize impacts to seabirds. Night construction will also be avoided during the peak fallout period of September 15 through December 15.

The proposed development is not anticipated to have a significant negative impact on those elements of the natural environment. Refer to **Appendix "C"**.

7. **Wetlands and Streams**

a. **Existing Conditions**

There are no existing wetlands or streams in the immediate vicinity of the proposed Waiehu Mauka residential project. The Spreckels Ditch, a plantation irrigation facility, is located as indicated in **Figure 1**. An unnamed intermittent stream also runs through lands mauka of the project site, approximately 1,100 feet away. The Waihee Stream is located approximately 3,300 feet to the north.

b. Potential Impacts and Mitigation Measures

As previously noted, there are no wetlands or streams located in the immediate vicinity of the proposed residential project. As such, no impacts for the proposed project are anticipated.

8. Archaeological and Historical Resources

a. Existing Conditions

An Archaeological Assessment survey for the Waiehu Mauka subdivision was carried out by Scientific Consultant Services (SCS). See **Appendix “D”**. The assessment included historic background research and settlement pattern analysis prior to fieldwork, systematic pedestrian survey of the entire project area, and representative mechanical testing. Fieldwork at the project site was conducted over a two day period in August 2006.

Historically, the project site has been heavily affected by commercial cultivation and construction purposes. Most of the project area appears to have been extensively disturbed by both previous and on-going activities. The project area was also utilized for sand mining and the stockpiling of sand during the construction of the Waiehu Heights Subdivision in the early 1980's.

Original sand is likely to be present in the vicinity of a water tank and along the bank along the eastern boundary of the project area. The entire project area shows signs of recent, on-going human disturbance. The prior land alterations are due to sand mining, operation, bulldozing, and filling. The on-going disturbances are due to activities involving dirt biking, use of the area as a paintball field, and small scale excavations performed by bottle hunters and/or children.

b. Potential Impacts and Proposed Mitigation Measures

No archaeological sites were identified during the Archaeological Assessment survey. However, given the presence of the original sand deposit (suggesting the possibility of subsurface archaeological sites such as burials and/or habitation sites) within the project area, a program of

Archaeological Monitoring will be carried out as a precautionary measure during the phases of construction which involve ground altering activities.

The applicant's archaeology consultant prepared an archaeological monitoring plan and submitted the plan to the State Historic Preservation Division (SHPD) for review and approval. The Archaeological Monitoring Plan was accepted by the SHPD on February 11, 2008. See **Appendix "D-1"** and **Appendix "D-2"**. Archaeological monitoring, in accordance with the SHPD approved monitoring plan, will be implemented at the project site during all ground altering activities associated with construction work.

Should any archaeological remains or cultural materials be encountered during construction and excavation activities, work in the vicinity of the find will be stopped and the SHPD will be contacted to establish appropriate mitigation measures in accordance with Chapter 6E, Hawaii Revised Statutes.

9. Cultural Resources

a. Existing Conditions

A Cultural Impact Assessment prepared by SCS evaluated the probability of impacts on identified cultural resources, cultural values, and rights within the project area and its vicinity. The assessment notes that the subject parcel is located in the Waiehu Ahupuaa. According to the assessment, the name Waiehu is translated as "*...where the combatants smoked with dust and perspiration...*" and refers to a battle or battles which occurred in the area. Another interpretation of Waiehu means "*water spray*". See **Appendix "E"**.

Tales of Waiehu go back to the mythological periods of Hawaiian culture. The Pele Collection records that the famous "Goddess of Fire" traveled to the Waiehu area. In the historic period, the area was the site of numerous battles. The mid-1700's saw pitched conflict between a chief from the island of Hawaii, Kalaniopuu, and the Mauian chief Kahekili, with Kahekili emerging victorious. Several decades later, the nearby Iao Valley saw the victories of Kamehameha over the local chiefs.

Waiehu was part of an old land division named Na Wai Eha (The Four Streams), referring to four large valleys that cut deep into the West Maui mountains, capturing vast amounts of water draining from Puu Kukui and in the case of Waiehu and Waihee, eventually emptying into the ocean (Handy and Handy 1972). This area was said to be the most expansive area of continuous kalo (taro) pond-field agriculture in the Hawaiian Islands.

In ancient times, Waiehu was among the largest continuous areas 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. Up until 1934, a few old plantations persisted and were used primarily for raising wet taro. Nonetheless, most of the old terraces of the upper slopes of Waiehu have been ploughed under (Handy).

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).

Before the historic era, it is highly likely that much of Waiehu Ahupuaa was extensively modified by terraces and irrigation ditches, from just mauka of the near-coastal sand dunes to the high upper valleys.

Later in time, much of these lands were transformed into commercial sugar cane fields. Commercial sugar cane cultivation in the neighboring Waihee Valley began in 1862. By 1865, the Waihee Sugar Company was producing over 700 tons of sugar and 45,000 gallons of molasses per year. Production continued into the early 20th century. The Waihee Dairy and Farm, located along the coast, was established in 1919. The dairy closed in 1967. Sugar cane production was widespread throughout this region by

the late 19th century to early 20th century. As a result of growth in the sugar cane industry, two (2) irrigation ditches were constructed in the late 19th century to early 20th century to channel water south from the Waihee Stream to nearby fields. Refer to **Appendix “D”**.

b. Potential Impacts and Proposed Mitigation Measures

The area surrounding the project site had been in agricultural use for over a century, for the cultivation of sugar cane and the grazing of plantation mules and livestock. Despite this, the possibility of uncovering iwi (human remains) exists when the land is graded. As such, archaeological monitoring will be undertaken during ground altering activities.

A Cultural Impact Assessment was prepared by SCS to obtain perspectives about cultural resources relative to the project. Contact was made with organizations whose jurisdiction includes knowledge of the area with an invitation for consultation. An effort was also made to identify and consult individuals who have an association with the project area. Refer to **Appendix “E”**.

The cultural consultant sought consultation via letter request from Kai Markell, the Director of Native Rights, Land and Culture, Office of Hawaiian Affairs on Oahu; Thelma Shimaoka, Coordinator of the Maui branch of the Office of Hawaiian Affairs; the Central Maui Hawaiian Civic Club; Hinano Rodrigues, Cultural Historian with the State Historic Preservation Division; Kamika Kepaa of the Native Hawaiian Preservation Council, and the Cultural Resources Commission of the Maui Planning Department.

An additional attempt to contact these agencies was done in November 2008. Thelma Shimaoka, the Coordinator of the Maui branch of the Office of Hawaiian Affairs, responded with the names of four (4) individuals she thought were qualified because of their residence, either past or present, near the project area and might be able to provide some information. Gordon Apo, a past resident of Waiehu near the project area, said he was not aware of any cultural activities taking place anywhere in the vicinity of the project area. Jan Buen had been raised in the makai portion and remembered when grading of the sand dunes for Waiehu Heights

uncovered several unmarked coffin burials. She was unaware of any ongoing cultural activities, but was concerned that more burials might be found during the project construction. Additional contact was made with Diana Goo, who presently has property in Waiehu near the project area. Mrs. Goo indicated that she could not identify any cultural activities or endangered resources in the area. Ms. Shimaoka provided the name of another individual who could not be reached for comment. Refer to **Appendix “E”**.

Hinano Rodrigues suggested contact with Scott Fisher of the Waihee Coastal Land Trust for additional information. Mr. Fisher also indicated that he was not aware of any cultural activities ongoing in the project area or in the vicinity.

Based on the information gathered during the cultural assessment, residential development of the land is not anticipated to have an adverse impact upon Native Hawaiian cultural resources within the immediate vicinity. The property is not currently used for traditional cultural gathering, access, or religious practices. As noted previously, a program of archaeological monitoring will be carried out during the phases of construction involving ground altering. Should any cultural remains be encountered during construction and excavation, activity work in the vicinity of the find will be stopped and the SHPD will be contacted to establish appropriate mitigation measures in accordance with Chapter 6E, Hawaii Revised Statutes.

10. Air and Noise Quality

a. Existing Conditions

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 that 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 Waiehu region 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.

The State of Hawaii Department of Health maintains one (1) air quality monitoring station on the island of Maui, located in Kihei. The site monitors for particulate matter less than or equal to 10 micrometers (PM_{10}) and 2.5 micrometers ($PM_{2.5}$). The measurement of air quality is expressed as mass per unit volume or micrograms per cubic meter ($\mu g/m^3$).

According to data collected at the station in 2006, the annual average concentration of PM_{10} over a 24-hour period was $23 \mu g/m^3$ and the average annual concentration of $PM_{2.5}$ over a 24-hour period was $4 \mu g/m^3$ (State of Hawaii, Department of Health Clean Air Branch, 2006 Annual Summary Hawaii Air Quality Data). These readings are well below the State standard of $150 \mu g/m^3$ for the average concentration of PM_{10} over a 24-hour period and the national standard of $65 \mu g/m^3$ of $PM_{2.5}$ over a 24-hour period. Although levels of particulate matter increase when agricultural burning takes place, prevalent tradewinds from the north and northeast minimize nuisance air quality problems in the vicinity. In 2006, the entire State of Hawaii was in attainment for all National Ambient Air Quality Standards (State of Hawaii, Department of Health Clean Air Branch, 2006).

There are no significant fixed noise generators in the vicinity of the subject property. Existing background noise in the project area is attributable to vehicles traveling along Kahekili Highway. Additional noise generated by construction in the project vicinity is considered temporary.

b. Potential Impacts and Proposed Mitigation Measures

Air quality attributed to the project will include dust generated by short-term construction related activities. Site work such as clearing, grubbing

and grading, and roadwork and construction will generate airborne particulates. Dust control measures, such as regular watering and sprinkling, will be implemented to minimize wind-blown emissions.

Graded and grubbed areas will be vegetated to mitigate dust-generated impacts. In the long term, the proposed project is not expected to adversely impact local and regional ambient air quality. Ambient noise conditions will be temporarily impacted by construction activities. Heavy construction equipment, such as bulldozers, front-end loaders, and material-transport vehicles, will likely be the dominant source of noise during the construction period. However, in the long term, the proposed project is not anticipated to adversely impact noise quality in the area.

11. Scenic and Open Space Resources

a. Existing Conditions

The subject property is located along the West Maui Mountains' foothills. Haleakala is visible to the east of the project site with the West Maui Mountains to the west. Nearby lands abutting the site were formerly used for large-scale agricultural production activities, with single-family subdivisions occupying lands to the east. The surrounding agricultural lands define the open space character of this part of the island. Additionally, the West Maui Mountains provide the scenic backdrop for the project area and surrounding lands. The Pacific Ocean is visible to the east of the subject property.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project will be developed as an architecturally integrated area with low-rise residential structures having building heights of approximately 28 to 29 feet. Landscaping will be established as part of the development to ensure visual buffering and softening. The project site is not part of a scenic corridor and will not affect views from inland vantage points. The proposed project is not anticipated to generate impacts to the visual character of the surrounding area.

12. Traditional Beach and Mountain Access

a. Existing Conditions

There are no known traditional beach and mountain access trails in or around the project site.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project will not adversely impact traditional beach or mountain trails.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Regional Setting

a. Existing Condition

The project area is located in Waiehu, adjacent to Wailuku town and is in proximity to the Waihee Village and existing single-family residential subdivisions. Single-family residential units are found at Oceanview Estates, Waiehu Heights, and Waiehu Terrace. Wailuku serves as the seat of County and State governments, with several agencies headquartered in the civic center area between Kaohu Street and Main Street. Wailuku also serves as a center for professional services including medical, dental, legal, and design professions.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is considered compatible with surrounding land uses. The regional character of Waiehu will not be adversely impacted by the development of the 100 multi-family units and six (6) single-family residential lots.

2. Population

a. Existing Conditions

The population of the County of Maui has exhibited relatively strong growth over the past decade. Between 1990 and 2000, according to the

U.S. Census, the State of Hawaii population grew from 1,108,229 to 1,211,537, a 0.9 percent growth over ten years. Maui County population, however, has grown from 100,374 in 1990 to 128,241 in 2000, with an average annual growth rate of 2.5 percent (U.S. Census 2000).

In 2000, the population of the island of Maui was 117,644 with 41,503 residents of the island's population living in Central Maui (Maui County Planning Department, June 2006). Growth in Maui County is expected to continue as baseline population forecasts for the year 2010 reflect a Central Maui population of 51,312, as well as an island-wide and County-wide population of 140,289 and 151,300, respectively (Maui County Planning Department, June 2006).

b. Potential Impacts and Proposed Mitigation Measures

Given the size and scope of the proposed action, impact on population is expected to be minimal. The proposed project is not considered a direct population generator from a long-term perspective. Instead, the project is anticipated to accommodate demands for affordable housing by existing residents in the Central Maui area. Any increase in population in the Wailuku-Kahului Community Plan region should be within expected growth parameters defined by migration and birth/death rates.

3. Economy and Labor Force

a. Existing Conditions

The Kahului region is the island's center of commerce. Combined with the neighboring region of Wailuku, the Wailuku-Kahului region encompasses a broad range of commercial, service, and governmental activities.

The Kahului Harbor, a deep sea port, and Kahului Airport, both located in the Wailuku-Kahului region, provide vital links to off-island economies and links through which virtually all imports and exports pass. The County government and major private companies are located in the Wailuku-Kahului region. The region supported an estimated 34,500 jobs as of 2002, representing approximately 44 percent of the total jobs on Maui. Economic

expansion is estimated to increase to 37,240 jobs by 2010 (Maui County Planning Department, June 2006).

In August 2009, the unemployment rate for Maui Island was 9.1 percent. This represents an increase from the August 2008 unemployment rate of 4.5 percent (Hawaii Workforce Informer, 2009).

b. Potential Impacts and Proposed Mitigation Measures

On a short-term basis, the project will support construction and construction-related employment. Accordingly, the project will have a beneficial impact on the local economy during the period of construction.

From a long-term perspective, project residents will require services related to family maintenance and goods and services which are expected to further support local business owners. Real property taxes generated by the project will contribute to the County's revenue base to support any increase in regional public service demands over time.

The project will provide much needed affordable housing for Maui's workforce.

4. Housing

a. Existing Conditions

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. The average household size in the Wailuku-Kahului area is projected to decrease to an average of 2.98 and 2.91, respectively by the year 2010 and 2015 (Maui County Planning Department, 2006).

In 2000, Maui County's housing supply totaled 56,377 units of which 23 percent, or 13,113 units, were located in the Wailuku-Kahului Community Plan region. This accounts for the largest percentage of housing units on the island. In the year 2000, there was a demand for 13,528 housing units in the Wailuku-Kahului region. As the number of households increases, so will the demand for housing. In the year 2010, the number of households

in the Wailuku-Kahului region is estimated to be 17,229, with the demand projected to grow up to 18,901 units. By the year 2020, the number of households will increase to 21,383; housing demand is projected to grow up to 23,774 units (Maui Planning Department, June 2006).

In August 2009, the year-to-date median sales price for a single-family home in Central Maui was \$480,000.00. The median year-to-date sales price of a multi-family unit in Central Maui was approximately \$155,000.00 (Realtors Association of Maui, October 2009). However, the median price for a multi-family unit in Maui County was \$560,000.00. While sales for single-family and multi-family homes have been slowing, inventory for a variety of housing types continues to be limited, with continuing long-term strength in demand anticipated for a variety of housing types for families in different income categories.

b. Potential Impacts and Proposed Mitigation Measures

As noted previously, there is a demand for affordable housing of varying product types to meet the needs of families in Maui County. The proposed action will address this need through the provision of rental housing intended for families earning at or below 50 percent of the median annual income and the provision of townhouse ownership units for families earning between 51 and 120 percent of the median annual income for the island of Maui. Based on consultation with housing agencies and trade union representatives, there is a need for rental housing for low income families.

C. PUBLIC SERVICES

1. Recreational Facilities

a. Existing Conditions

The Wailuku-Kahului region provides 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 at numerous County parks. The War Memorial Complex, for example, located along Kaahumanu Avenue, includes a gymnasium,

swimming pool, tennis courts, youth baseball fields, football and soccer practice areas, the War Memorial Stadium, and a baseball stadium. Also found in the Wailuku-Kahului area are the Kahului Community Center, Kanaha Beach Park, and Keopuolani Park, a regional recreational facility. The Waiehu Terrace subdivision also provides park space for residents and community members.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not considered significant in terms of population generation, since most of the tenants and buyers are expected to be residents currently residing in the Central Maui region. As such, the proposed project will not place any significant new demands on recreational activities.

The project will be processed as a Section 201H-38, HRS project. An exemption from Section 18.16.320 of the Maui County Code, relating to Parks and Playgrounds will be requested. This request would exempt the project from the provision of land and/or in-lieu fees for parks and playgrounds. Refer to **Appendix “B”**.

2. Police and Fire Services

a. Existing Conditions

Police protection for the Wailuku-Kahului region is provided by the County Police Department headquartered in Wailuku on Mahalani Street. The Waiehu area is served by the Department’s Wailuku Patrol Division.

Fire prevention, suppression, and protection services for the Wailuku-Kahului region are provided by the County Department of Fire and Public Safety's Wailuku Station, located approximately 2.0 miles from the project site in Wailuku Town.

b. Potential Impacts and Proposed Mitigation Measures

Police and fire protection services are not expected to be adversely impacted by the proposed project. Incremental increases in real property taxes will contribute to County revenues which may be used to address

service requirements for the Department of Police and the Department of Fire and Public Safety. It is noted that the location of the proposed project, adjacent to the existing residential areas in the Wailuku-Kahului urban core, does not significantly extend service area limits for emergency services.

3. Medical Services

a. Existing Conditions

Maui Memorial Medical Center, located on Mahalani Street, the only major medical facility on the island, services the Wailuku-Kahului region. Acute, general, and emergency care services are provided by the 231-bed facility. In addition, numerous privately operated medical/dental clinics and offices are located in the area to serve the region's residents.

b. Potential Impacts and Proposed Mitigation Measures

Primary health care service for Central Maui will continue to be provided by the Maui Memorial Medical Center. Moreover, existing private medical facilities in Central Maui provide additional health care services in the area. The proposed project is not anticipated to create a significant new demand for medical services.

4. Solid Waste

a. Existing Conditions

Single-family residential solid waste collection service is provided by the County of Maui on a weekly basis. Residential solid waste collected by County crews is disposed at the County's 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.

b. Potential Impacts and Proposed Mitigation Measures

As may be required, a solid waste management plan will be developed in coordination with the Solid Waste Division of the County Department of Environmental Management (DEM) for the disposal of clearing and grubbing material during construction. The plan will incorporate strategies for effective construction waste management to reduce, reuse, and recycle solid waste materials. Such strategies involve the use of efficient design to promote waste reduction, salvaging of material to be used by other businesses or local organizations, and by separating recyclable and non-recyclable materials for proper recycling and disposal. All materials deemed unfit for reuse or recycling will be disposed at an approved construction waste disposal site. Once completed, it is anticipated that solid waste collection and disposal for all multi-family units will be provided by a private refuse service and that solid waste collection and disposal for the six (6) single-family residences will be handled by DEM staff. The proposed project is not anticipated to significantly impact the long-term ability of the Central Maui Landfill to handle solid waste.

5. Schools

a. Existing Conditions

The Wailuku-Kahului region is served by the State Department of Education's (DOE) 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, Kahului, and Pomaikai Elementary 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). Maui Community College, a branch of the University of Hawaii, is located in Kahului along Kaahumanu Avenue and serves as the island's primary higher education institution.

Waihee School (Grades K-5) is located approximately 3.0 miles to the north of the proposed project site.

Area public school enrollments and capacities are presented in **Table 2** below. It is estimated that by 2012, Baldwin High School, Maui High School, Maui Waena Intermediate School, Waihee Elementary School, and Wailuku Elementary School will all be over capacity.

Table 2. Wailuku-Kahului Public Schools Enrollments and Capacities

School Name	2005 Rated Capacity	2005 Enrollment	2005 Percentage of Capacity (%)	2012 Projected Enrollment	2012 Percentage of Capacity (%)
Baldwin High School	1,542	1,574	102%	1,644	107%
Iao Intermediate School	945	830	88%	858	91%
Kahului Elementary School	959	865	90%	802	84%
Lihikai Elementary School	1,120	1,102	98%	903	81%
Maui High School	1,563	1,709	109%	1,665	107%
Maui Waena Intermediate School	1,008	1,017	101%	1,019	101%
Waihee Elementary School	751	850	113%	838	112%
Wailuku Elementary School	1,132	953	84%	1,312	116%

Source: R.M. Towill Corporation, 2007

b. Potential Impacts and Proposed Mitigation Measures

The proposed action will result in the development of dwelling units which will have a minimal impact on existing educational facilities in the region. This impact is anticipated to be mitigated by educational impact fees as determined by the DOE.

Coordination with the DOE will be undertaken to ensure that assessment policy provisions are appropriately addressed. Should impact fees be assessed and collected, they are assured to be earmarked for area schools such as Wailuku Elementary, Waihee Elementary, Iao Middle School, and Baldwin High School which would serve students of the proposed project. Therefore, it is anticipated that these funds will assist in the upgrade and improvement to schools in the Wailuku area.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

The Wailuku-Kahului region is served by a roadway network that includes arterial, collector, and local roads. Major roadways include Kaahumanu Avenue, the principal linkage between Wailuku and Kahului, Lower Main Street/Kahului Beach Road, Hana Highway, and Puunene Avenue. The following is a summary of the major roadways in the vicinity of the project site:

Kahekili Highway: The project site is served by Kahekili Highway, a two-lane, two-way County and State road with paved shoulders and a posted speed limit of 30 mph. Kahekili Highway 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.

Waiehu Beach Road: Waiehu Beach Road is a two-lane, two-way roadway that connects to Kahekili Highway just north of the project site. The intersection of Waiehu Beach Road and Kahekili Highway is not signalized.

Wailupe Drive and Haunani Place: Wailupe Drive is a local street within the Waiehu Heights Subdivision. It connects to Waiehu Beach Road just east of the project site and provides access to Haunani Place. Both streets are designed to urban standards with sidewalks, curbs, and gutters.

Makaala Drive: Makaala Drive, a two-lane collector street within the Waiehu Terrace Subdivision, connects to Waiehu Beach Road, just east of the project site, and intersects Kahekili Highway south of the project site.

b. **Potential Impacts and Mitigation Measures**

A Traffic Impact Assessment Report (TIAR) was prepared for the proposed project by Philip Rowell and Associates in August 2009. See **Appendix “F”**.

The TIAR analyzes the impacts of the proposed project and subdivision. This is assessed using the Level of Service (LOS) ratings as determined by the Highway Capacity Manual – HCM 2000 methodology. LOS 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. The LOS for the analyzed intersections was then determined for both the AM and PM peak periods. The existing LOS is summarized in **Appendix “F”**.

The following intersections were analyzed as part of the study:

- Waiehu Beach Road at Wailupe Drive
- Wailupe Drive at Haunani Place
- Kahekili Highway at Waiehu Beach Road
- Kahekili Highway at Hale Mua North Driveway and MEO BEST Project Driveway (a future intersection)
- Kahekili Highway at Hale Mua South Driveway and Waiehu Mauka Driveway (a future intersection)

Peak hour traffic analyses were based on traffic counts and projections for a morning peak hour of 6:45 a.m. to 7:45 a.m. and an afternoon peak hour of 3:30 p.m. to 5:30 p.m.

The traffic study examined two (2) sets of future conditions, one “without the project” and one “with the project.” Traffic attributed to new and/or future projects in the vicinity of the proposed project were incorporated in the analysis. These projects include the proposed Hale Mua Affordable Housing subdivision and the MEO BEST project. A detailed description of planned projects and assumptions made relative to these projects are presented in **Appendix “F”**.

Base Year 2015 was utilized to evaluate and analyze future traffic conditions. The analysis for the “with project” conditions considers the anticipated build out of the proposed project. The 2015 background traffic projections were calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects.

The LOS analysis of the intersections was performed for background and background plus project conditions. The project generated traffic was distributed and assigned based on the following assumptions:

1. There is no accessway connecting the single-family and multi-family components of the project.
2. Access to and egress from the single-family component will be via Waiehu Beach Road, Wailupe Drive and Haunani Place. It was assumed that traffic from the single-family units would have approach and departure patterns comparable to Waiehu Heights as estimated from the traffic counts performed at the intersection of Waiehu Beach Road at Wailupe Drive.
3. Access to and egress from the multi-family component will be via a new driveway along the east side of Kahekili Highway. This driveway aligns with the south driveway to and from the proposed Hale Mua residential project. Since Hale Mua and Waiehu Mauka are both primarily residential developments, the Waiehu Mauka project will have comparable trip distributions. As described in the Hale Mua traffic study, it is estimated that 80 percent of the project residents approach from and depart toward the south.

The results of the Level of Service (LOS) analysis for 2015 Conditions are summarized below:

Waiehu Beach Road at Wailupe Drive and Lower Waiehu Beach Road

1. During the morning peak hour, the northbound left and through movements from Lower Waiehu Beach Road will operate at LOS E, without and with project generated traffic. The change in delay as a result of project generated traffic is 1.0 second per vehicle, implying that project generated traffic has minimal impact.
2. Also during the morning peak hour, the southbound left and through movements will operate at LOS F, without and with project generated traffic. These movements currently operate at LOS F. The change in delay is 15.3 seconds per vehicle, or 7 percent.
3. During the afternoon peak hour, the northbound left and through movements will operate at LOS F, without and with project generated traffic. The delay increases 1.9 seconds, or 4 percent, as a result of project generated traffic.
4. Also during the afternoon peak hour, the southbound left and through movements will operate at LOS F, without and with project generated traffic. These movements currently operate at LOS F. The change in delay is 22.9 seconds per vehicle, or 5 percent.
5. It should be noted that traffic flow along Waiehu Beach Road through this intersection is currently constrained during the morning peak hour. Constraints along Waiehu Beach Road are primarily due to the buildup of traffic from the intersection of Waiehu Beach Road at Lower Main Street.

Wailupe Drive at Haunani Place

6. The intersection of Wailupe Drive at Haunani Place will operate at LOS A without and with project generated traffic. All controlled movements will operate at LOS A.

Waiehu Beach Road at Kahekili Highway

7. At the intersection of Waiehu Beach Road at Kahekili Highway, the left and right turns from Waiehu Beach Road to Kahekili Highway will operate at LOS F during both peak periods, without and with project generated traffic.

Kahekili Highway at Hale Mua North Driveway and MEO BEST Driveway

8. At Kahekili Highway at Hale Mua North Driveway and MEO BEST Driveway, all movements will operate a LOS C, or better, without and with project generated traffic.

Kahekili Highway at Hale Mua South Driveway and Waiehu Mauka Driveway

9. At the intersection of Kahekili Highway at Hale Mua South Driveway, the movements along Kahekili Highway will operate at LOS A.

The westbound approach from Waiehu Mauka to Kahekili Highway will operate at LOS E during the morning peak hour and LOS D during the afternoon peak hour. The eastbound approach from Hale Mua to Kahekili Highway will operate at LOS D during the morning peak hour and LOS C during the afternoon peak hour.

Traffic Assessment Summary

The timetable for the Hale Mua Residential project is uncertain and the project may not be constructed within the study period of the Waiehu Mauka project. Based on discussions with Maui County Department of Public Works (DPW), it was decided that background traffic projections would also be analyzed without Hale Mua traffic. The following provides a summary of the LOS analysis for 2015 without the Hale Mua traffic.

With the exception of the intersections of Waiehu Beach Road at Wailupe Drive and Lower Waiehu Beach Road and Waiehu Beach Road at Kahekili Highway, all movements will operate at LOS B or better during all peak periods.

Existing and future conditions at the intersection of Waiehu Beach Road at Wailupe Drive are below acceptable conditions with and without the project. Mitigation will be required for this intersection to operate at an acceptable LOS. The poor levels of service are the result of long delays to traffic along the side street approaches (Wailupe Drive and Lower Waiehu Beach Road). A level-of-service analysis for signalized conditions

determined that the intersection would operate at a Level-of-Service B during both peak periods, with and without project generated traffic. A traffic signal warrant analysis determined that traffic signals are not warranted for existing 100 percent, or urban, conditions.

At the intersection of Waiehu Beach Road at Kahekili Highway, the left and right turns from Waiehu Beach Road to Kahekili Highway will continue to operate at LOS F during the morning peak hour and LOS D during the afternoon peak hour without the Hale Mua generated traffic and proposed mitigation. It should be noted that the traffic study for the proposed Hale Mua project recommended that this intersection be signalized because the warrant for a traffic signal is satisfied by existing traffic conditions. With traffic signals, the intersection is anticipated to operate at LOS B during both the morning and afternoon peak periods.

The proposed project will generate 13 inbound and 41 outbound trips during the morning peak hour. During the afternoon peak hour, the project will generate 40 inbound and 24 outbound trips.

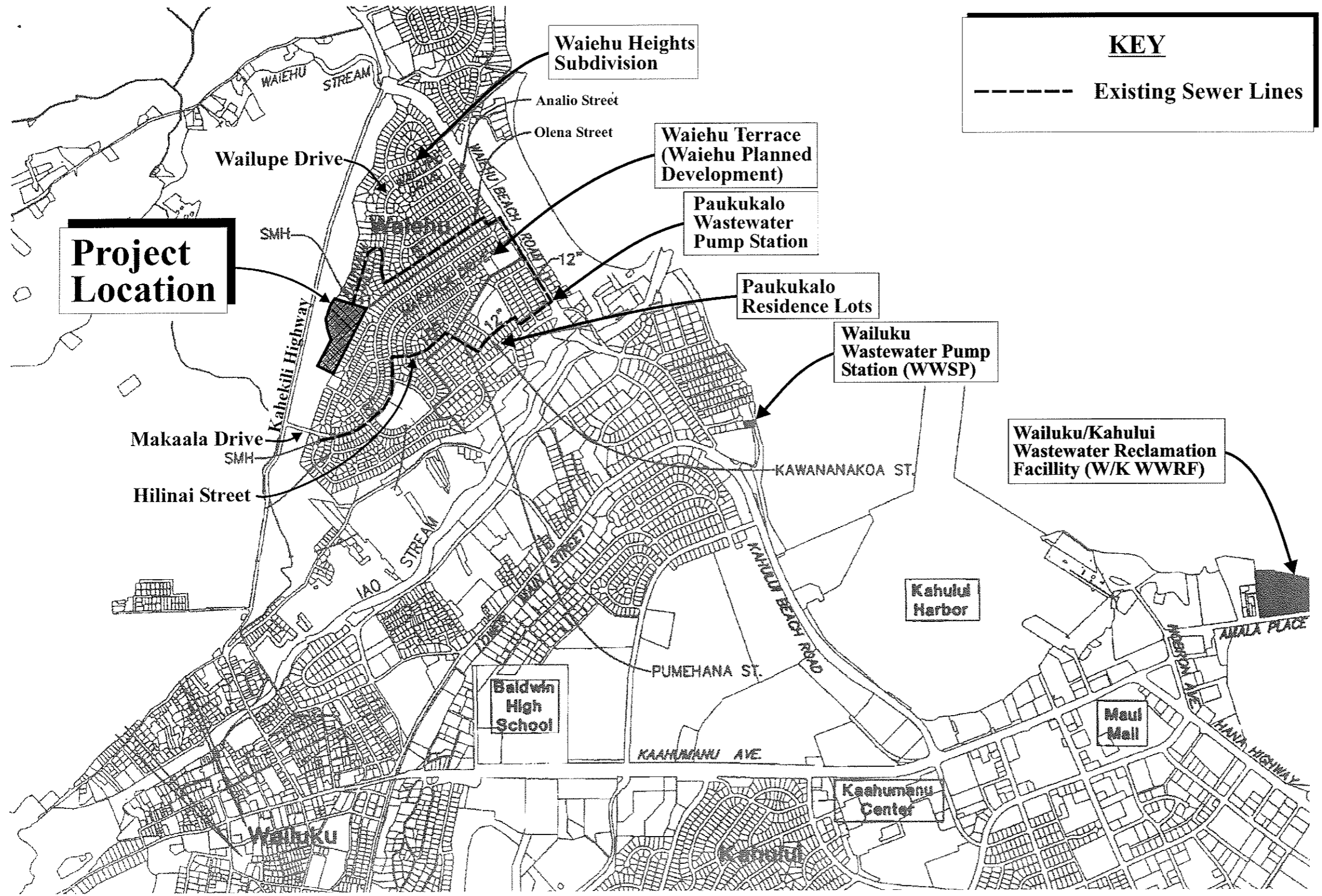
It is noted that the applicant is seeking an exemption to Chapter 14.76, MCC, to exempt the affordable component of the project from traffic impact fees. Given the affordable nature of the project, an exemption from regional roadway improvements is also being sought. See **Appendix “B”**.

Additionally, coordination with the Maui County Department of Transportation will be undertaken to explore mass transit options for future residents.

2. Wastewater

a. Existing Conditions

There are no sewer lines located in the proposed project site or along Kahekili Highway in the vicinity of the project. Wastewater disposal from adjacent residential developments is provided by a series of 8-inch, 10-inch, and 12-inch gravity sewer lines that discharge into the Paukukalo Wastewater Pump Station. See **Figure 8**. The wastewater flow is transmitted to transmitted to the Wailuku Wastewater Pump Station and



KEY

----- Existing Sewer Lines

Source: R.T. Tanaka Engineers, Inc.

Figure 8

Proposed Waiehu Mauka
Affordable Housing Project
Existing Offsite Wastewater Disposal System

NOT TO SCALE



Prepared for: Lokahi Pacific



eventually pumped to the Wailuku-Kahului Wastewater Reclamation facility east of Kahului Harbor. Other parcels in the vicinity of the project area operate using individual wastewater systems. See **Appendix “G”**.

b. Potential Impacts and Proposed Mitigation Measures

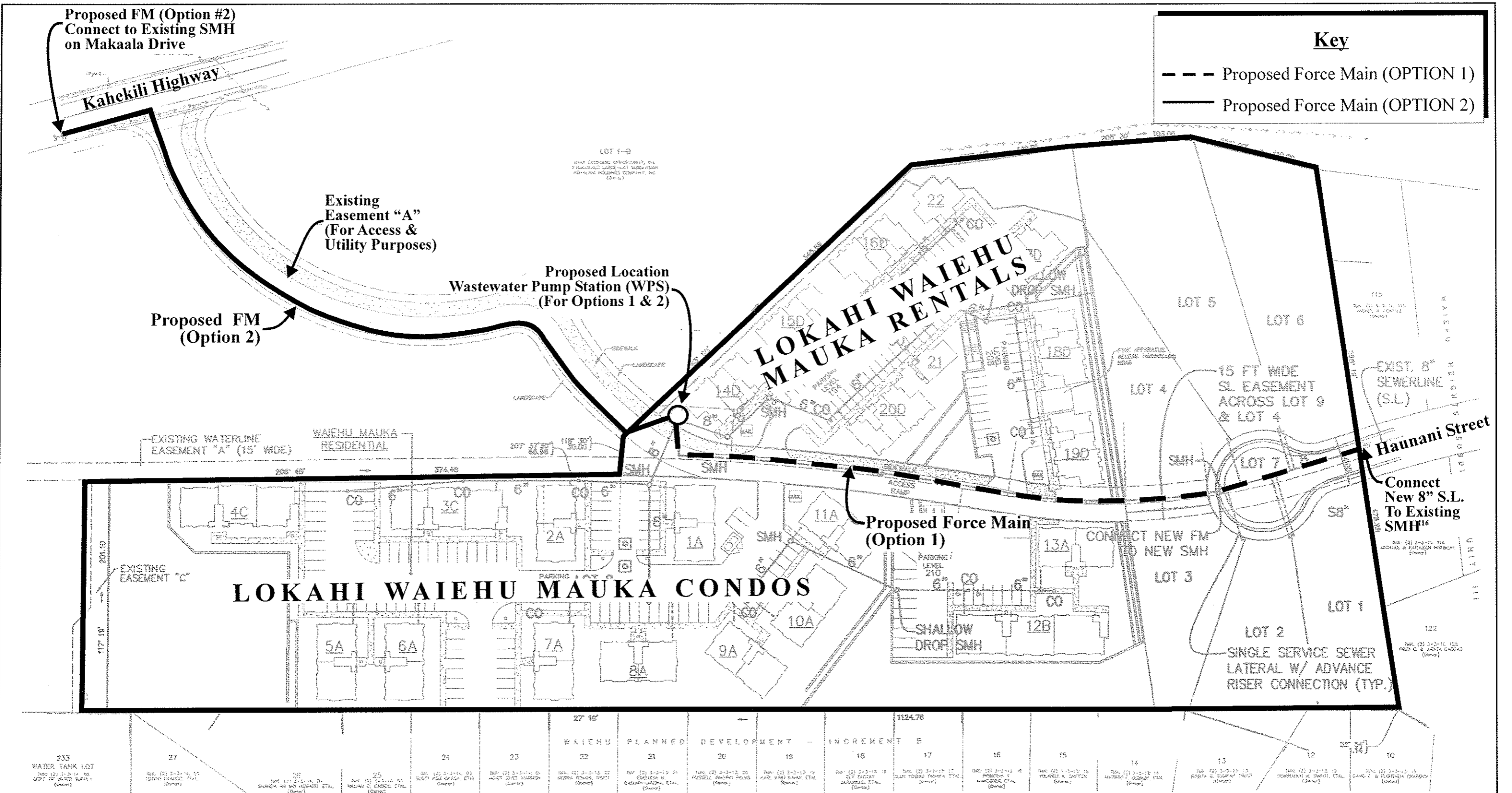
The average wastewater flow rates for the project area were estimated using County of Maui standards. The total average wastewater flow generated by the project is estimated to be about 28,110 gallons per day (gpd). The single-family residences are anticipated to generate about 2,100 gpd; the condominiums about 15,555 gpd; and the rental units about 10,455 gpd. Refer to **Appendix “G”**.

The County sewer system located along Haunani Street would be extended to the end of the new cul-de-sac to serve the single-family lots. Each lot will be provided with new service lateral.

Wastewater flow from the multi-family housing units will be collected by gravity sewer lines to discharge into a wastewater pump station (WPS) located at a low portion of the project site. Options for offsite wastewater disposal have been identified and are described in **Appendix “G”**. The options are briefly described below and illustrated in **Figure 9**.

Haunani Street Tie-In

Under this option, wastewater flows from the multi-family housing units are proposed to be pumped into a new Sewer Man Hole (SMH) located within the Haunani Street cul-de-sac. From this location, the wastewater will gravity flow to the existing Paukukalo WPS via a series of 8-inch sewer lines along Haunani, Olena, and Analio Streets, and to 12-inch sewer pipes along Waiehu Beach Road. Refer to **Figure 8** and **Figure 9**.



Source: R.T. Tanaka Engineers, Inc.

Figure 9 Proposed Waiehu Mauka Affordable Housing Project
Options for Offsite Wastewater Disposal System

NOT TO SCALE



Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

Makaala Drive Tie-In

The Makaala Drive Tie-In option would involve the pumping of wastewater along Easement A to Kahekili Highway, then southward along Kahekili Highway to its intersection with Makaala Drive. Refer to **Figure 9**. The wastewater would continue up to Makaala Drive to discharge into the existing SMH at its intersection of Makamua Street. Refer to **Figure 8**. The wastewater will be subsequently transmitted to the Paukukalo WPS via existing gravity sewer lines across the southern portion of Waiehu Terrace and through the Paukukalo Residence Subdivision.

The wastewater will gravity flow to the existing Paukukalo WPS in existing gravity sewerlines. The wastewater flow will then be transmitted to the Wailuku WPS and eventually pumped out to the Wailuku-Kahului Wastewater Reclamation facility east of Kahului Harbor.

Coordination with the Department of Environmental Management, Wastewater Division will be carried out to address necessary improvements to existing wastewater facilities, and during the building permit application process to ensure wastewater capacity will be available for the proposed project.

3. Water

a. Existing Conditions

Domestic water for the Wailuku-Kahului region is provided by the Department of Water Supply's (DWS) Central Maui System. Water for the Central Maui System is provided by wells in Mokuahau in Iao Valley and in Upper Waiehu. These well sources draw water from the basal lens referred to as the Iao Aquifer, which has an estimated sustainable yield of 20 million gallons per day (MGD).

Domestic water and fire protection for the area is provided by a 16-inch waterline that is fed by the existing Waiehu Heights 300,000 gallon water tank. The existing 16-inch waterlines traverse across the project site and connect to the 12-inch waterline on Haunani Street.

b. Potential Impacts and Proposed Mitigation Measures

The Preliminary Civil Engineering and Drainage and Soil Erosion Control Report prepared by R. T. Tanaka Engineering, Inc. for the Waiehu Mauka Affordable Housing Project in January 2009 and revised July 2009, contains information regarding the anticipated domestic and fire flow demands for the project. Refer to **Appendix “G”**. The estimated average and maximum daily domestic water demands, as well as the fire flow requirements are summarized in **Table 3** below.

Table 3. Average Daily Water Demand Flow and Fire Flow

Unit Type	Average Daily Demand Flow
Single-Family	3,600 gpd
Multi-Family	57,120 gpd
Total Average Daily Demand	60,720 gpd
Maximum Daily Demand	91,080 gpd
Unit Type	Fire Flow (gallons per minute, gpm)
Single-Family	1,000 gpm
Multi-Family	1,500 gpm
Source: R.T. Tanaka Engineering, Inc.	

Domestic water service for the single-family lots will be connected to an existing 12-inch waterline. Each lot will be served by 5/8-inch water meters for both domestic and irrigation purposes. The condominium units will be served by a 1 ½-inch water meter for domestic purposes while a 1-inch meter will serve the rental units. Irrigation requirements for the proposed multi-family units are undetermined at this time. It is recommended, however, that water meters solely for irrigation purposes should be installed so that irrigation usage will not be included in calculating the bi-monthly sewer fees.

The project will meet DWS standards for fire flow demand of 1,000 gallons per minute for a two (2) hour duration for the single-family lots and 1,500 gpm for a two (2) hour duration for the low rise apartments. The proposed fire protection systems will consist of double check detector assemblies and fire hydrants. The final location of the hydrants will be determined during the design development of the project. Refer to **Appendix “G”**.

In an effort to reduce potable water use, the applicant will explore the availability of non-potable water sources for irrigation purposes. The applicant would like to be able to utilize R-1 recycled water, where appropriate and when made available.

The use of native and non-invasive plants will be utilized, as applicable, for landscaping, which will help to conserve water and protect the watershed from degradation.

The DWS noted that County water availability will be determined at the time of water meter application, and that the DWS will not issue meters until the project is ready to receive service. The applicant will continue coordination with the DWS to incorporate this project into the County’s Water Use and Development Plan. The applicant’s discussions with the department are ongoing. The applicant is seeking an exemption from Chapter 14.12, MCC, Water Availability, through the 201-H process. Refer to **Appendix “B”**.

4. **Drainage**

a. **Existing Conditions**

Waiehu Stream and Spreckels Ditch are two water bodies located in the vicinity of the project site. Waiehu Stream is a perennial stream. The Spreckels Ditch is a plantation irrigation facility. Refer to **Figure 1**.

At present, onsite runoff flows into the adjacent properties from three (3) distinct drain areas. Refer to **Appendix “G”**. Approximately 78 percent of the project site flows into an existing drainageway located west of the project site. This drainageway discharges into Waiehu Stream via a 36-inch underground culvert across Waiehu Beach Road at the intersection of

Kahekili Highway. Additional runoff at the northeastern corner of the property flows to Haunani Street, while runoff along the eastern border of the property sheet flows into the adjacent residential lots within the Waiehu Terrace Subdivision.

Stormwater runoff flows across these areas and infiltrates into the ground or discharges into the underground culvert and eventually into the ocean. Peak discharge resulting from a 50-year, 1-hour storm event on the project site is presently calculated at 13.3 cubic feet per second (cfs). Refer to **Appendix “G”**.

b. Potential Impacts and Proposed Mitigation Measures

A Preliminary Civil Engineering and Drainage, and Soil Erosion Report was prepared by R.T. Tanaka Engineering, Inc. for the project in January 2009 and revised in August 2009. Refer to **Appendix “G”**. The report notes that development of the project area is expected to increase the 50-year, 1-hour storm runoff generated from 13.3 cfs before development to 21.7 cfs, an increase of approximately 8.4 cfs. Measures will be implemented to maintain storm runoff at or below pre-development conditions. The existing runoff volume will be increased by about 23,398 cubic feet (cf); from 19,132 cf to 42,530 cf.

The drainage report notes that increase of runoff to Haunani Street from the six (6) single-family lots is minimal and is not expected to affect the existing drainage facilities of the existing subdivision.

To mitigate the increased runoff, the applicant will make onsite drainage improvements within the multi-family area which will remain privately owned. The proposed drainage improvements involve the installation of onsite subsurface retention basins to impound the additional runoff that may enter the existing drainageway on the west side of the project site. Drainage improvements will be sized to retain the 50-year, 1-hour storm runoff volume increase that is anticipated to be generated by the proposed project. The development of an onsite subsurface retention basin aligns with the requirements of the Maui County Drainage Standards.

To ensure that the proposed development will not have adverse drainage effects on downstream properties and drainage facilities, the onsite retention basins shall be sized to have drainage capacities slightly greater than the anticipated volume increase. The onsite retention basins are anticipated to reduce the potential for sediments contained in the runoff from entering neighboring properties and eventually the ocean.

The proposed drainage system will include subsurface retention basins that consist of perforated pipes with rock envelopes. The system also includes grated drain inlets to collect onsite runoff and unperforated pipes to convey the runoff to the retention basins located within the multi-family parking areas. The combined storage capacity of the retention basins is approximately 27,195 cubic feet, which is 3,797 cubic feet greater than the anticipated 50-year, 1-hour runoff volume increase for the project. The proposed drainage plan also involves the installation of drainage facilities at the low point of the access road off of Kahekili Highway. This system will collect runoff from the new access road and ramp. It will also allow the existing drainageway flow to pass under the proposed access road. Refer to **Appendix "G"**.

Grading of the multi-family residence area will involve some excavation to level the site, while the single-family residence area will have minimal grading. A Best Management Practices (BMPs) Plan will be prepared for the project and will include measures to minimize erosion and provide dust control during construction. Included measures are: graded areas shall be thoroughly watered after construction activity has ceased for the day and for weekends and holidays; time of construction activity shall be minimized; and installation of dust and silt fences, gravel bag berms or other approved sediment trapping devices on the project site.

The proposed development is not anticipated to have significant adverse impacts as no work will be performed in the Waiehu Stream or Spreckels Ditch. The proposed development is not anticipated to impact any waters connecting to the Pacific Ocean.

5. Electrical, Telephone, and Cable Television Services

a. Existing Conditions

There are overhead telephone lines along Kahekili Highway and fronting the proposed subdivision site. However, there are no existing electrical or cable television lines in the immediate project area and no utility service to the subdivision site.

b. Potential Impacts and Proposed Mitigation Measures

Electrical, telephone, and cable television services for the project area will be coordinated with Maui Electric Company, Hawaiian Telcom, and Oceanic Time Warner Cable, respectively. It is anticipated that service capacity will be available, as required, and the proposed development will not have an adverse impact on service providers.

E. CUMULATIVE AND SECONDARY 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.

The proposed project is not part of a larger action, nor would it occur within the context of such actions. It is noted, however, that the County of Maui's ongoing General Plan update process will involve the formulation of a Maui Island Plan which would delineate urban and rural growth boundaries. Other landowners in the vicinity may seek to have portions of their respective land holdings placed on the Maui Island Plan for purposes of defining future development potential in the Central Maui region. The overall time frame for the General Plan covers a planning horizon up to the year 2030.

In the General Plan context, future regional growth opportunity in surrounding lands in the Wailuku-Kahului region is envisioned.

Secondary impacts are those which have the potential to occur later in time or 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, for example, can occur because they can induce development by removing one of the

impediments to growth-transportation access. The provision of affordable housing in Central Maui will ensure the adequacy of needed affordable housing over the long term.

The project is not anticipated to have a significant adverse impact on the physical environment. Necessary infrastructure systems and services can be reasonably provided to serve the project. Consequently, the proposed action is not anticipated to result in significant adverse secondary impacts.

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

This section discusses the relationship of the proposed Waiehu Mauka Affordable Housing (Waiehu Mauka) project to State and County land use plans, policies, and controls for the Central Maui region.

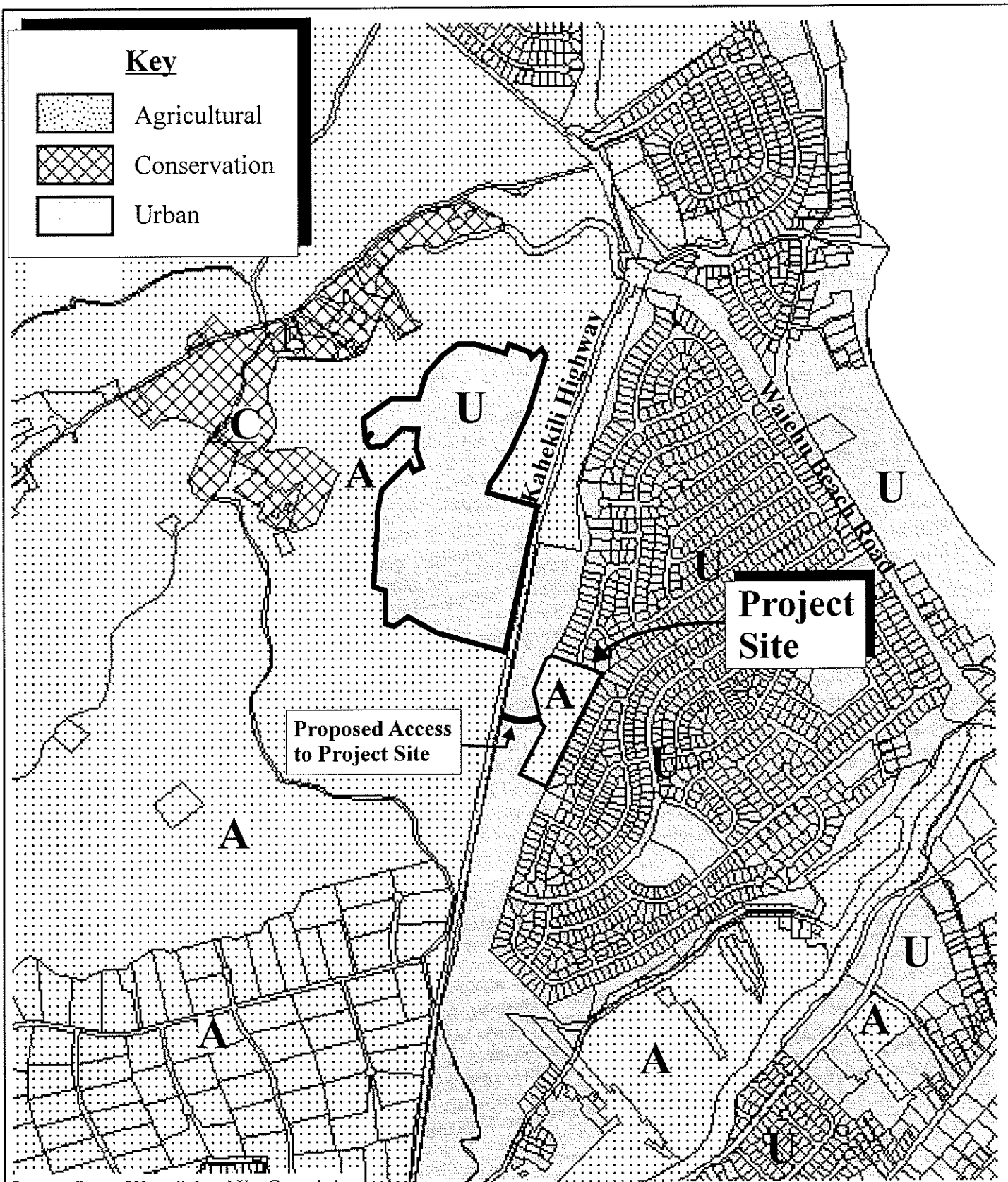
A. STATE LAND USE DISTRICTS

Pursuant to Chapter 205, Hawaii Revised Statutes, all lands in the State have been placed into one (1) of four (4) major land use districts by the State Land Use Commission. These land use districts are designated "Urban", "Rural", "Agricultural", and "Conservation". The project site is located within the "Agricultural" district. See **Figure 10**.

B. LAND USE COMMISSION RULES, CHAPTER 15-15, HAWAII ADMINISTRATIVE RULES (HAR)

A State Land Use District Boundary Amendment from the Agricultural district to the Urban district is being requested as part of the entitlement process to bring consistency to the State Land Use District boundaries and the Waiehu Mauka project. Criteria considered in the reclassification of lands are set forth in the State Land Use Commission Rules (Chapter 15-15-18, Hawaii Administrative Rules). In keeping with current practice, County 201H-38, HRS applications affecting State Agricultural lands will need to receive State Land Use Commission approval of the reclassification request, irrespective of parcel size. The proposed project will be filed as a 201H-38, HRS project with the State Land Use Commission.

The proposed reclassification of the 8-acres within the project area from "Agricultural" to "Urban" has been analyzed with respect to the "Urban" criteria, as discussed below.



Source: State of Hawaii, Land Use Commission

Figure 10

Proposed Waiehu Mauka
Affordable Housing Project
State Land Use District Map

NOT TO SCALE



Chapter 15-15-18

- (1) **It shall include lands characterized by “city-like” concentrations of people, structures, streets, urban level of services and other related land uses.**

Comment: The area proposed for reclassification is proximate to Wailuku and Kahului, the main urban areas of Maui. The project site is itself abuts and is located near various residential subdivisions (e.g., Waiehu Heights and Waiehu Terrace) of a similar character, with structures, streets, and services of an urban type. Additionally, the proposed project abuts the future Piihana Project District, a 78-acre planned community with a target residential unit count of 390. In this context, the subject property is in immediate proximity to the “city-like” concentrations required.

- (2) **It shall take into consideration the following specific factors:**

- A. **Proximity to centers of trading and employment except where the development would generate new centers of trading and employment.**

Comment: The area proposed for reclassification is located in close proximity to Wailuku Town and approximately 3.0 miles to Kahului Town. The proposed Waiehu Mauka project will provide a residential community in proximity to key employment centers in both towns, as well as generate employment opportunities associated with home building and maintenance services.

- B. **Availability of basic services such as schools, parks, wastewater systems, solid waste disposal, drainage, water, transportation systems, public utilities, and police and fire protection.**

Comment: The area proposed for reclassification will be serviced by infrastructure and public services without creating capacity and operational constraints. Appropriate onsite and offsite infrastructure improvements will be provided by the applicant as reported in the Preliminary Engineering Report. Refer to **Appendix "G"**. The area is located in close proximity to major existing roadways, such as Kahekili Highway and Waiehu Beach Road.

The project area requiring reclassification will be served by nearby schools, parks, and acute care/health facilities. Police and fire protection services are available nearby in both Kahului and Wailuku Towns.

C. Sufficient reserve areas for foreseeable urban growth.

Comment: Other planned areas of urban growth are reflected in the Wailuku-Kahului Community Plan. The Maui Lani, Kehalani, and Piihana Project Districts, for example, will also accommodate future urban growth. While the implementation timeframe for the Piihana Project District has not been disclosed, incremental development at Maui Lani and Kehalani is proceeding, with build out anticipated over the next several years. The proposed action, however, differs from other project development areas in that Lokahi Pacific Waiehu Mauka is an affordable housing project.

- (3) It shall include lands with satisfactory topography, drainage, and reasonably free from the danger of any flood, tsunami, unstable soil conditions, and other adverse environmental effects.**

Comment: The project site gently slopes in an east to west direction toward Kahekili Highway, with elevations ranging between 170 and 254 feet AMSL. Having been formerly used for the grazing of plantation mules and livestock, sand mining, and in recent years for the staging of construction of the Waiehu Heights subdivision, the property can be characterized as generally level, even with defined drainage patterns. The land proposed for reclassification is located within Zone C, an area of minimal flooding, on the Federal Emergency Management Agency (FEMA) flood insurance rate maps. This land area is not subject to tsunami inundation or unstable soil conditions.

- (4) Land contiguous with existing urban areas shall be given more consideration than non-contiguous land, and particularly when indicated for future urban use on state or county general plans.**

Comment: The 8-acre parcel proposed for reclassification is contiguous with existing Urban district lands to the east and west. Adjacent to or in close proximity to the project site are the Oceanview Estates, Waiehu Heights, and Waiehu Terrace residential subdivisions. It is noted that the project site is completely surrounded by Urban district lands and represents an infill development. Refer to **Figure 10**.

- (5) **It shall include lands in appropriate locations for new urban concentrations and shall give consideration to areas of urban growth as shown on the state and county plans.**

Comment: The proposed boundary reclassification is done so in the context of an existing urban fabric. The 8-acre parcel is adjacent to the Waiehu Heights and Waiehu Terrace subdivisions, as well as the planned Piihana Project District, as designated in the Wailuku-Kahului Community Plan.

- (6) **It may include lands which do not conform to the standards in paragraphs (1) to (5):**

- A. When surrounded by or adjacent to existing urban development; and
- B. Only when those lands represent a minor portion of this district.

Comment: The area proposed for reclassification is adjacent to existing urban development and activity. The 8-acres proposed for reclassification represent a minor portion of the 244,088 acres of Agricultural classified lands on the island of Maui (Maui County Data Book, 2007).

- (7) **It shall not include lands, the urbanization of which will contribute toward scattered spot urban development, necessitating unreasonable investment in public infrastructure or support services.**

Comment: The area proposed for reclassification is an infill location adjacent to other residential areas. As such, the area proposed for reclassification will be developed in the context of existing residential uses and will not contribute to spot development or burdensome infrastructure investments.

- (8) **It may include lands with a general slope of twenty percent or more if the commission finds that those lands are desirable and suitable for urban purposes and that the design and construction controls, as adopted by any federal, state, or county agency, are adequate to protect the public health, welfare and safety, and the public's interest in the aesthetic quality of the landscape.**

Comment: The Project Area contains slopes that face downward in a westerly direction of about 11 percent. County grading regulations will be followed to ensure the protection of public health, safety and welfare.

- (9) **The extent to which the proposed reclassification conforms to the applicable goals, objectives, and policies of the Hawaii state plan and relates to the applicable priority guidelines of the Hawaii state plan and adopted functional plans.**

Comment: The proposal to incorporate the land uses as envisioned in the Waiehu Mauka project is in alignment with overall theme, goals, objectives, and policies of Chapter 226, Hawaii Revised Statutes, relating to Hawaii State Planning Act. The applicable objectives, policies, and priority guidelines are set forth in Section C of this chapter.

- (10) **The extent to which the proposed reclassification conforms to the applicable district standards.**

Comment: The proposed reclassification conforms to Urban District standards as identified in Chapter 205-2 and is in keeping with the Maui County General Plan.

- (11) **The impact of the proposed reclassification on the following areas of state concern:**

A. Preservation or maintenance of important natural systems or habitats.

Comment: There are no important natural systems or habitats within the reclassification area.

B. Maintenance of valued cultural, historical or natural resources.

Comment: An archaeological inventory survey was carried out on the subject property. Refer to **Appendix “D”**. An archaeological monitoring and preservation plan for the property has been developed to appropriately cover the recommendations of the State Historic Preservation Division (SHPD). Refer to **Appendix “D-1”** and **Appendix “D-2”**. The property is not being used for cultural practices, therefore, adverse impacts to cultural resources are not anticipated as a result of reclassification.

C. Maintenance of other natural resources relevant to Hawaii's economy, including, but not limited to, agricultural resources.

Comment: The use of the subject property for affordable and market housing purposes will not compromise agricultural productivity for the island. The subject property was formerly used for agricultural operations and most recently for the staging of construction for an adjacent subdivision. Moreover, other natural resources are not anticipated to be adversely affected by the proposed action.

D. Commitment of State funds and resources.

Comment: The proposed reclassification will not require commitment of State funds or resources.

E. Provision for employment opportunities and economic development.

Comment: The Waiehu Mauka project as a whole will provide new employment opportunities for Maui residents. The residential projects will provide construction and service-related employment.

F. Provision for housing opportunities for all income groups, particularly the low, low-moderate, and gap groups.

Comment: The Waiehu Mauka project will provide affordable rental units and townhouse units for sale. The affordable housing parameters for the project include the provision of at least 94 percent of the units to families earning not more than 120 percent of the Maui County median income.

C. 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 development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. The proposed Waiehu Mauka project 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.

1. **Objectives and Policies of the Hawaii State Plan**

The proposed reclassification is in conformance with the following objectives and policies of the Hawaii State Plan:

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

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.

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.

226-5(b)(3), HRS: Promote increased opportunities for Hawaii’s people to pursue their socio-economic aspirations throughout the islands.

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

226-6 (b)(6), HRS: Strive to achieve a level of construction activity responsive to, and consistent with, State growth objectives.

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

226-11 (a)(2), HRS: Effective protection of Hawaii’s unique and fragile environmental resources.

226-11 (b)(3), HRS: Take into account the physical attributes of areas when planning and designing activities and facilities.

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

226-12(b)(5), HRS: Encourage the design of developments and activities that complement the natural beauty of the islands.

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

226-13(b)(2), HRS: Promote the proper management of Hawaii's land and water resources.

226-13(b)(6), HRS: Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.

226-13(b)(7), HRS: Encourage urban developments in close proximity to existing services and facilities.

226-19 Objectives and Policies for Socio-Cultural Advancement - Housing

226-19(a)(2), HRS: The orderly development of residential areas sensitive to community needs and other land uses.

226-19(b)(1), HRS: Effectively accommodate the housing needs of Hawaii's people.

226-19(b)(3), HRS: Increase homeownership, rental opportunities and choices in terms of quality, location, cost, densities, style and size of housing.

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.

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.

Chapter 226-23, HRS, Objectives and Policies for Socio-Cultural Advancement - Leisure

226-23(b)(4), HRS: Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.

2. Priority Guidelines of the Hawaii State Plan

The proposed action is in keeping with the following priority guidelines of the Hawaii State Plan.

Chapter 226-103, HRS, Economic Priority Guidelines:

226-103(1), HRS: Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.

A. Encourage investments which:

- (i) Reflect long-term commitments to the State;
- (ii) Rely on economic linkages within the local economy;
- (iii) Diversify the economy;
- (iv) Reinvest in the local economy;
- (v) Are sensitive to community needs and priorities; and
- (vi) Demonstrate a commitment to management opportunities to Hawaii residents.

Chapter 226-104, HRS, Population Growth and Land Resources Priority Guidelines

226-104(a)(1), HRS: Encourage planning and resource management to ensure that population growth rates throughout the State are consistent with available and planned resource capacities and reflect the needs and desires of Hawaii's people.

226-104(b)(1), HRS: Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures and away from areas where other important benefits are present, such as protection of important agricultural land or preservation of lifestyles.

226-104(b)(2), HRS: Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

226-104(b)(12), HRS: Utilize Hawaii's limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs

while ensuring the protection of the environment and the availability of the shoreline conservation lands, and other limited resources for future generations.

Chapter 226-106, HRS, Affordable Housing Priority Guidelines

226-106(1), HRS: Seek to use marginal or nonessential agricultural land and public land to meet housing needs of low- and moderate-income and gap-group households.

226-106(8), HRS: Give higher priority to the provision of quality housing that is affordable for Hawaii's residents and less priority to development of housing intended primarily for individuals outside of Hawaii.

D. STATE FUNCTIONAL PLANS

The State Functional Plans implement the Hawaii State Plan by identifying needs, problems, and issues, and by recommending policies and priority actions which address the identified areas of concern. The proposed reclassification request is consistent with the following State Functional Plans:

1. State Agricultural Functional Plan

The proposed action will reclassify approximately 8-acres of land from the State Agricultural district to the State Urban district. While the subject property was formerly utilized for the grazing of plantation mules and livestock, it is now fallow. The proximity of the subject property to existing and planned urban land uses provides a reasonable nexus and an appropriate foundation for the proposed reclassification request, particularly in the context of meeting affordable housing needs of the community.

2. State Housing Functional Plan

Recent news reports and the growing public demand for affordable housing indicates that demand for homes is strong on Maui, and specifically in the Central Maui area with continuing strength in demand anticipated. The 42 multi-family rental units, the 58 townhouse for sale units, and the six (6) single-family units within the proposed project will help to address a critical community need for a variety of housing types and options for families in different income categories.

E. 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 indicated by the Maui County Charter, the purpose of the general plan shall be to:

...indicate desired population and physical development patterns for each island within the county; shall address the unique problems and needs of each island and region within the county; 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

The Maui County General Plan contains five (5) major themes that focus on the overall goals of the plan. These themes were devised to reflect the general scope and priorities of the Maui County General Plan. The proposed project responds to the following theme:

Theme Number 5

Provide for needed resident housing:

- Amendments to the General Plan address the development of resident housing as a major social need in our community.

The proposed action is in keeping with the following General Plan objectives relating to population, land use, economic activity, housing, and urban design.

POPULATION

Objective

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.

Policies

- 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.
- Balance population growth by achieving concurrency between the resident employee work force, the job inventory created by new industries, affordable resident/employee housing, constraints on the environment and its natural resources, public and private infrastructure, and essential social services such as schools, hospitals, etc.

LAND USE

Objective

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

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

Objective

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

Policies

- Encourage land use methods that will provide a continuous balanced inventory of housing types in all price ranges.

- Encourage programs to stabilize affordable land and housing prices.

ECONOMIC ACTIVITY (General)

Objective

Utilize an equitable growth management program which will guide the economic well-being of the community.

Policy

- Encourage the adoption of a resource allocation program which gives a high priority to affordable residential projects.

HOUSING

Objective

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

Policies

- Provide or require adequate physical infrastructure to meet the demands of present and planned future affordable housing needs.
- Encourage the construction of housing in a variety of price ranges and geographic locations.
- Encourage the use of innovative performance standards and building methods to reduce housing costs to the consumer.
- Streamline or “fast-track” the governmental review process for affordable single-family housing projects.
- Make full use of State and Federal programs that provide financial assistance to renters and homebuyers.
- Ensure that each community plan region contains its fair share of affordable housing.

URBAN DESIGN

Objective

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

Policies

- Encourage community design that establishes a cohesive identity

F. WAILUKU-KAHULUI COMMUNITY PLAN

The subject parcel is located in the Wailuku-Kahului Community Plan region which is one (1) of nine (9) Community Plan regions established in the County of Maui. Planning for each region is guided by the respective Community Plans, which are designed to implement the Maui County General Plan. Each Community Plan contains recommendations and standards that guide the sequencing, patterns, and characteristics of future development in the region.

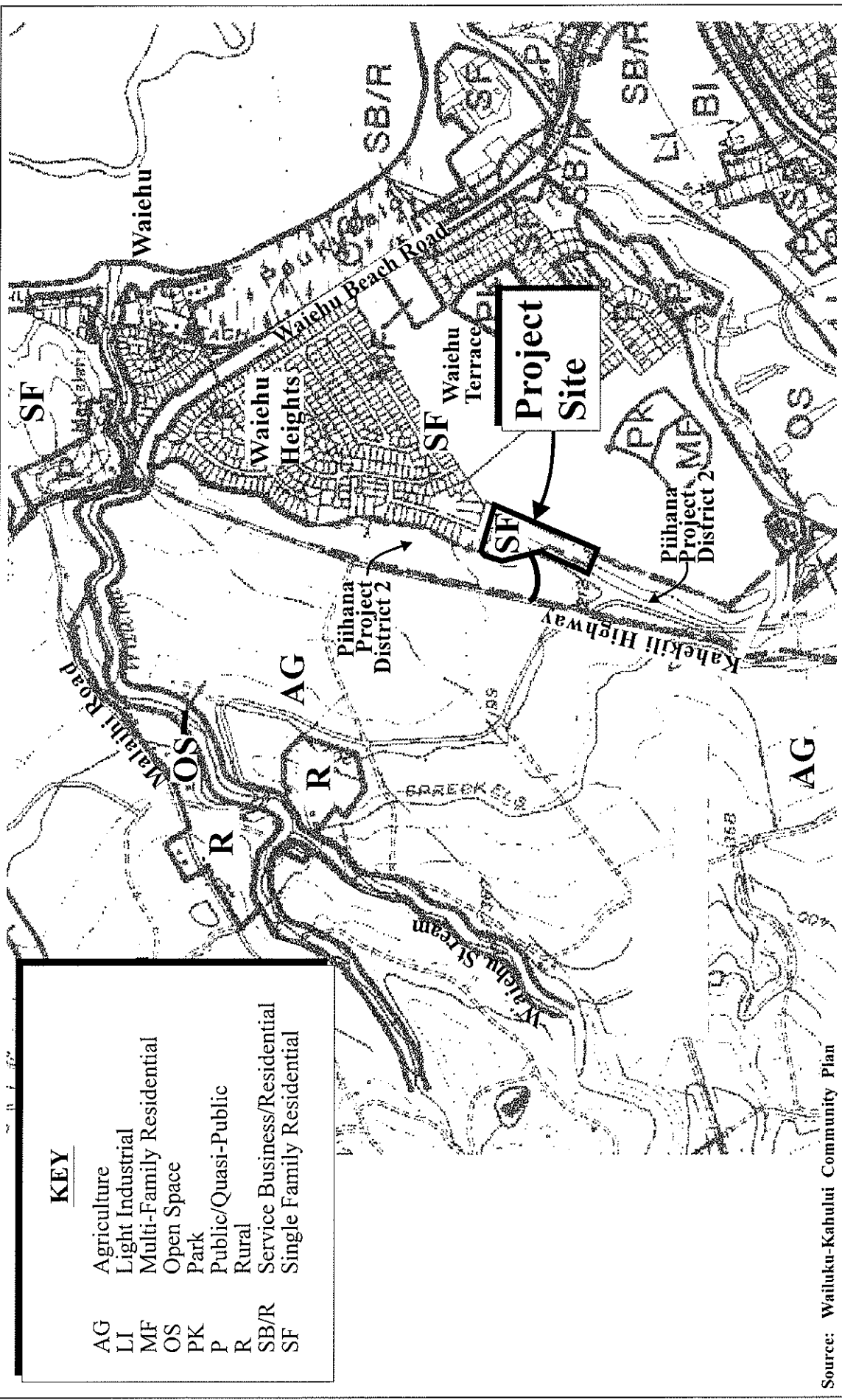
The land use map for the Wailuku-Kahului Community Plan designates the property for "Single-Family" use. See **Figure 11**. The Section 201H-38, HRS request for the project will include an exemption from the requirements of a Community Plan Amendment.

The Wailuku-Kahului Community Plan identified the lack of affordable housing as one of the area's major problems. As the cost of residential housing has dramatically increased in the past 10 to 15 years, the Community Plan recognizes that providing affordable housing opportunities for residents - specifically those earning below 80 percent of median income - needs to be aggressively pursued.

The proposed action is in keeping with the following Wailuku-Kahului Community Plan goals, objectives, policies, and implementing actions:

Goal - Housing

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



KEY	
AG	Agriculture
LI	Light Industrial
MF	Multi-Family Residential
OS	Open Space
PK	Park
P	Public/Quasi-Public
R	Rural
SB/R	Service Business/Residential
SF	Single Family Residential

Source: Wailuku-Kahului Community Plan

Figure 11



Proposed Waiehu Mauka
Affordable Housing Project
Community Plan Land Use Map

NOT TO SCALE



Prepared for: Lokahi Pacific

LokahiPac/Waiehu EA/ep10

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.
- Coordinate the planning, design and construction of public infrastructure improvements with major residential projects that have an affordable housing component.
- Plan, design and construct off-site public infrastructure improvements (i.e. water, roads, sewer, drainage, police and fire protection, and solid waste) in anticipation of residential, commercial and industrial developments defined in the Community Plan.
- Promote efficient housing designs in order to reduce residential home energy and water consumption.

Implementing Actions

- Develop a comprehensive housing strategy for low and moderate income groups involving government and private industry cooperation that provides an adequate supply of housing for the various strata of income. This approach would combine the resources of Federal, State, County and private enterprise to improve the availability of rental and ownership housing targeted to various need groups. Anti-speculation and specification of a percentage of low and moderate income units in major projects are tools which should be considered as part of an overall housing program.

- Develop procedures and regulations to streamline government review and approval for housing projects. This should result in cost reductions by expediting the time required for implementation.

Goal - Urban Design

An attractive and functionally integrated urban environment that enhances neighborhood character, promotes quality design, defines a unified landscape planting and beautification theme along major public roads and highways, watercourses and at major public facilities and recognizes the historic importance and traditions of the region.

Objectives and Policies for the Wailuku - Kahului Region in General

- Incorporate drought tolerant plant species and xeriscaping in future landscape planting.
- Use Native Hawaiian plants for landscape planting in public projects to the extent practicable.

G. MAUI COUNTY ZONING

The proposed Waiehu Mauka project site is zoned “Interim” by Maui County zoning. While the current zoning does not allow for the proposed multi-family residential uses, a 201H-38, HRS application is being filed with the Maui County Council. Included in the 201H-38 application is a request to exempt the project from the County’s Title 19 processes which will enable full project implementation.

H. HAWAII COASTAL ZONE MANAGEMENT PROGRAM

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. The subject property is not within the County of Maui’s Special Management Area.

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
 - (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 uses 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, and county authorities; and crediting such dedication against the requirements of Section 46-6, HRS.

Response: The project site is located inland, and to the west of the coastline. As such, the proposed action is not expected to impact coastal recreational opportunities or affect existing public access to the shoreline.

2. Historical/Cultural 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: An archaeological assessment was carried out on the subject property. An archaeological monitoring plan will be implemented in order to identify, protect, and preserve historic resources during ground altering activities. Should any archaeological remains or cultural materials be encountered during construction and excavation activities, work in the vicinity of the find will be stopped and the SHPD will be contacted to establish appropriate mitigation measures in accordance with Chapter 6E, Hawaii Revised Statutes.

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 that are not coastal dependent to locate in inland areas.

Response: The proposed affordable housing project will be designed to ensure visual compatibility with the surrounding land uses and character of the region. The low-rise multi-family units established by the proposed project plan will be buffered by landscaping to ensure visual screening and softening. The buildings will be approximately 28 feet to 29 feet in height. The proposed project is not anticipated to generate adverse impacts to the region's scenic or open space resources.

4. **Coastal Ecosystem**

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

Policies:

- a. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
- b. Improve the technical basis for natural resource management;
- c. Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
- d. 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
- e. Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Response: The proposed action is not expected to adversely impact coastal ecosystems. Runoff will be mitigated through onsite drainage improvements. Drainage system improvements will be designed in accordance with applicable regulatory standards to ensure that there is no adverse effect on downstream properties.

In addition, appropriate erosion control measures and Best Management Practices will be implemented to minimize the effects of stormwater runoff during construction of the project and to ensure that coastal ecosystems are not adversely impacted.

5. **Economic Use**

Objective: 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 will be a positive contribution to the local economy through the generation of affordable housing for Maui's residents and the creation of construction-related job opportunities. The proposed project is not contradictory to the objective and policies for economic use.

6. **Coastal Hazards**

Objective: Reduce hazard to life and property from tsunamis, 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; and
- d. Prevent coastal flooding from inland projects.

Response: The project site falls within Zone C, an area of minimal flooding. Drainage improvements will be designed in accordance with the Drainage Standards of the County of Maui to ensure that the project will not adversely affect downstream properties from the effects of flooding and erosion. Adverse impacts to hazard-sensitive areas are not anticipated as the project site is not located within a flood hazard district and is not located near the shoreline.

7. Managing Development

Objective: 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: Early consultation and public review are required as part of the Environmental Assessment process. Applicable State and County requirements will be adhered to in the design and construction of the proposed project.

8. Public Participation

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

Policies:

- a. Promote public involvement in coastal zone management processes;
- 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 issues, developments, and government activities; and
- c. Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Response: Opportunities for agency and public review will also be provided as part of the notification review and comment process required for the Environmental Assessment review process. Additionally, opportunity for public input will be offered through the review process for the Section 201H-38, HRS application for the proposed action.

9. Beach Protection

Objective: Protect beaches for public use and recreation.

Policies:

- a. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and 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 located upland, away from the shoreline, and is not anticipated to impact shoreline processes.

10. Marine Resources

Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

- a. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
- b. Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;
- c. 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;
- d. 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
- e. Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: As previously stated, the project is located inland, away from the ocean and is, therefore, not anticipated to have an impact on marine or coastal resources.

In addition to the foregoing objectives and policies, SMA permit review criteria pursuant to Act 224 (2005) provides that:

No Special Management Area Use Permit or Special Management Area Minor Permit shall be granted for structures that allow artificial light from floodlights, uplights, or spotlights used for decorative or aesthetic purposes when the light:

- (1) *Directly illuminates the shoreline and ocean waters; or*
- (2) *Is directed to travel across property boundaries toward the shoreline and ocean waters.*

As previously noted, the proposed affordable housing project is located away from the shoreline. The proposed project lighting design will specify the shielding of all lights and directional down lighting. The design considerations should mitigate light pollution and prevent lighting from traveling across property boundaries.

I. SECTION 201H-38, HAWAII REVISED STATUTES

Section 201H-38 of the Hawaii Revised Statutes (HRS) allows eligible developers/housing projects to be exempt from “*all statutes, ordinances, charter provisions, and rules of any governmental agency relating to planning, development improvement to land, and the construction of units thereon...*”, in order to facilitate the timely and cost effective implementation of proposed affordable housing projects. In coordination with the County of Maui’s Department of Housing and Human Concerns (DHHC), the Waiehu Mauka Affordable Housing Project has been determined to be an eligible project. Accordingly, a Section 201H-38, HRS application has been prepared and will be submitted to DHHC for review and transmittal to the Maui County Council. Upon receipt of the Section 201H-38, HRS request, the County Council shall have 45 days to render its decision on the request for exemptions.

The list of exemptions sought for this project is listed in **Appendix “B”** of this document. The proposed exemptions are intended to support the timely implementation of the project without compromising public health, safety, or welfare considerations.

J. OTHER REGULATORY APPROVALS

Activities necessitating requirements for Department of the Army (DA) permitting and Section 401 Water Quality Certification are not anticipated for the proposed project. Additionally, there are no other Federal permits or licenses required which would prompt the need for a Coastal Zone Management Consistency review.

**IV. SUMMARY OF
ADVERSE
ENVIRONMENTAL
EFFECTS WHICH
CANNOT BE AVOIDED**

IV. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Assessment of construction-related impacts, noise and air quality impacts, and potential impact on the physical and socio-economic environment, as well as an archaeological inventory survey were carried out as part of the environmental assessment documentation process. The proposed development will have a limited, unavoidable construction-related impact on the environment, as described in Chapter II.

In the short term, construction associated with the Waiehu Mauka project will have a temporary impact on air quality from dust generation and discharge of exhaust from construction equipment during ground altering activities and site grading. Appropriate BMPs will be incorporated to mitigate adverse impacts, including watering of exposed surfaces and regular maintenance of construction equipment, to minimize construction-related impacts.

Additional traffic is anticipated with the completion of this development due to project generated traffic flows and increased ambient traffic associated with regional population growth. Implementation of the traffic improvements outlined in the recommendations section of the Traffic Impact Assessment Report (TIAR) (refer to **Appendix “F”**) is anticipated to mitigate the anticipated traffic increases.

To minimize potential adverse impacts to natural resources in building design, the Office of Environmental Quality Control’s publication entitled “Guidelines for Sustainable Building Design in Hawaii” has been reviewed. As a result, the following low-impact development and sustainable design measures to conserve natural resources and to promote energy efficiency will be undertaken in the planning, design, construction, and operation of the project.

- Site buildings to take advantage of natural features and maximize their beneficial effects by providing for solar access, daylighting, and natural cooling.
- Design south, east, and west shading devices to minimize solar heat gain.
- Locate buildings to encourage bicycle and pedestrian access and pedestrian oriented uses.

- Consolidate utility and infrastructure in common corridors to minimize site degradation and cost, improve efficiency, and reduce impermeable surfaces.
- Provide tenant sub-metering to encourage utility use accountability.
- Design space for recycling and waste diversion opportunities during occupancy.

Construction of the Waiehu Mauka project will also generate short-term noise impacts which will be unavoidable. The use of properly maintained construction equipment will mitigate noise impacts caused by equipment. The incorporation of State Department of Health construction noise limits and curfew times is another measure to mitigate noise impacts caused by equipment.

V. ALTERNATIVES TO THE PROPOSED ACTION

V. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The proposed development of 100 multi-family units and six (6) single-family residential lots was deemed an appropriate use for the property given the surrounding single-family residential and urban type land uses.

This approach to development, incorporating both affordable multi-family units and market priced lots, was deemed appropriate in terms of surrounding uses and conditions. This alternative will provide much needed workforce housing in a location that is available and underused, and in proximity to similar land uses.

B. NO ACTION ALTERNATIVE

The “no action” alternative does not deal with the increasing need for affordable housing on Maui. As mentioned, area sales prices for multi-family units have been out of the reach for individuals and families at low- and low-moderate income levels. The site presents a beneficial opportunity to develop affordable housing surrounded by similar residential uses. If the “no action” alternative were implemented, the project site would continue to be underutilized as a vacant lot, surrounded by residential uses.

C. AGRICULTURAL USES

Agricultural use would involve neither a commitment of resources nor short- and long-term adverse environmental effects related to residential and commercial development. As a result, aside from potential water use impacts, the agricultural use alternative would not involve an increase of infrastructure or public service demands associated with project implementation.

However, as mentioned in the agriculture section of this document, the parcel’s geographic proximity to adjacent urban residential uses and the single-family land use designation for

the parcel in the Wailuku-Kahului Community Plan render agricultural uses of the property incompatible. The project site is isolated from other agricultural lands, making it difficult to cultivate. Moreover, the entire project site is considered “Other Important” agricultural lands, the lowest classified designation by the State Department of Agriculture.

D. ALTERNATIVE LOCATIONS

The Applicant’s mission is to provide affordable housing in the County of Maui. Lokahi Pacific has initiated and completed projects at various locations which provided for affordable residential units both with multi-family and single-family residences. The landowner approached the Applicant with the opportunity to utilize the project site for the development of affordable housing. As such, alternative locations for the proposed project were not examined.

E. ALTERNATIVES FOR OFFSITE WASTEWATER DISPOSAL

The preliminary engineering report prepared by R. T. Takana Engineers, Inc. in August 2009 provides an analysis of alternatives considered for offsite wastewater disposal. Refer to **Appendix “G”**. The following presents an analysis of each alternative. The alternatives presented discuss the rationale for selection and/or elimination from further consideration.

1. Haunani Street Tie-In (Option 1) - Preferred Alternative for Offsite Wastewater Disposal

As previously mentioned, this option would propose that wastewater flows from the multi-family housing be pumped into a new Sewer Man Hole (SMH) located within the Haunani Street cul-de-sac.

The Haunani Street Tie-In is preferred as an option for wastewater disposal since it would require minimal impacts to existing roadway infrastructure. From the Haunani Street cul-de-sac, the wastewater will gravity flow to the existing Paukukalo WPS via a series of 8-inch sewer lines along Haunani, Olena, and Analio Streets, and to 12-inch sewer pipes along Waiehu Beach Road. Refer to **Figure 8** and **Figure 9**.

Coordination with the Department of Environmental Management, Wastewater Division, will be carried out to ensure that wastewater capacity will be available for

the proposed project and to address any necessary improvements to the existing wastewater facilities in the area.

2. Makaala Drive Tie-In (Option 2)

In this alternative, wastewater would be pumped along a utility easement to Kahekili Highway. The wastewater flow would move southward along Kahekili Highway to its intersection with Makaala Drive, and discharge into a SMH at Makamua Street. From there, the wastewater would be transmitted to the Paukukalo WPS via an existing 8-inch sewer line at Makamua Street, and a 10-inch sewer line at Hilinai Street within the Waiehu Terrace Subdivision. Wastewater flows would also continue via a 10-inch sewer line within Pumehana Street, and a 12-inch sewerline at Kawanānakoā Street and conveyed to the Paukukalo WPS in the Paukukalo Residential Subdivision. Refer to **Figure 8**.

While coordination with the Department of Environmental Management, Wastewater Division, would be carried out to ensure that wastewater capacity will be available for the proposed project and to address any necessary improvements to the existing wastewater facilities in the area, this option is least preferred since it would require that wastewater to gravity flow through several areas throughout the region before reaching the Paukukalo WPS.

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed action will not entail a substantial commitment of public services or facilities. Development of the proposed project will involve a commitment of energy, labor, fiscal, and material resources. The use of these resources, when weighed against the expected benefit to be derived from the project, is not considered an adverse commitment.

VII. SIGNIFICANCE CRITERIA ASSESSMENT

VII. SIGNIFICANCE CRITERIA ASSESSMENT

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 criteria and preliminary analysis are provided.

1. **Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.**

Temporary environmental effects due to construction of subdivision improvements will occur. There are no known rare, threatened, or endangered species of flora, fauna, avifauna, or important habitats located within the project site. As mentioned previously, an archaeological monitoring plan will be implemented to identify, protect, and preserve historic resources discovered during ground altering activities. Should archaeological features, cultural artifacts, or human burials be located during construction activities, work in the immediate area of the find shall be promptly halted and the find protected from further disturbance. The State Historic Preservation Division (SHPD) will be immediately contacted to determine the significance of the find and establish appropriate mitigative measures, if necessary.

2. **Curtails the range of beneficial uses of the environment.**

The proposed action and the commitment of land resources will not curtail the range of beneficial uses of the environment. The proposed use of the property for workforce housing is compatible with surrounding residential uses. Fallow agricultural lands would be converted to home sites to help meet affordable housing needs of the community.

3. **Conflicts with the state’s long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.**

The State's Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statutes (HRS). The proposed action is consistent with the policies and guidelines of Chapter 344, HRS.

4. **Substantially affects the economic welfare, social welfare, and cultural practices of the community or State.**

The proposed action will have a beneficial effect on the local economy during construction. In the long term, the proposed project will provide a stable inventory of affordable rental units and opportunity for home ownership by Maui residents. In this regard, the project offers a social welfare benefit to Maui island residents.

5. **Substantially affects public health.**

No adverse impact to public health or welfare is anticipated as a result of the proposed action. The proposed 201H-38, HRS exemptions will not compromise public health or welfare.

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

A secondary impact is generally defined as an impact which is caused by a specific action and which takes place later in time or further removed in distance but is still reasonably foreseeable. The proposed action will provide affordable housing to meet the needs of current families earning up to 120 percent of the Maui County median income. Demands placed on public services and infrastructure are not considered substantial or adverse in this context.

7. **Involves a substantial degradation of environmental quality.**

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, effect on 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 from the action is anticipated.

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

The proposed development does not represent a commitment to larger actions. The scope of the project is focused on meeting the housing needs of Maui residents within the eight-acre project site.

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

There are no rare, threatened, or endangered species of flora, fauna, avifauna, or important habitats that will be adversely affected by the project. Refer to **Appendix "C"**.

10. **Detrimentially affects air or water quality or ambient noise levels.**

Construction activities will have an impact on air and noise quality; however, it will be minimal and temporary. Dust control measures, such as regular watering and sprinkling, will be implemented to minimize wind-blown emissions. Noise impact will be mitigated through limitation on construction to daylight work hours. Utilizing approved BMPs, water quality should not 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. **Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.**

The project site is situated inland and is not anticipated to have any adverse impact upon coastal waters or resources. An onsite drainage basin on a portion of the project site is expected to retain the runoff generated by the project. Further appropriate mitigation measures will be developed in consultation with the applicable governmental agencies during the design process. During construction, recommended BMPs will be implemented for erosion and sedimentation control.

12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.

The proposed development will not block scenic vistas or viewplanes. The project will not affect scenic corridors, coastal scenic, or open space resources. The project will incorporate open space areas that will provide view corridors within and throughout the project.

13. Requires 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 will not be substantially or excessively more than the energy consumed by similar developments throughout the region.

In summary, the site is situated at an attractive and central location in Waiehu, in close proximity to community services and commercial areas in the Wailuku region. Necessary infrastructure systems and services are within near proximity, or can be reasonably provided to serve the project. Residential development is not anticipated to have a significant adverse impact on the physical environment. The site is suitable for the development of multi-family and single-family housing to meet the housing needs of the region. In this context, a Finding of No Significant Impact is anticipated for the proposed action.

VIII. LIST OF PERMITS AND APPROVALS

VIII. LIST OF PERMITS AND APPROVALS

The following permits and approvals will be required prior to the implementation of the project:

State of Hawaii

1. State Land Use Commission District Boundary Amendment (Agricultural to Urban).
2. Requirements of the State of Hawaii Department of Health:
 - a. As applicable, project activities shall comply with the Administrative Rules of the Department of Health:

Chapter 11-39, Air Conditioning and Ventilation;
Chapter 11-45, Radiation Control;
Chapter 11-46, Community Noise Control;
Chapter 11-501, Asbestos Requirements;
Chapter 11-502, Asbestos-Containing Materials in Schools;
Chapter 11-503, Fees for Asbestos Removal and Certification;
Chapter 11-62, Wastewater Systems;
Chapter 11-60.1-33, Fugitive Dust;
Chapter 11-20, Rules Relating to Potable Water Systems;
Chapter 11-21, Cross-Connections and Backflow Control; and
Chapter 11-23, Underground Injection Control.
3. National Pollution Discharge Elimination System (NPDES) Permit.
4. Work to Perform in State Highway Right-of-Way (as applicable).

County of Maui

1. Section 201H-38, HRS approval by the Maui County Council.
2. Subdivision approval.
3. Construction Permits.

**IX. PARTIES
CONSULTED DURING THE
PREPARATION OF THE
DRAFT ENVIRONMENTAL
ASSESSMENT; LETTERS
RECEIVED; AND
RESPONSES TO
SUBSTANTIVE
COMMENTS**

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

- | | |
|---|--|
| <p>1. Ranae Ganske-Cerizo, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, Hawaii 96793-2100</p> | <p>7. Dan Davidson, Executive Director
Hawaii Housing Finance and Development Corporation
677 Queen Street
Honolulu, Hawaii 96813</p> |
| <p>2. George Young
Chief, Regulatory Branch
U.S. Department of the Army
U.S. Army Engineer District, Honolulu
Regulatory Branch
Building 230
Fort Shafter, Hawaii 96858-5440</p> | <p>8. Theodore E. Liu, Director
State of Hawaii
Department of Business, Economic Development & Tourism
P.O. Box 2359
Honolulu, Hawaii 96804</p> |
| <p>3. Gordon Furutani, Field Office Director
U. S. Department of Housing and Urban Development
500 Ala Moana Boulevard, Suite 3A
Honolulu, Hawaii 96813-4918</p> | <p>9. Patricia Hamamoto, Superintendent
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804</p> |
| <p>4. Patrick Leonard
Field Supervisor
U. S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm. 3-122
Box 50088
Honolulu, Hawaii 96813</p> | <p>10. Heidi Meeker
Planning Section
Office of Business Services
Department of Education
809 Eighth Avenue
Honolulu, Hawaii 96816</p> |
| <p>5. Russ K. Saito, State Comptroller
Department of Accounting and General Services
1151 Punchbowl Street, #426
Honolulu, Hawaii 96813</p> | <p>cc: Bruce Anderson, Complex Area
Superintendent (Central/Upcountry
Maui)</p> |
| <p>6. Sandra Lee Kunimoto, Chair
Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814-2512</p> | <p>11. Micah Kane, Chairman
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu, Hawaii 96805</p> |

12. Chiyome Fukino, M.D., Director
State of Hawaii
Department of Health
919 Ala Moana Blvd., Room 300
Honolulu, Hawaii 96814
13. Alec Wong, P.E., Acting Chief
Clean Water Branch
State of Hawaii
Department of Health
919 Ala Moana Blvd., Room 300
Honolulu, Hawaii 96814
14. Herbert Matsubayashi
District Environmental Health
Program Chief
State of Hawaii
Department of Health
54 High Street
Wailuku, Hawaii 96793
15. Laura Thielen, Chairperson
State of Hawaii
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809
16. Bryan Flower, Interim Administrator
State of Hawaii
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawaii 96707
17. Hinano Rodrigues
Maui/Lanai Islands Burial Council
130 Mahalanai Street
Wailuku, Hawaii 96793
18. Barry Fukunaga, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813
- cc: Fred Cajigal
19. Katherine Kealoha, Director
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235 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813
20. Clyde Namu'o
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
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21. Mary Lou Kobayashi, Administrator
State of Hawaii
Office of Planning
P.O. Box 2359
Honolulu, Hawaii 96804
22. Rodney Maile, Interim Executive Officer
State of Hawaii
State Land Use Commission
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Honolulu, Hawaii 96804
23. Neal Bal, Deputy Chief
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Department of Fire and Public Safety
200 Dairy Road
Kahului, Hawaii 96732
24. Vanessa A. Medeiros, Director
County of Maui
Department of Housing and Human Concerns
200 South High Street
Wailuku, Hawaii 96793
25. Tamara Horcajo, Director
County of Maui
Department of Parks and Recreation
700 Halia Nakoia Street, Unit 2
Wailuku, Hawaii 96793
26. Jeffrey Hunt, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793
27. Thomas Phillips, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawaii 96793
28. Milton Arakawa, Director
County of Maui
Department of Public Works
200 South High Street
Wailuku, Hawaii 96793

29. Cheryl Okuma, Director
County of Maui
Department of Environmental Management
One Main Plaza
2200 Main Street, Suite 176
Wailuku, Hawaii 96793
30. Donald Medeiros, Director
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Department of Transportation
200 South High Street
Wailuku, Hawaii 96793
31. Jeffrey Eng, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793
32. G. Riki Hokama, Council Chair
Maui County Council
200 South High Street
Wailuku, Hawaii 96793
33. Danny Mateo, Council Vice Chair
Maui County Council
200 South High Street
Wailuku, Hawaii 96793
34. Councilmember Michelle Anderson
Maui County Council
200 South High Street
Wailuku, Hawaii 96793
35. Councilmember Gladys Baisa
Maui County Council
200 South High Street
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36. Councilmember Jo Anne Johnson
Maui County Council
200 South High Street
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37. Councilmember Bill Medeiros
Maui County Council
200 South High Street
Wailuku, Hawaii 96793
38. Councilmember Michael J. Molina
Maui County Council
200 South High Street
Wailuku, Hawaii 96793
39. Councilmember Joseph Pontanilla
Maui County Council
200 South High Street
Wailuku, Hawaii 96793
40. Councilmember Mike Victorino
Maui County Council
200 South High Street
Wailuku, Hawaii 96793
41. **Hawaiian Telcom**
60 South Church Street
Wailuku, Hawaii 96793
42. Neal Shinyama, Manager – Engineering
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawaii 96733
43. **Alu Like, Inc.**
1977 Kaohu Street
Wailuku, Hawaii 96793



REPLY TO
ATTENTION OF:

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

MAY 29 2008

May 23, 2008

Regulatory Branch

File Number POH-2008-124

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

Dear Ms. Dagdag:

We have received your April 24, 2008, request for early consultation comments in preparation of a Draft Environment Assessment (EA) for the proposed development of Waiehu Mauka Residential Housing project. The proposed project site is located within TMK (2) 3-3-001:102 and a portion of (2)3-3-001:016, at Latitude 20.907° N. and Longitude 156.499° W., in Wailuku, Maui. This project has been assigned File number POH-2008-124, which should be referred to in all future correspondence with us.

We recommend the draft EA address whether any potential waters of the U.S., as represented by the presence of perennial, intermittent or ephemeral streams or wetlands, are in, adjacent to or flow through, the land parcels subject to development. The EA should also disclose whether any streams or other aquatic resources that may occur within the land parcel have an existing direct or indirect surface water connection to the Pacific Ocean.

Section 404 of the Clean Water Act requires that a Department of the Army (DA) permit be obtained for the discharge of dredged and/or fill material into waters of the U.S., including jurisdictional wetlands (33 U.S.C. 1344). The Corps defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Section 10 of the Rivers and Harbors Act of 1899 requires that a DA permit be obtained for structures or work in or affecting navigable waters of the U.S. (33 U.S.C. 403). Section 10 waters are those waters subject to the ebb and flow of the tide shoreward to the mean high water mark.

We appreciate the opportunity to provide comments on the proposed development project and associated EA. Should you have any questions, please contact Mr. Benjamin Soiseth of my staff at (808) 438-2039 or at Benjamin.N.Soiseth@usace.army.mil. For additional information about our Regulatory Program, visit our web site at <http://www.poh.usace.army.mil/EC-R/EC-R.htm>.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch



MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

George Young, P.E.
Chief, Regulatory Branch
Department of the Army
U. S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Young:

Thank you for your letter dated May 23, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we wish to provide the following information in response to your comments in the order presented in the memorandum.

1. The Draft Environmental Assessment (EA) will include an analysis of potential impacts to waters of the United States, via streams or aquatic resources that directly connect with the Pacific Ocean. This information can be found in Section II.D.4 Drainage of the Draft EA.
2. The applicant acknowledges your recommendations to obtain a Department of the Army (DA) permit for any discharge of dredged and/or fill material into the Pacific Ocean and to jurisdictional wetlands (33 U.S.C. 1344). The applicant notes that discharge of dredged and/or fill material into the Pacific Ocean or jurisdictional wetlands is not anticipated.
3. The applicant acknowledges your recommendations to obtain a DA permit for structures or work in or affecting navigable waters of the United States. The applicant notes that the proposed project does not involve structures or work affecting navigable waters of the United States.

Copies of the Chapter 343 Draft EA, which include the preliminary drainage report and the schematic development plans, will be provided to your office for review and comment.

George Young, P.E.
October 9, 2009
Page 2

We appreciate the input from your office. Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineering, Inc.

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United States Department of the Interior



FISH AND WILDLIFE SERVICE
 Pacific Islands Fish and Wildlife Office
 300 Ala Moana Boulevard, Room 3-122, Box 50088
 Honolulu, Hawaii 96850

In Reply Refer To:
 2008-TA-0185
 2008-FA-0118

JUN 0 4 2008

Ms. Rowena Dagdag
 Munekiyo and Hiraga, Inc.
 305 High Street, Suite 104
 Wailuku, Hawaii 96793

Subject: Request for Technical Assistance for Proposed Reclassification and Development of Waiehu Mauka Residential Project, TMK (2) 3-3-001:102 and 016(por.), Wailuku, Maui, Hawaii

Dear Ms. Dagdag:

Thank you for your April 24, 2008, letter indicating that you are compiling information that will be incorporated into an environmental assessment for a change in zoning and development of an 8.5-acre area of parcels TMK (2) 3-3-001:102 and 016(por.), in Wailuku, Maui. We received your request on April 28, 2008, and on May 28, 2008, you extended our comment period until June 4, 2008. Based on the project information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, the endangered *Scaevola coriacea* (Dwarf naupaka) occurs within the proposed project area. In addition, the threatened Newell's shearwater (*Puffinus auricularis newelli*) and endangered Hawaiian petrel (*Pterodroma phaeopygia sandwichensis*) (collectively referred to as seabirds), endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), and endangered Hawaiian goose (*Branta sandvicensis*) are known to occur and use habitats within the vicinity of the proposed project.

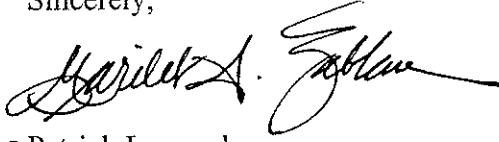
Because parcel specific data are not available, we recommend you have qualified botanists and biologists conduct surveys for federally listed species within the project area. Please contact our office for survey method recommendations. We further recommend that within your planning documents, you address any potential project impacts to listed species and include measures to avoid or minimize project impacts to these species. We provide the following recommendations to assist you in developing your environmental assessment:

- We recommend the site be surveyed by a qualified botanist for *Scaevola coriacea* (Dwarf naupaka). If any individuals of this species are found within the project area, you should contact our office for additional information regarding actions to address potential project impacts to this species.

- Construction equipment, signs, poles, and other structures associated with the project could pose a flight obstacle to the night-flying seabirds during the breeding season. Any increase in the use of night-time lighting, particularly during each year's peak fallout period, could result in seabird disorientation, fallout, and injury or mortality. Potential impacts to seabirds could be minimized by shielding outdoor lights associated with the project, avoiding night-time construction, and providing all project staff and residents with information about seabird fallout. All lights, including street lights, should be shielded so the bulb can be seen only from below. Use of lights at night during the peak fallout period of September 15 through December 15 should be avoided.
- To avoid impacts to the endangered Hawaiian hoary bat, woody plants suitable for bat roosting should not be removed or trimmed during the bat birthing and pup rearing season (April to August) and use of barbed wire in fences should be prohibited. If this avoidance measure can not be implemented, bat surveys are recommended in areas where tree cutting or fence construction is planned.
- The endangered Hawaiian goose may be attracted to ditches and mowed grass areas in the project area, increasing their vulnerability to collision with vehicles and exposure to domesticated animal predators. If the Hawaiian goose is found in the project area, you should contact our office for additional information regarding actions to address potential impacts to this species.
- To minimize erosion, sedimentation, and other adverse impacts to aquatic fish and wildlife resources and nearby coral reef ecosystems, we recommend that applicable measures identified in the enclosed list of Standard Best Management Practices for fish and wildlife be incorporated into the project's plan.
- We recommend using native plants for landscaping purposes in order to reduce the spread of non-native invasive species. If native plants do not meet your landscaping objectives, we recommend that you choose species that are thought to have a low risk of becoming invasive. The following websites are good resources to use when choosing landscaping plants: Pacific Island Ecosystems at Risk (<http://www.hear.org/Pier/>), Hawaii-Pacific Weed Risk Assessment (http://www.botany.hawaii.edu/faculty/daehler/wra/full_table.asp) and Global Compendium of Weeds (www.hear.org/gcw).

If, you determine the proposed development may adversely impact federally listed species, please contact our office for further assistance. If you have questions or would like additional information, please contact Consultation and Technical Assistance Program Fish and Wildlife Biologist, Dawn Greenlee (phone: 808-792-9400; fax: 808-792-9581).

Sincerely,


for Patrick Leonard
Field Supervisor

Enclosure

**US Fish and Wildlife Service
Recommended Standard Best Management Practices**

The Fish and Wildlife Service recommends that the following measures be incorporated into projects to minimize the degradation of water quality and impacts to aquatic fish and wildlife resources:

- a. Turbidity and siltation from project-related work will be minimized and contained to within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse weather conditions;
 - b. dredging and filling in the aquatic environment will be designed to avoid or minimize the loss special aquatic site habitat (pool/riffle areas, wetlands, etc.) and the unavoidable loss of such habitat will be compensated for;
 - c. all project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water will be cleaned of pollutants prior to use;
 - d. no project-related materials (fill, revetment rock, pipe, etc.) will be stockpiled in the water (stream channels, wetlands, etc.);
 - e. all debris removed from the aquatic environment will be disposed of at an approved upland or ocean dumping site;
 - f. no contamination (trash or debris disposal, alien species introductions, etc.) of adjacent aquatic environments (stream channels, wetlands, etc.) will result from project-related activities;
 - g. fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project will be developed. Absorbent pads and containment booms will be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases;
 - h. any under-layer fills used in the project will be protected from erosion with (rock, core-loc units, etc.) as soon after placement as practicable; and
 - i. any soil exposed near water as part of the project will be protected from erosion (with plastic sheeting, filter fabric, etc.) after exposure and stabilized as soon as practicable (with vegetation matting, hydroseeding, etc.).
-

October 9, 2009

Patrick Leonard
Field Supervisor
United States Department of the Interior
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Leonard:

Thank you for your letter dated June 4, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we wish to provide the following information in response to your comments in the order presented in the memorandum (Reference No. 2008-TA-0185 and 2008-FA-0118). We offer the following comments, in response to your remarks.

1. A biological survey of the project site was conducted by Robert Hobby in May 2008. The survey report indicates that there are no known rare, endangered, or threatened species of flora and fauna located within or in the vicinity of the project site. A copy of the biological survey will be included in the Draft Environmental Assessment (EA).
2. The applicant acknowledges your recommendation to survey the project area for the dwarf naupaka (*Scaevola coriacea*). The biological survey report identified 46 plant species during the site visits to the property, which did not include the dwarf naupaka.
3. It is anticipated that there will be no night construction associated with the development of the project. Moreover, all project related lighting, including street lights, will be shielded.
4. The applicant acknowledges your comment relating to the protection of the Hawaiian hoary bat during the bat birthing and pup rearing season of April to August. During this specified time period, protection measures will be in place to


avoid any impacts to the Hawaiian hoary bat. It is noted that the biological assessment conducted on the site also made an effort to observe if any Hawaiian hoary bats were present in the vicinity. It was noted that the low grass vegetation existing at the site was not seen as a suitable habitat for the bat.

The dry sandy habitat of the project area is not suitable for the Hawaiian goose. They are typically found in lush and grassy areas, such as irrigated lawns and golf courses. The applicant will coordinate with your office to ensure that measures will be implemented to address potential impacts to the Hawaiian goose in the event that a group of them are found at the project site.

5. The list of Standard Best Management Practices (BMP) for fish and wildlife will be forwarded to the applicant's civil engineer for incorporation in project construction documents to prevent erosion, sedimentation, and other potential adverse impacts to aquatic fish and wildlife resources in the vicinity of the project site.
6. The applicant acknowledges your recommendation to use native plants for landscaping purposes. Your letter will be provided to the project architect for consideration of special native plants or species that have a low risk of being invasive.

We appreciate the input we received from your office. A copy of the Draft EA will be provided for your review and comment. Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineering, Inc.
Robert Hobdy

F:\DATA\LokahiPac\Waiehu EA\USFWS.ecres.wpd

JUN 1 1 2008

LINDA LINGLE
GOVERNOR



RUSS K. SAITO
COMPTROLLER

BARBARA A. ANNIS
DEPUTY COMPTROLLER

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

(P)1144.8

JUN - 6 2003

Ms. Rowena Dagdag
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

Subject: Early Consultation for Draft Environmental Assessment
Proposed Waiehu Mauka Residential Project
Wailuku, Island of Maui, Hawaii
TMK (2) 3-3-001:016 (por) and 102

The project does not impact any of the Department of Accounting and General Services' projects or existing facilities and we have no comments to offer.

If there are any questions regarding the above, please have your staff call Mr. David DePonte of the Planning Branch at 586-0492.

Sincerely,

ERNEST Y. W. LAU
Public Works Administrator

DD:vca

c: Mr. David Victor, DAGS Maui District Office

MAY 08 2008

LINDA LINGLE
GOVERNOR



ORLANDO "DAN" DAVIDSON
EXECUTIVE DIRECTOR

STATE OF HAWAII

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM
HAWAII HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
Honolulu, Hawaii 96813
FAX: (808) 587-0600

IN REPLY REFER TO:

08:PEO/53

May 7, 2008

Ms. Rowena Dagdag
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

Re: Early Consultation for Proposed Waichu Mauka Residential Project, Wailuku,
Maui, Hawaii, TMK: (2) 3-3-001:016 (port) and 102

The proposed project will provide affordable rental and for-sale housing opportunities for 100 households earning less than 80 percent of the area median income, as well as market housing opportunities for six households. The project is consistent with the affordable housing policy set forth in the Hawaii State Plan of increasing homeownership and rental opportunities and choices in terms of quality, location, cost densities, style and size of housing.

Thank you for the opportunity to comment.

Sincerely,

Orlando "Dan" Davidson
Executive Director

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[Faint, illegible text, likely a scan artifact or bleed-through from the reverse side of the page.]



MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

Karen Seddon, Executive Director
State of Hawaii
Department of Business, Economic Development and Tourism
Hawaii Housing Finance and Development Corporation
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Ms. Seddon:

We are writing to you on behalf of the applicant, Lokahi Pacific, Inc., to thank your department for a letter dated May 7, 2008 (Reference No. 08:PEO/53), responding to our request for early consultation comments for the proposed Waiehu Mauka Affordable Housing project located in Wailuku, Maui, Hawaii.

Since our letter of April 24, 2008, the project has been planned to provide affordable rental and for-sale housing opportunities for 100 households earning below 50 and up to 120 percent of the area median income (AMI), and will also include market housing opportunities for six (6) households. The 58 condo units will be offered at prices affordable to those earning between 51 and 120 percent of the AMI and the rental units will be offered at prices affordable to those earning 50 percent of the AMI and below.

We appreciate the input we received from your office. A copy of the Draft EA will be provided for your review and comment.

Karen Seddon, Executive Director
October 9, 2009
Page 2

Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.

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STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

May 16, 2008

Ms. Rowena Dagdag, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

Subject: Early Consultation Request for the Proposed Waiehu Mauka Residential
Workforce Housing Project at TMK (2) 3-3-001:016 (por.) and 102
Wailuku, Maui, Hawaii

The Department of Education (DOE) has reviewed your request for early consultation on the proposed Waiehu Mauka Housing Project.

The 2007 Legislature passed a bill establishing school impact fees. The bill became Act 245 and is in the process of being implemented. We believe that it is very likely that Waiehu will be in an impact district under the new law and will be required to pay an impact fee. If the project falls within an impact district, the DOE will meet with the developers of the project to discuss impact fees.

The table below shows actual and projected enrollment at schools servicing the area. Please note that Waihee Elementary School is currently operating above facility capacity and that both Waihee Elementary and Wailuku Elementary are projected to be well over capacity for the 2012 school year.

BALDWIN COMPLEX			
School	Enrollment 2007	Capacity '06-'07	Projected Enrollment 2012
WAIHEE	819	775	838
WAILUKU	894	1076	1312

Ms. Rowena Dagdag

Page 2

May 8, 2008

We request more detailed information, prior to the publication of the Environmental Assessment, on the general price range for each residential plan.

Thank you for the opportunity to offer our early comments. If you have any questions, please call George Casen of our Facilities Development Branch at (808) 377-8308.

Very truly yours,



Patricia Hamamoto
Superintendent

PH:jmb

c: Randolph Moore, Assistant Superintendent, OSFSS
Duane Kashiwai, Public Works Administrator, FDB
Bruce Anderson, CAS, Baldwin/King Kekaulike/Maui High Complex Areas



MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

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

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Ms. Hamamoto:

We are writing to you on behalf of the applicant, Lokahi Pacific, Inc., to thank you for your letter dated May 16, 2008, regarding the proposed Waiehu Mauka Affordable Housing project located in Wailuku, Maui, Hawaii.

The applicant acknowledges that the 2007 Legislature passed a bill establishing school impact fees. As a 94 percent affordable housing development, the applicant will continue coordination with the Department of Education to ensure that impacts to school facilities are reasonably considered, ensuring that the affordability objectives of the project are achieved.

The affordable housing distribution and pricing for this project are contained in Table 1 below.

Table 1. Affordable Housing Distribution

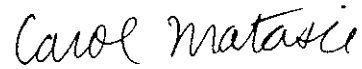
FOR SALE UNITS				
Target Income Group	Product Type	No. of Units	Sales Price Range ^{1,2}	
101-120% AMI Moderate	4- bedroom	3	\$381,915.00 to \$416,645.00	
81-100% AMI Below Moderate	4- bedroom	3	\$312,455.00 to \$347,185.00	
101-120% AMI Moderate	3- bedroom	6	\$332,100.00 to \$362,300.00	
81-100% AMI Below Moderate	3- bedroom	24	\$271,700.00 to \$301,900.00	
51-80% AMI Low	3- bedroom	22	\$181,200.00 to \$241,500.00	
RENTAL UNITS				
Target Income Group	Product Type	No. of Units	County Affordable Rent Guidelines ³	Lokahi Pacific Proposed Rents ⁴
<50% AMI Very Low	2-bedroom	14	\$848.00	\$792.00
	1-bedroom	28	\$707.00	\$668.00
TOTAL AFFORDABLE UNITS		100		
¹ Sales/Rental Price Range based on 2009 County of Maui Affordable Sales Price Guidelines effective March 20, 2009. ² Sales Price based on prevailing interest rate of 5.875% per County. ³ County Affordable Rents based on 30% of gross monthly income and do not include utilities. ⁴ Lokahi Pacific proposed monthly rents based on HOME Program rent structure and include water/sewer and an allowance for electricity.				

Patricia Hamamoto, Superintendent
October 9, 2009
Page 3

We appreciate the input we received from your office. A copy of the Draft EA will be provided for your review and comment.

Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group

F:\DATA\LokahiPaciWaiehu EA\DOE.ecres.wpd

AUG 06 2008

PHONE (808) 594-1888

FAX (808) 594-1865



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

HRD08/3699

August 4, 2008

Rowena Dagdag, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

**RE: Request for pre-consultation on the proposed Waiehu Mauka Residential Project,
Wailuku, Maui; TMKs: 3-3-001:016 and 102**

Aloha e Rowena Dagdag,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter requesting comments. The proposed project would allow Lokahi Pacific to develop the Waiehu Mauka Residential Workforce Housing project, including 100 multi-family unites in 18 buildings and six single-family residential lots. OHA has reviewed the project, apologizes for the delayed response and has no comments at this time.

We look forward to the opportunity to review the forthcoming Draft Environmental Assessment for this project, however, and will offer substantive comments at that time. Thank you for the opportunity to comment now. If you have further questions, please contact Heidi Guth at (808) 594-1962 or e-mail her at heidig@oha.org.

'O wau iho nō me ka 'ōia'i'ō,

A handwritten signature in black ink, appearing to read "Clyde W. Nāmu'ō".

Clyde W. Nāmu'ō
Administrator

C: OHA – Maui Community Resources Coordinator

October 9, 2009

Clyde Nāmu`o
State of Hawaii
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Nāmu`o:

Thank you for your letter dated August 4, 2008, commenting on the subject project. We appreciate the input that we received from your office and would like to note that coordination will be undertaken with individuals familiar with the project area. A cultural impact assessment and an archaeological inventory survey have been prepared and will be included in the Draft Environmental Assessment (EA). Additionally, we would like to note that since our request for early consultation comments, revisions to the project plans have been made and are included in the Draft EA. The project will continue to provide 100 multi-family units which will now be situated in twenty (20) buildings as opposed to eighteen (18) buildings mentioned in our early consultation request letter. A copy of the Draft EA will be provided for your review and comment.

Should you have any questions, please do not hesitate to call me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Mike Dega, Scientific Consulting Services, Inc.

F:\DATA\LokahiPac\Waiehu EA\OHA.ecres.wpd

MAY 14 2008

LINDA LINGLE
GOVERNOR OF HAWAII



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

LORRIN W. PANG, M. D., M. P. I.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2102

May 12, 2008

Ms. Rowena Dagdag
Munekiyo & Hiraga, Inc.
305 South High Street, Suite 104
Wailuku, Hawai'i 96793

Dear Ms. Dagdag:

Subject: **Proposed Waiehu Mauka Residential Project, Wailuku, Maui
TMK: (2) 3-3-001:016 (por.) and 102**

Thank you for the opportunity to participate in the early consultation process for the proposed residential project. The following comments are offered:

1. National Pollutant Discharge Elimination System (NPDES) permit coverage is required for this project. The Clean Water Branch should be contacted at 808 586-4309.
2. The noise created during the construction phase of the project may exceed the maximum allowable levels as set forth in Hawaii Administrative Rules (HAR), Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work.
3. HAR, Chapter 11-46 sets maximum allowable sound levels from stationary equipment such as compressors and HVAC equipment. The attenuation of noise from these sources may depend on the location and placement of these types of equipment. This should be taken into consideration during the planning, design, and construction of the building and installation of these types of equipment.

Ms. Rowena Dagdag
May 12, 2008
Page 2

It is strongly recommended that the Standard Comments found at the Department's website: <http://hawaii.gov/health/environmental/env-planning/landuse/landuse.html> be reviewed, and any comments specifically applicable to this project should be adhered to.

Should you have any questions, please call me at 808 984-8230.

Sincerely,

A handwritten signature in black ink, appearing to read 'H. Matsubayashi', enclosed within a hand-drawn oval border.

Herbert S. Matsubayashi
District Environmental Health Program Chief

c: EPO

October 9, 2009

Patti Kitkowski
Acting Environmental Health
Program Chief
State of Hawaii
Department of Health
54 High Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Ms. Kitkowski:

We are writing to you on behalf of the applicant, Lokahi Pacific, Inc., to thank you for your department's letter dated May 12, 2008, regarding the proposed Waiehu Mauka Affordable Housing project located in Wailuku, Maui.

We offer the following comments in response to your department's remarks:

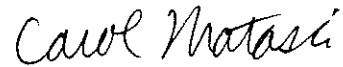
1. The applicant's civil engineer will coordinate with the Clean Water Branch to address applicable National Pollutant Discharge Elimination System (NPDES) permit requirements for the project.
2. Pursuant to Hawaii Administrative Rules (HAR), Chapter 11-46, "Community Noise Control", a noise permit will be secured prior to commencement of construction, as applicable.
3. The planning, design, and construction of the project will be undertaken in accordance with the maximum allowable sound levels as set forth by HAR, Chapter 11-46.
4. The applicant will review the Department of Health's standard comments and will adhere to comments specifically applicable to this project.

We appreciate the input we received from the department. A copy of the Draft EA will be provided for your review and comment.

Patti Kitkowski
October 9, 2009
Page 2

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineering, Inc.
David Lundquist, Maui Architectural Group

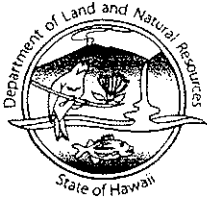
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MAY 22 2008

LINDA LINGLE
GOVERNOR OF HAWAII



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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 21, 2008

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

Attention: Ms. Rowena Dagdag

Dear Ms. Dagdag:

SUBJECT: Proposed Waiehu Mauka Residential Project at Wailuku, Maui,
Hawaii; TMK: (2) 3-3-001:016(por.) and 102

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from the Division of Forestry and Wildlife and the Maui District office of the Land Division on the subject matter. Should you have any questions, please feel free to call my office at 587-0433. Thank you.

Sincerely,


Morris M. Atta
Administrator

Enclosures

LINDA LINGLE
GOVERNOR OF HAWAII



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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 1, 2008

RECEIVED
LAND DIVISION
2008 MAY -6 P 3:33
HONOLULU, HAWAII

MEMORANDUM

- TO: **DLNR Agencies:**
- Div. of Aquatic Resources
 - Div. of Boating & Ocean Recreation
 - Engineering Division
 - Div. of Forestry & Wildlife
 - Div. of State Parks
 - Div. of Water Resource Management
 - Office of Conservation & Coastal Lands
 - Land Division - (~~Hawaii~~ District office)

RECEIVED
08 MAY -5 AM 10:43
FORESTRY & WILDLIFE
STATE OF HAWAII

Maui

FROM: *for* Morris M. Atta *Charlene*

SUBJECT: Proposed Waiehu Mauka Residential Project

LOCATION: Wailuku, Maui, Hawaii; TMK: (2) 3-3-001:016 (por.) and 102

APPLICANT: Lokahi Pacific, in partnership with Pacific Rim Land, Inc.

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 20, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *Paul J. Conry*
Date: MAY - 5 2008

**PAUL J. CONRY, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE**

cc: Central Files

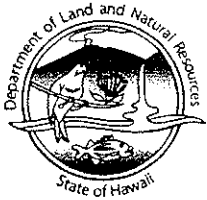
LINDA LINGLE
GOVERNOR OF HAWAII



RECEIVED
MAUI DISTRICT
LAND DIVISION

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

2008 MAY -5 PM 3: 35



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 1, 2008

MEMORANDUM

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division
- Div. of Forestry & Wildlife
- Div. of State Parks
- Div. of Water Resource Management
- Office of Conservation & Coastal Lands
- Land Division - (~~Honolulu~~ District office)

RECEIVED
LAND DIVISION
2008 MAY -8 A 11: 31
MAUI DISTRICT OFFICES
STATE OF HAWAII

Maui

FROM:

to Morris M. Atta *Charlene*

SUBJECT:

Proposed Waiehu Mauka Residential Project

LOCATION:

Wailuku, Maui, Hawaii; TMK: (2) 3-3-001:016 (por.) and 102

APPLICANT:

Lokahi Pacific, in partnership with Pacific Rim Land, Inc.

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 20, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *aa*

Date: *5/6/08*

cc: Central Files

MAY 23 2008

LINDA LINGLE
GOVERNOR OF HAWAII



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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 22, 2008

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

Attention: Ms. Rowena Dagdag

Dear Ms. Dagdag:

SUBJECT: Proposed Waichu Mauka Residential Project at Wailuku, Maui,
Hawaii; TMK: (2) 3-3-001:016(por.) and 102

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

In addition to the comments previously sent you, enclosed are additional comments from the Engineering Division on the subject matter. Should you have any questions, please feel free to call my office at 587-0433. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Morris M. Atta".

Handwritten initials in black ink, appearing to be "MA".
Morris M. Atta
Administrator

Enclosures

LINDA LINGLE
GOVERNOR OF HAWAII



LAURA H. THIELEN
RECEIVED
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
MAY 05 AM 11:04



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 1, 2008

MEMORANDUM

TO: DLNR Agencies:
 Div. of Aquatic Resources
 Div. of Boating & Ocean Recreation
 Engineering Division
 Div. of Forestry & Wildlife
 Div. of State Parks
 Div. of Water Resource Management
 Office of Conservation & Coastal Lands
 Land Division - (~~Honolulu~~ District office)

RECEIVED
LAND DIVISION
2008 MAY 20 P 2:07
DEPARTMENT OF LAND AND NATURAL RESOURCES
HONOLULU, HAWAII

FROM: *Maui* Morris M. Atta *Charlene*
SUBJECT: Proposed Waichu Mauka Residential Project
LOCATION: Wailuku, Maui, Hawaii; TMK: (2) 3-3-001:016 (por.) and 102
APPLICANT: Lokahi Pacific, in partnership with Pacific Rim Land, Inc.

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 20, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- We have no objections.
- We have no comments.
- Comments are attached.

Signed: *[Signature]*
Date: 5/15/08

cc: Central Files

**DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION**

LD/MorrisAtta
Ref.: WaichuMaukaResidentialWailuku
Maui.408

COMMENTS


- () We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ____.
- (X) **Please take note that based on the map the you provided, the project site according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone C. The National Flood Insurance Program does not have any regulations for developments within Zone C.**
- () 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 Sumitomo at (808) 768-8097 or Mr. Mario Siu Li at (808) 768-8098 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 water demands and infrastructure required to meet project needs. Please note that projects within State lands requiring water service from the Honolulu Board of Water Supply system will be required to pay a resource development charge, in addition to Water Facilities Charges for transmission and daily storage.
 - () 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 Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

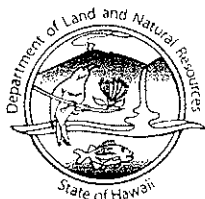
Signed: 
ERIC T. HIRANO, CHIEF ENGINEER
Date: _____

MAY 30 2008

LINDA LINGLE
GOVERNOR OF HAWAII



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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 29, 2008

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

Attention: Ms. Rowena Dagdag

Dear Ms. Dagdag:

SUBJECT: Proposed Waiehu Mauka Residential Project at Wailuku, Maui,
Hawaii; TMK: (2) 3-3-001:016(por.) and 102

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

In addition to the comments previously sent you, enclosed are additional comments from the Commission on Water Resources Management on the subject matter. Should you have any questions, please feel free to call my office at 587-0433. Thank you.

Sincerely,

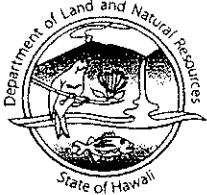
for Morris M. Atta
Administrator

Enclosures

LINDA LINGLE
GOVERNOR OF HAWAII



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



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 1, 2008

MEMORANDUM

TO: DLNR Agencies:
 Div. of Aquatic Resources
 Div. of Boating & Ocean Recreation
 Engineering Division
 Div. of Forestry & Wildlife
 Div. of State Parks
 Div. of Water Resource Management
 Office of Conservation & Coastal Lands
 Land Division – (~~Honolulu~~ District office)

Maui

FROM: *for* Morris M. Atta *Chairman*
SUBJECT: Proposed Waiehu Mauka Residential Project
LOCATION: Wailuku, Maui, Hawaii; TMK: (2) 3-3-001:016 (por.) and 102
APPLICANT: Lokahi Pacific, in partnership with Pacific Rim Land, Inc.

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 20, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

- () We have no objections.
- () We have no comments.
- () Comments are attached.

Signed: _____
Date: _____

cc: Central Files

COMMUNICATIONS SECTION
RECEIVED

08 MAY 5 AIO: 10

RECEIVED

LINDA LINGLE
GOVERNOR OF HAWAII



LAURA H. THIELEN
CHAIRPERSON
MEREDITH J. CHING
JAMES A. FRAZIER
NEAL S. FUJIWARA
CHIYOME L. FUKINO, M.D.
DONNA FAY K. KIYOSAKI, P.E.
LAWRENCE H. MIKE, M.D. J.D.
KEN C. KAWAHARA, P.E.
DEPUTY DIRECTOR

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

May 27, 2008

REF: WaiehuMauka.dr

TO: Morris Atta, Acting Administrator
Land Division

FROM: Ken C. Kawahara, P.E., Deputy Director
Commission on Water Resource Management

SUBJECT: Waiehu Mauka Workforce Housing

FILE NO.: TMK: (2) 3-3-001:016(por) & 102

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore, all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at <http://www.hawaii.gov/dlnr/cwrm>.

Our comments related to water resources are checked off below.

- 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.
- 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.
- 3. There may be 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.

Permits required by CWRM: Additional information and forms are available at www.hawaii.gov/dlnr/cwrm/forms.htm.

- 4. The proposed water supply source for the project is located in a designated ground-water management area, and a Water Use Permit is required prior to use of ground water.
- 5. A Well Construction Permit(s) is (are) required before the commencement of any well construction work.
- 6. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

DRF-IA 03/02/2006

- 7. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- 8. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- 9. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a stream channel.
- 10. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- 11. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- 12. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.
- 13. We recommend that the report identify feasible alternative non-potable water resources, including reclaimed wastewater.
- OTHER:

The primary water source for this project is the Iao Ground Water Management Area under the State Commission on Water Resource Management (CWRM). New uses initiated after July 21, 2003 will be addressed under new applications by the Maui Department of Water Supply. Limited pumpage from Iao is augmented from other sources, but inadequate supplies could result in restrictions of use within the service area. New uses within the Central Maui Service Area not relying on Iao sources may also be affected if Iao sources are restricted.

If there are any questions, please contact Charley Ice at 587-0251.

CI:ss



MICHAEL T. MUNEKIYO
GWEN DHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

Laura Thielen, Chairperson
State of Hawaii
**Department of Land and Natural
Resources**
P. O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Ms. Thielen:

Thank you for your letters dated May 21, 2008, May 22, 2008 and May 29, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we wish to provide the following information in response to your comments in the order presented in the memorandum.

As recommended, the applicant will coordinate with the Department of Water Supply (DWS) to incorporate the project into the County's Water Use and Development Plan. Further, the applicant will engage DWS staff in discussions about utilization of water source in the Ground Water Management Area.

We appreciate the input we received from your department. A copy of the Draft Environmental Assessment will be provided for your review and comment.

Laura Thielen, Chairperson
October 9, 2009
Page 2

Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineering, Inc.

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MAY 28 2008

INDA LINGLE
GOVERNOR



BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI

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

IN REPLY REFER TO:

HWY-PS
2.8105

MAY 23 2008

Ms. Rowena Dagdag
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

Subject: Waiehu Mauka Residential Project
Draft Environmental Assessment (Draft EA)
Maui, Wailuku District, Waiehu, TMK: 3-3-1: 16 (por.) & 102

Thank you for your April 24, 2008 letter requesting Department of Transportation comments. We request that the Draft EA for Waiehu Mauka Residential Project address project traffic impacts and proposed County traffic mitigation measures at Waiehu Beach Road's intersection with Kahekili Highway. We have emailed you an electronic copy of a November 2007 Traffic Impact Analysis Report which addresses this intersection.

If you have any questions, please contact Ken Tatsuguchi, Head Planning Engineer, Highways Division, at (808) 587-1830. Please reference Planning Branch file review number 08-157.

Very truly yours,

A handwritten signature in black ink, appearing to read "Brennon T. Morioka".

BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

LINDA LINGLE
GOVERNOR



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

JUN 13 2008
BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SERIGUCHI

IN REPLY REFER TO

STP 8.2874

June 9, 2008

Ms. Rowena Dagdag, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

Subject: Waiehu Mauka Residential Project
Lokahi Pacific in partnership with Pacific Rim Land, Inc.
Early Consultation for Draft Environmental Assessment (DEA)
TMK: 3-3-001: 016 and 102

Thank you for requesting the Department of Transportation's (DOT) review of the subject project. Our comments are as follows:

1. The project will have a traffic impact on our highways by contributing its portion of vehicle activity onto the local streets and joining with other local traffic funneling from adjoining areas to collectively access the highways at certain intersections or points.
2. A traffic assessment or traffic impact analysis report should be prepared by the developer/landowner and submitted as part of the project's environmental assessment. The traffic report should cover both project and regional impacts and mitigation measures the project should provide and/or participate and contribute to in addressing the traffic impacts.
3. We request that at least four (4) copies of the environmental assessment report be provided to us so that the various appropriate staff in our Department can review the report at the same time.

We appreciate the opportunity to provide comments.

Very truly yours,

A handwritten signature in black ink, appearing to read "BM", with a stylized flourish at the end.

BRENNON T. MORIOKA, PH.D., P.E.
Director of Transportation



MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

Brennon T. Morioka, Ph.D., P.E.
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii
STP 8.2874/HWY-PS 2.8105

Dear Mr. Morioka:

Thank you for your letters dated May 23, 2008 and June 9, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we wish to provide the following information in response to your comments in the order presented in your letter.

The applicant acknowledges your comment regarding traffic impacts on to State Highways as a result of the proposed project. A traffic impact assessment report (TIAR) has been prepared by the traffic engineer and will be included in the Draft Environmental Assessment (EA). A copy of your letter has been forwarded to the traffic engineer to ensure that the TIAR includes an assessment of project and regional impacts and required mitigation measures.

We would also like to note that four (4) copies of the Draft EA will be provided to your office for review and comment during the 30-day public review period.

Brennon T. Morioka, PH.D., P.E.
October 9, 2009
Page 2

We appreciate the input we received from your office. Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Phillip Rowell, Phillip Rowell and Associates

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MAY 21 2008

LINDA LINGLE
GOVERNOR
STATE OF HAWAII



MICAH A. KANE
CHAIRMAN
HAWAIIAN HOMES COMMISSION

KAULANA H. PARK
DEPUTY TO THE CHAIRMAN

ROBERT J. HALL
EXECUTIVE ASSISTANT

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS

P.O. BOX 1879
HONOLULU, HAWAII 96805

May 9, 2008

Ms. Rowena Dagdag
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Dagdag:

Subject: Request for Comments on the Proposed Waiehu Mauka Residential Workforce Housing Project; Wailuku, Maui, Hawaii, Tax Map Key No.: (2)3-3-001:016

Thank you for inquiring with the Department of Hawaiian Home Lands (DHHL) for a pre-draft Environmental Assessment on the above-referenced housing project in Wailuku, Maui. We understand the project will provide up to 100 "affordable" multi-family housing units and 6 single-family homes at market value.

In response to your letter, DHHL would like to receive your responses to the following questions:

- 1) How is the project meeting its potable water source and storage requirements; and
- 2) How will the project dispose of its wastewater? Will the project have any significant impact on the Paukukalo Sewer Pump Station situated on DHHL lands and force mains previously constructed by DHHL?

Should you have any questions or comments regarding the above, please feel free to call Mr. Stewart Matsunaga of our Land Development Division, at (808)620-9283.

Aloha and Mahalo,

Micah A. Kane, Chairman
Hawaiian Homes Commission



MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

Kaulana Park, Chairman
State of Hawaii
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu, Hawaii 96805

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Park:

We are writing to you on behalf of the applicant, Lokahi Pacific, Inc., to thank you for your department's letter dated May 9, 2008 regarding the proposed Waiehu Mauka Affordable Housing project in Wailuku, Maui, Hawaii.

We offer the following comments in response to your remarks:

1. Water for the project is anticipated to be provided by the County of Maui, Department of Water Supply. The applicant has been coordinating with the department regarding adequate long-term water source.
2. Wastewater disposal options have been studied. A viable proposal involves the collection of flow from the multi-family housing units via gravity sewer lines to discharge into a wastewater pump station (WPS) located at the low portion of the project site. The flow will be discharged offsite via a series of existing gravity sewer lines directed toward the Paukukalo WPS. The wastewater flow will then be transmitted to the Wailuku Wastewater Pump Station and eventually pumped to the Wailuku/Kahului Wastewater Reclamation facility east of Kahului Harbor. A discussion on the disposal of wastewater will be included in the Draft Environmental Assessment. Additionally, coordination with the Department of Environmental Management will be carried out to ensure wastewater capacity will be available for the proposed project and to address necessary improvements to existing wastewater facilities.

We would like to note that a copy of the Draft Environmental Assessment will be provided to your office for review and comment during the 30-day public review period.

Kaulana Park, Chairman
October 9, 2009
Page 2

We appreciate the input we received from your office. Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



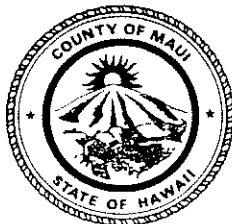
Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineering, Inc.
David Lundquist, Maui Architectural Group

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CHARMAINE TAVARES
Mayor
CHERYL K. OKUMA, Esq.
Director
GREGG KRESGE
Deputy Director



TRACY TAKAMINE, P.E.
Solid Waste Division
DAVID TAYLOR, P.E.
Wastewater Reclamation
Division

**COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT**

2200 MAIN STREET, SUITE 175
WAILUKU, MAUI, HAWAII 96793

June 4, 2008

Ms. Rowena Dagdag
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

**SUBJECT: WAIEHU MAUKA RESIDENTIAL PROJECT
EARLY CONSULTATION OF DRAFT EA
TMK (2) 3-3-001:016 AND 102, WAILUKU**

Dear Ms. Dagdag,

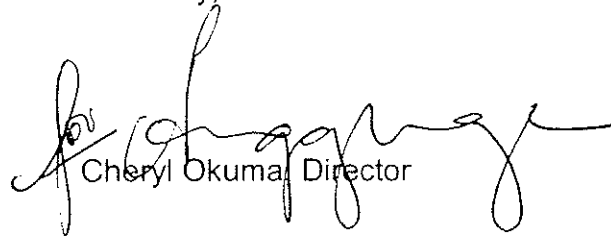
We reviewed the subject project as a pre-application consultation and have the following comments:

1. Solid Waste Division comments
 - a. Include a plan for construction waste disposal, recycling, reuse.
2. Wastewater Reclamation Division comments:
 - a. Although wastewater system capacity is currently available as of 6/4/2008, the developer should be informed that wastewater system capacity cannot be ensured until the issuance of the building permit.
 - b. Provide discussion and calculations (sewer impact study) to substantiate that the existing wastewater system is adequate to serve this project.
 - c. Wastewater contribution calculations are required before building permit is issued.
 - d. Developer shall pay assessment fees for treatment plant expansion costs in accordance with ordinance setting forth such fees.
 - e. Developer is required to fund any necessary off-site improvements to collection system and wastewater pump stations.

- f. Plans should show the installation of a single service lateral, advanced riser, and service manhole near the property line prior to connection to the County sewer.
- g. 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.
- h. Non-contact cooling water and condensate should not drain to the wastewater system.

If you have any questions regarding this memorandum, please contact Gregg Kresge at 270-8230.

Sincerely,



Cheryl Okuma, Director

October 9, 2009

Cheryl Okuma, Director
Department of Environmental Management
2200 Main Street, Suite 175
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Ms. Okuma:

Thank you for your letter dated June 4, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we wish to provide the following information in response to your comments in the order presented in the memorandum.

1. The applicant confirms that a solid waste management plan will be developed for the disposal or recycling of materials resulting from site and construction activities. The plan will incorporate strategies for effective construction waste management to reduce, reuse, and recycle solid waste materials.
- 2a. The applicant confirms that wastewater system capacity cannot be ensured until the issuance of the building permit.
- 2b. A preliminary engineering report (PER) has been prepared by the project's civil engineer. The PER will provide an assessment of the existing wastewater system servicing the project area and determine potential wastewater demand for the proposed project.
- 2c. The applicant confirms that wastewater calculations for the proposed project will be carried out by a licensed civil engineer and shall be submitted with the building permit application.
- 2d. The applicant intends on submitting a Section 201H-38 Application, Hawaii Revised Statutes (HRS) for this project. The applicant will seek an exemption from the wastewater assessment fees. The Draft EA will serve as the technical document for the Section 201H HRS Application. A discussion on the proposed exemptions will be included in the Draft EA.

- 2e. The applicant acknowledges and confirms the project will comply with any necessary off-site improvements to collection system and wastewater pump stations. The applicant notes that the proposed exemptions for this project include an exemption from wastewater system connection fees.
- 2f. The applicant confirms that construction plans will show the installation of a single service lateral, advanced riser and service manhole at the property line.
- 2g. The applicant confirms that construction plans will also indicate the ownership of any easements on the property and acknowledges that the County of Maui will not accept sewer easements traversing private property.
- 2h. The applicant confirms non-contact cooling water, condensate, etc. will not drain into the wastewater system.

We appreciate the input we received from your office. A copy of the Draft EA will be provided for your review and comment. Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,



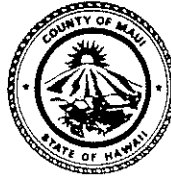
Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineering, Inc.
David Lundquist, Maui Architectural Group

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CHARMAINE TAVARES
MAYOR



MAY 15 2008

JEFFREY A. MURRAY
CHIEF

ROBERT M. SHIMADA
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE AND PUBLIC SAFETY
FIRE PREVENTION BUREAU

780 ALUA STREET
WAILUKU, HAWAII 96793
(808) 244-9161
FAX (808) 244-1363

May 13, 2008

Munekiyo & Hiraga, Inc.
Attention: Rowena Dagdag
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Proposed Waichu Mauka Residential Project
TMK: (2)3-3-001:016 & Por. 102 Wailuku, Maui , Hawaii

Dear Ms. Dagdag,

I have received your request concerning the Waichu Mauka Residential Project. Our office will look at the project details during the building permit process. We have no further comments at this time.

Sincerely,

Valeriano F. Martin
Captain
Fire Prevention Bureau

MAY 3 0 2008



DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

CHARMAINE TAVARES
Mayor

VANESSA A. MEDEIROS
Director

LORI TSUHAKO
Deputy Director

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 270-7805 • FAX (808) 270-7165 • EMAIL director.hhc@mauicounty.gov

May 27, 2008

Ms. Rowena Dagdag
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

SUBJECT: Early Consultation Request for Proposed Waiehu Mauka Residential Project at TMK (2) 3-3-001:016 (por.) and 102, Wailuku, Maui, Hawaii

We have reviewed the Early Consultation Request for the above subject project and would like to offer the following comments:

1. In a project description for the HOME Program, Lokahi Pacific indicated that the rental units would be targeted to families earning 50% or less of the County of Maui's median family income and the rents would be maintained as affordable to households earning 50% of the County's median family income. However, it is indicated in your April 24, 2008 letter that the rental units would be made affordable to households earning 80 percent (80%) of the County's median family income. Please clarify if the rental units will be targeted and made affordable to households earning 50% or 80% of the County's median family income.
2. It is also indicated in your letter that Lokahi Pacific has received a grant from the County for the development of the project. Please clarify what grant Lokahi Pacific has received from the County.
3. An Environmental Assessment also needs to be prepared in accordance with 24 Code of Federal Register (CFR) Part 58 since federal (HOME Investment Partnerships Program) funds will be utilized for the development of the rental unit project.

Ms. Rowena Dagdag
Planner
May 27, 2008

Please call Mr. Wayde Oshiro of our Housing Division at 270-7355 if you have any questions.

Sincerely,



VANESSA A. MEDEIROS
Director of Housing and Human Concerns

xc: Housing Division

October 9, 2009

Lori Tsuhako, Director
County of Maui
Department of Housing and Human Concerns
2200 Main Street, Suite 546
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project at TMK (2)3-3-001:016 (por.) and 102, Wailuku, Maui, Hawaii

Dear Ms. Tsuhako:

We are writing to you on behalf of the applicant, Lokahi Pacific, Inc., to thank your department for a letter dated May 27, 2008, in response to our request for early consultation comments regarding the proposed Waiehu Mauka Affordable Housing Project. We wish to provide the following information in response to your comments in the order presented in the memorandum.

1. A portion of the overall Waiehu Mauka Residential Project will involve the construction of 42 long-term affordable rental units targeting households earning up to 50 percent of the County's median family income. These units include 28 one-bedroom units, and 14 two-bedroom units.

The remainder of the project involves the construction of 58 for sale affordable townhouse units targeting households earning between fifty-one (51) and 120 percent of the county's median family income. These units include six (6) four-bedroom units and 52 three-bedroom units.

In addition, there will be six (6) single-family residential lots that are proposed to be sold at market price.

2. Lokahi Pacific was awarded FY08 HOME Program grant funds through the County of Maui. The organization was also approved for funding through the County of Maui's Affordable Housing Fund via Resolution No. 08-98.
3. The applicant proposes the use of Federal funds administered by the County of Maui, Department of Housing and Human Concerns. As such, an Environmental Assessment is being prepared for the United States (U.S.) Department of Housing

Lori Tsuhako, Director
October 9, 2009
Page 2

and Urban Development (HUD) in accordance with 24 Code of Federal Register (CFR) 58.36.

We appreciate the input from your office. Copies of the Chapter 343 Draft EA and the HUD EA will be provided for your review and comment. Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

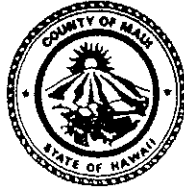
CM:lh

cc: Wayde Oshiro, Department of Housing and Human Concerns, Housing Division
Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.

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MAY 23 2008

CHARMAINE TAVARES
Mayor



TAMARA HORCAJO
Director

ZACHARY Z. HELM
Deputy Director

(808) 270-7230
Fax (808) 270-7934

DEPARTMENT OF PARKS & RECREATION

700 Hali'a Nakoa Street, Unit 2, Wailuku, Hawaii 96793

May 15, 2008

Munekiyo & Hiraga, Inc.
Attention: Rowena Dagdag
305 High Street, Suite 104
Wailuku, Hawaii 96793

**SUBJECT: Preliminary Consultation for Draft EA
Proposed Waiehu Mauka Residential Project
TMK (2) 3-3-001: 016 (por.) and 102
Wailuku, Maui, Hawai'i**

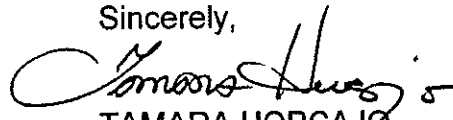
Dear Ms. Dagdag:

Thank you for the opportunity to review and comment on the subject project. We would like to receive the confirmation from the County of Maui Department of Housing and Human Concerns that this project meets the criteria of an affordable housing project under Section 201H-38, HRS.

The exemption from Section 18.16.320, Maui County Code, will then be provided once the Maui County Council has approved the subject 201H-38 application.

Please feel free to contact me or Mr. Patrick Matsui, Chief of Parks Planning and Development, at 270-7387 should you have any questions.

Sincerely,


TAMARA HORCAJO
Director

cc: Patrick Matsui, Chief of Parks Planning and Development



MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 12, 2009

Tamara Horcajo, Director
Department of Parks and Recreation
700 Hali'a Nakoa Street, Unit 2
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project at TMK (2)3-3-001:016 (por.) and 102, Wailuku, Maui, Hawaii

Dear Ms. Horcajo:

We are writing to you on behalf of the applicant, Lokahi Pacific, Inc., to thank you for your letter dated May 15, 2008, regarding the proposed Waiehu Mauka Affordable Housing Project in Wailuku, Maui, Hawaii.

The Waiehu Mauka Affordable Housing project is proposed as a 94 percent affordable housing project. Lokahi Pacific has developed the project to meet the affordability criteria set forth by the Section 201H-38, Hawaii Revised Statutes (HRS) project by the County of Maui's Department of Housing and Human Concerns (DHHC), and meets the criteria for an affordable project pursuant to Chapter 2.96.

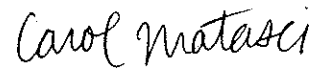
The filing of the 201H-38, HRS application for the project will serve as notice of the DHHC's endorsement of the proposed action.

We appreciate the input from your office. A copy of the Draft EA will be provided for your review and comment.

Tamara Horcajo, Director
October 12, 2009
Page 2

Should you have any questions, please do not hesitate to contact me at (808) 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group

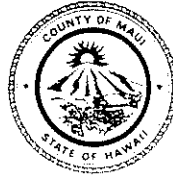
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CHARMAINE TAVARES
Mayor

MAY 30 2008

JEFFREY S. HUNT
Director

COLLEEN M. SUYAMA
Deputy Director



COUNTY OF MAUI
DEPARTMENT OF PLANNING

May 28, 2008

Ms. Rowena Dagdag
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag:

**SUBJECT: PRECONSULTATION COMMENTS REGARDING THE
PROPOSED WAIEHU MAUKA RESIDENTIAL PROJECT AT
WAILUKU, MAUI, HAWAII, TMK: (2) 3-3-001:102 AND 016
(PORTION) (EAC 2008/0021)**

The Department of Planning (Department) has reviewed your letter dated April 24, 2008, requesting pre-consultation and provides the following comments in preparation of the Draft Environmental Assessment (DEA).

1. Should an application be made for exemptions under HRS Section 201H-38 the Department anticipates that the Department of Housing and Human Concerns will be the accepting authority for the DEA. In this case the Department will serve as a commenting agency;
2. We expect that the DEA will include the basic subject matter topics as your office has prepared for other projects requesting Section 201H-38 application approvals, such as the recent DEA for the "Proposed Kula Ridge Residential Workforce Housing Subdivision;"
3. The most developable portion of the site includes principally a ridgeline which appears to have been flattened at least at the northerly end of the property and has more sloped terrain at the southerly end. Steep slopes lie on both sides of the ridge, some of which appear to be within the site and some which appear to lie outside of it. Please pay special attention to the environmental review of project planning for these slope areas and possible impacts upon them. Please identify and address possible slope and related impacts including, at least, site drainage, erosion, revegetation where needed, soil stability, and aesthetic/view impacts to and/or through the site;


Ms. Rowena Dagdag
May 28, 2008
Page 2

4. Please include a preliminary drainage report and preliminary grading plan with the DEA;
5. Please address any education or social programs or facilities which may be impacted by the project and its target population;
6. Although the project is anticipated to involve an application for exemptions from local planning requirements under Section 201-H, please address how the project would and/or would not comply with such requirements if no exemptions were to be approved;
7. To help mitigate possible safety impacts upon pedestrians within and exiting the subdivision, please provide sidewalks or walking paths within the site and along driveways exiting the site;
8. All projects shown on the Department's Central Maui Development Projects map are planned and/or proposed and should be considered for inclusion within the analysis of cumulative impacts. This map may be found at: <http://www.co.maui.hi.us/departments/Planning/pdf/0707CentralMauiNorth.pdf>
9. Alternatives: Please address alternatives considered for the use(s) of the site and alternative sites considered for the proposed uses.

Thank you for the opportunity to comment. Should you need additional clarification on these comments or the DEA process, contact Staff Planner Jeffrey Dack via email at jeffrey.dack@mauicounty.gov or by phone at 270-6275.

Sincerely,



 CLAYTON I. YOSHIDA, AICP
Planning Program Administrator

For: JEFFREY S. HUNT, AICP
Planning Director

xc: Jeffrey P. Dack, AICP, Staff Planner
Project File
General File

JSH:CIY:JPD:vb
K:\WP_DOCS\PLANNING\EAC\2008\0021_WAIEHUMAUKARES\PRECONSULTATION.DOC

October 9, 2009

Jeffrey S. Hunt, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project at TMK (2)3-3-001:016 (por.) and 102, Wailuku, Maui, Hawaii

Dear Mr. Hunt:

Thank you for your letter dated May 28, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we wish to provide the following information in response to your comments in the order presented in the memorandum.

1. Based on discussion with the County of Maui, Department of Housing and Human Concerns (DHHC), it has been determined that the approving agency for the Environmental Assessment (EA) is the DHHC.
2. The applicant acknowledges that the Draft EA will serve as the technical document for the Section 201H-38, Hawaii Revised Statutes application.
3. The applicant acknowledges your comments relating to site drainage, erosion, revegetation of the property, soil stability, and aesthetic/view impacts throughout the site. An assessment on each of these elements will be included in the Draft EA.
4. A preliminary drainage report and a preliminary grading plan will be included in the Draft EA. Best Management Practices (BMPs) shall be utilized to ensure erosion and runoff control. A copy of this letter will be sent to the project engineer to ensure compliance.
5. A request for preliminary comments has been made with the State of Hawaii, Department of Education. The applicant will work with the Department of Education to discuss the education assessment requirements for the proposed project and will be providing the Department with information regarding project parameters and pricing for housing units.

An analysis of the impacts to educational or social programs as a result of the project will be provided in the Draft EA.

6. A list of proposed exemptions will be included in the Draft EA. Should any of the exemptions not be approved, the applicant will need to comply with the applicable section of the Maui County Code. An assessment and determination will then need to be made regarding the implications of compliance, both in terms of cost and time.
7. The applicant notes your suggestion to provide sidewalks or walking paths within the site and along driveways exiting the site. The Draft EA will contain a conceptual site plan including internal sidewalks and walkways within the project, and along the project access road.
8. The proposed project is noted as a Planned/Designated project on the Department's Central Maui Development Projects map.
9. An analysis of alternative site considerations will be provided in the Draft EA.

We appreciate the input from your office. A copy of the Draft EA will be provided for your review and comment.

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R. T. Tanaka Engineering, Inc.
Phillip Rowell, Phillip Rowell and Associates
David Lundquist, Maui Architectural Group

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MAY 12 2008 Maui #13

CHARMAINE TAVARES
Mayor

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

MICHAEL M. MIYAMOTO
Deputy Director

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



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

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

May 8, 2008

Ms. Rowena Dagdag, Planner
MUNEKIYO & HIRAGA, INC.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Dagdag:

**SUBJECT: ENVIRONMENTAL ASSESSMENT FOR PROPOSED
WAIEHU MAUKA RESIDENTIAL PROJECT
TMK: 3-3-001:016 (POR) AND 102**

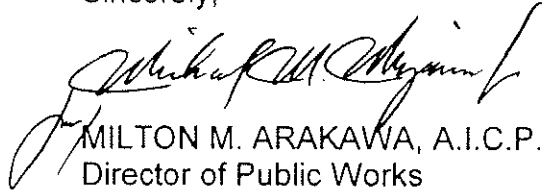
We reviewed the subject application and have the following comments:

1. Driveway and internal roads for the multi-family units shall be kept under private ownership and maintenance. Drainage on-site and off-site shall be kept under private ownership and maintenance.
2. Not able to tell where the driveway is in relation to the stream that crosses Kahekili Highway and runs roughly parallel to the highway and potential conflict with road and/or development. Stream should be shown on plans.
3. Please identify the area at the end of the Haunani Street cul-de-sac and continuing into the multi-family area as shown on Figure 3. If this is some sort of vehicle or pedestrian access, this access shall be kept under private ownership and maintenance.

Ms. Rowena Dagdag, Planner
May 8, 2008
Page 2

Please call Michael Miyamoto at 270-7845 if you have any questions regarding this letter.

Sincerely,



MILTON M. ARAKAWA, A.I.C.P.
Director of Public Works

MMA:MMM:ls

xc: Highways Division
Engineering Division

S:\LUCA\CZMProp_Waiehu_Mauka_res_proj_dea_33001016_ls.wpd

October 9, 2009

Milton Arakawa, AICP, Director
Department of Public Works
200 South High Street, Room 434
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Arakawa:

Thank you for your letter dated May 8, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we are providing the following information in response to your comments in the order presented in the letter.

1. The applicant confirms that the driveway and internal roads for the multi-family units will be kept under private ownership and maintenance. Proposed improvements to mitigate drainage impacts for the multi-family units will also be kept under private ownership and maintenance. It should be noted that the six (6) single-family residential lots are accessed through Haunani Street, a facility maintained by the County of Maui. This roadway access will remain within the jurisdiction of the County of Maui.
2. The Spreckels Ditch is identified as a waterway which crosses Kahekili Highway and runs roughly parallel to the highway. This waterway crosses Kahekili Highway approximately 2,000 feet from the project driveway, and is not anticipated to be impacted by the proposed development. The alignment of Spreckels Ditch will be identified in the Draft Environmental Assessment (EA). The Regional Location Map has been revised with Spreckels Ditch clearly labeled.
3. As mentioned previously, the roadway access for the six (6) single-family residential lots will remain within the jurisdiction of the County of Maui, and will not continue into the multi-family portion of the project site. The applicant confirms that pedestrian and vehicle access to the multi-family site cannot be made available due to existing grade conditions.

We appreciate the input from your office. A copy of the Draft EA will be provided for your review and comment.

Milton Arakawa, AICP, Director
October 9, 2009
Page 2

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,

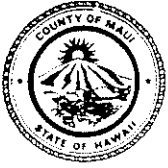


Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R. T. Tanaka Engineering, Inc.
Phillip Rowell, Phillip Rowell and Associates

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POLICE DEPARTMENT
COUNTY OF MAUI

Lokahi Pacific/Wa
MAY 12 2008 M
#131



CHARMAINE TAVARES
MAYOR

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

OUR REFERENCE
YOUR REFERENCE

GARY A. YABUTA
DEPUTY CHIEF OF POLICE

May 5, 2008

Ms. Rowena Dagdag
Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Dagdag:

SUBJECT: Proposed Waiehu Mauka Residential Project at TMK (2) 3-3-001:016
(por.) and 102

This is in response to your letter of April 24, 2008, requesting comments on the above subject.

We have reviewed the information for the above mentioned subject and offer the enclosed comments.

Thank you for giving us the opportunity to comment on this project.

Very truly yours,

Assistant Chief Wayne T. Ribao
for: Thomas M. Phillips
Chief of Police

c: Jeffrey Hunt, Maui County Planning Department

COPY

TO : THOMAS PHILLIPS, CHIEF OF POLICE, COUNTY OF MAUI
VIA : CHANNELS
FROM : STEPHEN ORIKASA, ADMINISTRATIVE SERGEANT,
WAILUKU PATROL DIVISION
SUBJECT : RESPONSE TO REQUEST FOR EARLY CONSULTATION
COMMENTS REGARDING THE PROPOSED WAIEHU MAUKA
RESIDENTIAL PROJECT

CONCUR:
AC [Signature]
05/01/08

This communication is submitted as a response to a request by Munekiyo & Hiraga, Inc. Planner, Rowena Dagdag, for early consultation comments regarding the below subject;

SUBJECT : Proposed Waiehu Mauka Residential Project
TMK : 92) 3-3-001:016(por.) and 102, Wailuku, Maui, Hawai'i

RESPONSE:

The conceptual site plan depicts one-hundred (100) units in eighteen (18) buildings and six (6) residential lots, with access to the project area involving an extension of Haunani Street in the established Waiehu Heights Subdivision and a driveway to Kahekili Highway.

Being this is a large multi-family residential type project, there will be a significant increase in pedestrian and traffic movement to the area. At present, the inundated feeder roads to this area, Waiehu Beach Road, Kahekili Highway and Maka'ala Drive, are only two-lane roadways and lack adequate designated pedestrian walkways (with the exception of Maka'ala Drive).

I believe there is an immediate needs for a coordinated effort among State, County and Private Entities (who have developed or will developing in the area) to address the issues of traffic congestion and pedestrian safety. Developments have been on-going in the Waiehu area without any feeder roadway improvements, which only intensifies the safety factor for all (residents and visitors) who travel in these areas.

Traffic mitigation efforts should be carried out to include this growth, and possible future mitigation issues. Roadway improvements including widening, dividers, control signals and timing throughout the impact area needs to be strongly considered to minimize congestion. I would also suggest the entities work in conjunction with the Public Transit coordinators and providers to another aspect of decreasing traffic congestion.

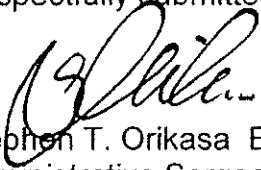
The increase in pedestrian traffic along all surrounding roadways should include adequate set backs and/or separate dedicated walking paths, corridors and/or overpasses. Pedestrian safety is an existing concern as the increases are already apparent during day to day operations.

During the construction phases of this project, extreme efforts should be made to minimize dust & debris so not to inhibit those whose health and well being may be affected. Adequate traffic control devices and personnel should be utilized to minimize the impact of heavy equipment and vehicles traveling in and out of the area.

CONCLUSION:

There are no objections to the progression of this project at this time, although, it is of utmost importance to be cognizant of any health and safety impacts, directly and indirectly, which may arise from this project.

Respectfully submitted for your review and approval.


Stephen T. Orikasa E#716
Administrative Sergeant/Wailuku Patrol Division
05/01/08 @ 0900 Hours

*I HAVE NO FURTHER
COMMENTS.*

*CHAD. PANG
05/01/08 @ 1140*

October 9, 2009

Gary Yabuta, Chief of Police
County of Maui
Maui Police Department
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Chief Yabuta:

Thank you for your department's letter dated May 5, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we wish to provide the following information in response to your comments in the order presented in the memorandum.

1. A traffic impact analysis report has been prepared for the project and will be included in the Draft Environmental Assessment (EA). This report addresses the increase in traffic from the additional homes.
2. The applicant is carefully considering traffic impacts associated with the development of the multi-family project and would like to note that the project's traffic engineer and planners have undertaken coordination efforts with the County of Maui, Department of Public Works to determine roadway improvements surrounding the project area to minimize traffic congestion. Additionally, coordination with the County of Maui, Department of Transportation will be undertaken to identify cost-effective alternatives for allowing residents to access public transit from the proposed development area.
3. The applicant notes the Department's concern regarding pedestrian traffic safety. A copy of your letter has been forwarded to the project architect and civil engineer to consider the implementation of adequate setbacks, walkway corridors, and walking paths that would allow safe pedestrian access within the site and along the project access road.
4. The applicant will ensure that traffic control devices and personnel will be utilized during construction to minimize the impacts of large equipment traveling and in and out of the area. Best Management Practices developed by the project's civil

Gary Yabuta, Chief of Police
October 9, 2009
Page 2

engineer will also be implemented to minimize dust and debris which may result during construction of the project.

We appreciate the input from your office. A copy of the Draft EA will be provided for your review and comment.

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,



Carol Matasci, Planner

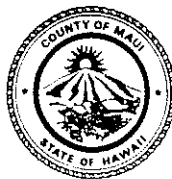
CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R. T. Tanaka Engineering, Inc.
Phillip Rowell, Phillip Rowell and Associates
David Lundquist, Maui Architectural Group

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MAY 14 2008

CHARMAINE TAVARES
MAYOR



DON A. MEDEIROS
Director
WAYNE A. BOTEILHO
Deputy Director
Telephone (808) 270-7511
Facsimile (808) 270-7505

DEPARTMENT OF TRANSPORTATION

COUNTY OF MAUI
200 South High Street
Wailuku, Hawaii, USA 96793-2155

May 9, 2008

Ms. Rowena Dagdag
Munekiyo & Hiraga Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Subject: Waiehu Mauka Residential

Dear Ms. Dagdag,

Thank you for the opportunity to comment on this project.

We believe that the clientele at this development will need transit services. Therefore, we would like the development to include on the parcel TMK (2)3-3-001:016(por), a driveway access to include a bus turning circle prior to the entrance (see attached figure 3). This minor additional expenditure in the project would be the most efficient way to allow transit services to access the development.

The additional design feature will allow school buses, commuter buses, MEO buses and paratransit buses to service the development. We recommend at least a 55 foot turning radius to allow for a safe turning area for the buses to exit the development area.

Please feel free to contact me if you have any questions.

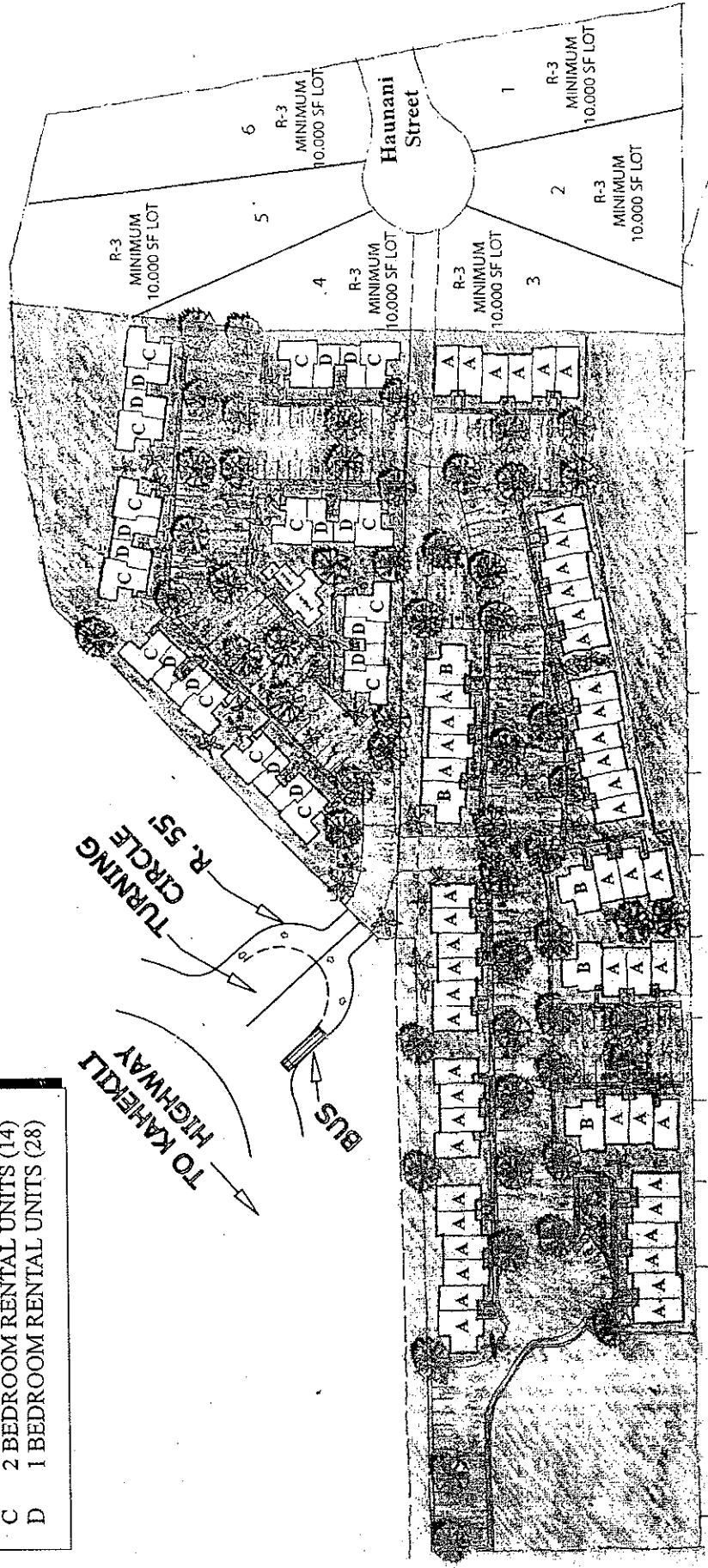
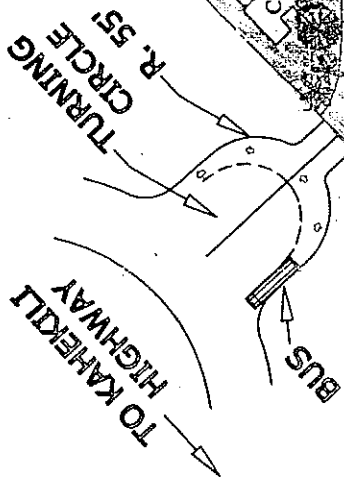
Sincerely,

A handwritten signature in black ink, appearing to read "Don Medeiros", is written over a white background.

Don Medeiros
Director

KEY

- A 3 BEDROOM TOWNHOUSES (52)
- B 4 BEDROOM TOWNHOUSES (6)
- C 2 BEDROOM RENTAL UNITS (14)
- D 1 BEDROOM RENTAL UNITS (28)



Source: Hans Riecke

Figure 3



Proposed Waiehu Mauka Residential
Workforce Housing Project
Conceptual Site Plan

NOT TO SCALE

Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

LokahiPac/Waiehu EA/ECL/Conceptual/SitePlan



MICHAEL T. MUNEKIYO
GWEN DHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

Don Medeiros, Director
County of Maui
Department of Transportation
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Medeiros:

Thank you for your letter dated May 5, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we are providing the following information in response to your comments presented in your letter.

The applicant acknowledges your request for the inclusion of a bus turning circle at the driveway entrance of the proposed project and the important service that public transit provides for residents. The applicant is provided with a 44-foot wide access easement from Kahekili Highway to the multi-family units on a portion of land identified as TMK 3-3-001:016. The easement portion of this parcel is owned by Kehalani Holdings Company, Inc. The limitation to the size of the easement is recognized as a constraint in the development of a bus turning circle at the driveway entrance. As the easement is not wide enough to accommodate a 55-foot bus turning circle, and placing the turning circle onsite would require a reduction in the number of affordable units built, a bus turning circle is not considered feasible at this time. However, the applicant is open to other accommodations for public transportation, such as a bus stop on Kahekili Highway.

We appreciate the input from your office. A copy of the Draft Environmental Assessment will be provided for your review and comment.

Don Mederios, Director
October 9, 2009
Page 2

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R. T. Tanaka Engineering, Inc.
Phillip Rowell, Phillip Rowell and Associates
David Lundquist, Maui Architectural Group

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CHARMAINE TAVARES
Mayor



JEFFREY K. ENG
Director

ERIC H. YAMASHIGE, P.E., L.S.
Deputy Director

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

March 16, 2009

Ms. Rowena Dagdag-Andaya
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Re: TMK: (2) 3-3-001:016 (por.) And 102
Project Name: Proposed Waiehu Mauka Residential Project

Dear Ms. Dagdag-Andaya:

Thank you for the opportunity to comment on this Early Consultation for the Draft Environmental Assessment (DEA).

Source Availability and Consumption

The DEA should identify sources and potable and non-potable demand for the proposed project. The project area is served by the Central Maui System. The main sources of water for the Central system are the designated Iao aquifer, Waihee aquifer, the Iao tunnel and the Iao-Waikapu Ditch in the designated Na Wai Eha. New source development projects include Maui Lani Wells, Waikapu South Well and Waiale Surface Water Treatment Plant. According to system per acre standards, anticipated demand for the parcels would be approximately 75,000 gpd. There is currently no additional source available to accommodate new customers according to system standards on the Central Maui System. The proposed project is subject to the County's availability policy, codified in Title 14 of the Maui County Code, in the subdivision process. The Department may delay issuance of meters until new sources are on line. The Department will not issue temporary construction meters for Central Maui projects.

System Infrastructure

Two water transmission lines bisect the parcel: a 36 inch on the south, and a 16 inch on the north side. Given the size of the property, substantial system improvements will be required. The applicant will be required to provide for water service and fire protection in accordance with system standards. Fire flow for single-family residential zoning is 1,000 gpm for 2 hours duration at 350' spacing. Although the county zoning is Interim, please note that fire flow for multi-family A-1 residential zoning is 1,500 gpm for 2 hours duration at 250 feet spacing. Fire flow for multi-family A-2 residential zoning is 2,000 gpm for 2 hours duration at 250 feet spacing. System requirements will be determined in the subdivision process.

"By Water All Things Find Life"

The Department of Water Supply is an Equal Opportunity provider and employer. To file a complaint of discrimination, write: USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington DC 20250-9410. Or call (202) 720-5864 (voice and TDD)

Printed on recycled paper



Conservation

To alleviate demand on the Central system, please find attached a conservation checklist for condominiums, and our planting brochure. We recommend that the following conservation measures be included in the project design and noted in the DEA:

Use Non-potable Water: Use reclaimed or brackish water for landscaping, dust control and other non-potable purposes where feasible.

Use Climate-adapted Plants: Limit irrigated turf to active play and picnic areas. Use native climate-adapted or non-invasive drought tolerant plants for all landscaping. The project is located in Plant Zone 4. Native plants adapted to the area conserve water and protect the watershed from degradation due to invasive alien species.

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. Such models should be avoided.

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. Regular maintenance programs should be established.

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, water closets, and hose bibs.

Prevent Over-Watering By Automated Systems: Provide rain shut offs and smart controllers on all automated irrigation systems. Any controllers which do not provide for soil moisture or evapotranspiration based response should be checked and reset at least once a month.

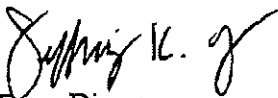
Pollution Prevention

In order to protect ground and surface water sources the applicant should utilize Best Management Practices (BMPs) for pollution prevention. The mitigation measures below should be included in the DEA and be implemented during construction:

1. Prevent cement products, oil, fuel and other toxic substances from falling or dripping on the ground as this can cause them to leach into the water table or nearby wetland. Store them in proper containers on non-porous surfaces and protect from the elements.
2. Retain ground cover until the last possible date.
3. Stabilize denuded areas by sodding or planting as soon as possible. Replanting should include soil amendments, and temporary irrigation. Use high seeding rates to ensure rapid stand establishment.
4. Avoid fertilizers and biocides, or apply only during periods of low rainfall to minimize chemical run-off.
5. Keep run-off on site.

Should you have any questions, please contact our Water Resources and Planning Division at 808-244-8550.

Sincerely,



Jeffrey K. Eng, Director

mlh

cc: applicant, engineering division

Attachments: Plant Brochure: "Saving Water in the Yard"; Checklist of Water Conservation Ideas for Condominiums"



MICHAEL T. MUNEKIYO
GWEN OHASHI HIRAGA
MITSURU "MICH" HIRANO
KARLYNN FUKUDA

MARK ALEXANDER ROY

October 9, 2009

Jeffrey Eng, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Eng:

Thank you for your letter dated March 16, 2009, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we are providing the following information in response to your comments presented in your letter.

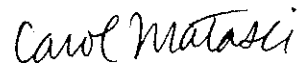
1. The applicant, Lokahi Pacific, Inc., acknowledges that the proposed project is subject to Maui County Code Chapter 14.12, relating to "Water Availability", and that the Department will not issue meters until new sources are on line. Project-related water usage for the proposed project has been estimated at approximately 60,720 gallons per day (GPD). Continued coordination with the Department of Water Supply (DWS) will be undertaken to identify new source development projects. An analysis of the potable and non-potable water demand for the proposed project will be included in the Draft Environmental Assessment (EA). In addition, coordination with the DWS will be carried out to ensure that water source is adequately and appropriately addressed for the project.
2. We note that the required fire flow for residential subdivisions is 1,000 gallons per minute (gpm) at 350 feet spacing for a 2-hour duration, and 1,500 gpm at 250 feet spacing.
3. The suggested water conservation measures will be forwarded to the applicant for review and possible incorporation into the landscaping design of the project, as applicable.
4. A list of the Best Management Practices (BMPs) which will be utilized for the project may be found in the Preliminary Civil Engineering report in the Draft EA.

Jeffrey Eng, Director
October 9, 2009
Page 2

We appreciate the input from your office. A copy of the Draft EA will be provided for your review and comment.

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R. T. Tanaka Engineering, Inc.
David Lundquist, Maui Architectural Group

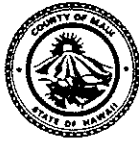
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COUNTY OF MAUI
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793
www.mauicounty.gov/council

May 1, 2008

Munekiyo and Hiraga, Inc.
Attention: Rowena Dagdag, Planner
305 High Street, Suite 104
Wailuku, HI 96793

SUBJECT: Early Consultation Request for Proposed Waiehu Mauka Residential Project at TMK (2)3-3-001:016(por.) and 102, Wailuku, Maui, Hawai'i

Dear Ms. Dagdag:

Thank you for the opportunity to provide early review and comments for the proposed Waiehu Mauka Residential Project at TMK (2)3-3-001:016(por.) and 102, Wailuku, Maui, Hawai'i.

After review of the information presented, I am submitting the following comments:

1. Provide address to water source and availability for the project.
2. Provide address to traffic impacts resulting from project to Kahekili Highway.
3. Will the proposed Haunani Street extension provide access to the proposed multi-family unit housing portion of the project?

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph Pontanilla".

JOSEPH PONTANILLA,
COUNCIL MEMBER

October 9, 2009

Honorable Joseph Pontanilla
County of Maui
Maui County Council
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Council Member Pontanilla:

Thank you for your letter dated March 1, 2008, commenting on the subject project. On behalf of the applicant, Lokahi Pacific, Inc., we are providing the following information in response to your comments presented.

1. The applicant will undertake coordination efforts with the Department of Water Supply (DWS) regarding the development of adequate water source. Coordination with the DWS will be carried out to ensure that water source is adequately and appropriately addressed for the project.
2. A traffic impact analysis report has been prepared for the project and will be included in the Draft Environmental Assessment (EA). This report addresses the increase in traffic from the additional homes and its impacts on surrounding highway and roadway facilities.
3. The project's six (6) single-family residential lots will be accessed via Haunani Street. This roadway will not continue into the multi-family portion of the project site. This portion will be accessed via Kahekili Highway. The applicant confirms that pedestrian and vehicle access cannot be made available between the multi-family and single-family areas due to existing grade conditions.

We appreciate the input from you. A copy of the Draft EA will be provided for your review and comment.

Honorable Joseph Pontanilla
October 9, 2009
Page 2

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R. T. Tanaka Engineering, Inc.
Phillip Rowell, Phillip Rowell and Associates
David Lundquist, Maui Architectural Group

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MAY 15 2008



May 14, 2008

Ms. Rowena Dagdag, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Dagdag,

Subject: Proposed Waiehu Mauka Residential Project
Kahekili Highway, Wailuku, Maui, Hawaii
TMK: (2) 3-3-001:016(por.) and 102

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

In reviewing our records and the information received, Maui Electric Company (MECO) will be requiring access and electrical easements for our facilities to serve the subject project site. Since permits will be required prior to MECO's installation, we highly encourage the customer's electrical consultant to submit the electrical demand requirements, project time schedule, and schedule a meeting with us as soon as practical so that service can be provided on a timely basis.

Should you have any questions or concerns, please call me at 871-2340.

Sincerely,

A handwritten signature in black ink, appearing to read "Ray Okazaki". The signature is fluid and cursive.

Ray Okazaki
Staff Engineer

October 9, 2009

Ray Okazaki, Staff Engineer
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawaii 96733

SUBJECT: Proposed Waiehu Mauka Affordable Housing Project, TMK (2) 3-3-001:102 and 016 (por.), Wailuku, Maui, Hawaii

Dear Mr. Okazaki:

Thank you for your letter dated May 14, 2008, providing comments in response to our early consultation request for the subject project.

On behalf of the applicant, Lokahi Pacific, Inc., we offer the following responses to your comments.

1. The project's electrical consultant will submit the projected electrical demand requirements, and a project time schedule, as early as is practical, and schedule a meeting with you to facilitate the provision of electrical service.

We appreciate the input received from your office. A copy of the Draft Environmental Assessment will be provided for your review and comment.

Should you have any questions, please do not hesitate to contact me at 244-2015.

Very truly yours,



Carol Matasci, Planner

CM:lh

cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group
Kirk Tanaka, R. T. Tanaka Engineering, Inc.

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X. REFERENCES

X. REFERENCES

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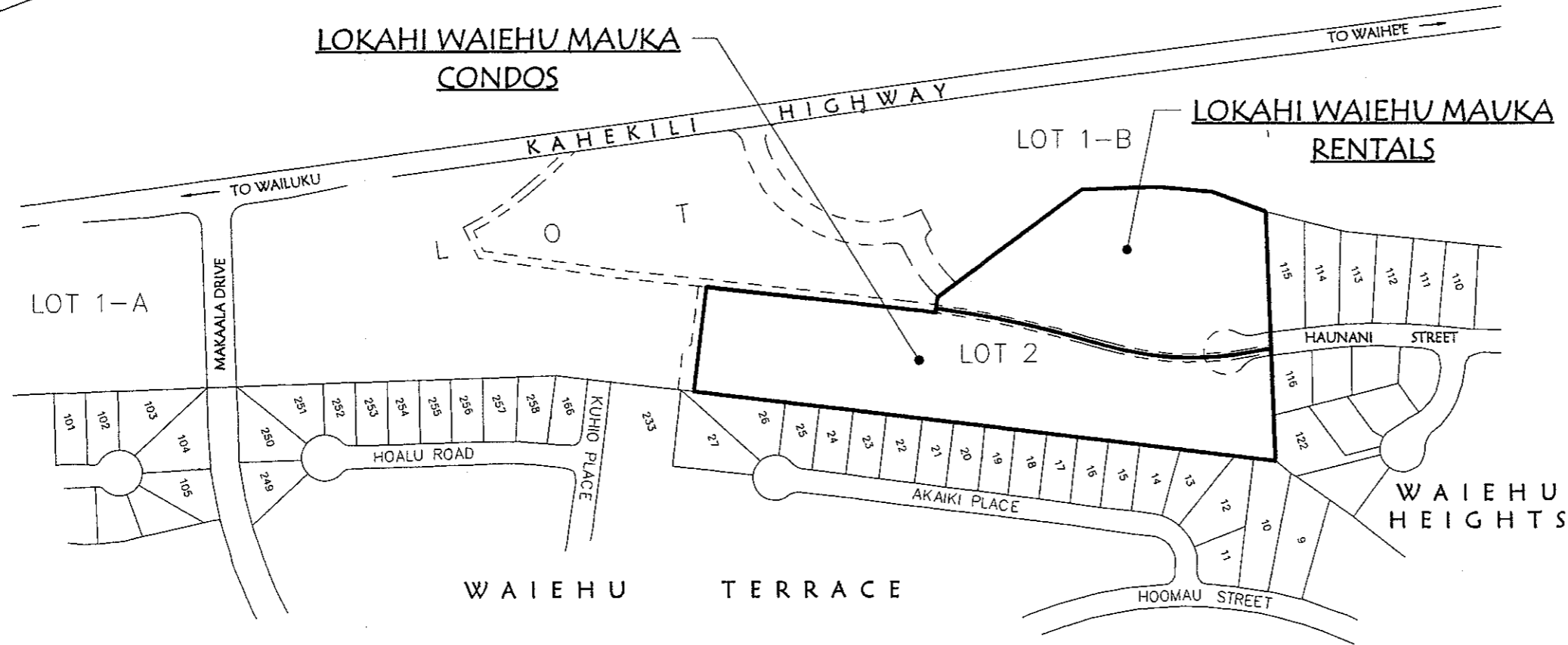
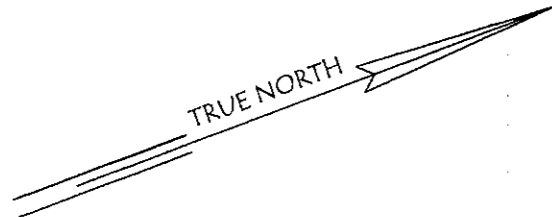
U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, August 1972.

APPENDIX A.

Architectural Plans for Proposed Waiehu Mauka Affordable Housing Project

LOKAHI PACIFIC WAIEHU MAUKA

WAIEHU, MAUI, HAWAII
TMK: (2) 3-3-01:102



VICINITY MAP
(NOT TO SCALE)

PARKING SUMMARY

LOKAHI WAIEHU MAUKA CONDOS

PARKING SPACE - ADA: STANDARD - 8.5' wide	4
PARKING SPACE - ADA: VAN - 8.5' wide	2
PARKING SPACE: STANDARD	118

TOTAL PARKING PROVIDED 124
TOTAL NO. OF UNITS = 58 x 2 = 116 STALLS REQ'D.

LOKAHI WAIEHU MAUKA RENTALS

PARKING SPACE - ADA: VAN - 8.5' wide	4
PARKING SPACE: COMPACT	8
PARKING SPACE: STANDARD	52

TOTAL PARKING PROVIDED 64
TOTAL NO. OF 1 BEDROOM UNITS = 28 x 1 = 28 STALLS
TOTAL NO. OF 2 BEDROOM UNITS = 14 x 2 = 28 STALLS
TOTAL NO. OF STALLS REQUIRED = 56 STALLS REQ'D

LOKAHI WAIEHU MAUKA CONDOS

LOT COVERAGE SUMMARY

BLDG. TYPE	GROUND FLOOR	NO. OF BLDGS.	BLDG. SQ. FTG.
A	2,382 SF	10	23,820 SF
B	4,393 SF	1	4,393 SF
C	3,596 SF	2	7,192 SF

UNIT & BLDG. SQ. FOOTAGE SUMMARY

BLDG. NO.	UNIT COUNT	BLDG. SQ. FTG.
1A	4	4,620 SF
2A	4	4,620 SF
3C	6	6,946 SF
4C	6	6,946 SF
5A	4	4,620 SF
6A	4	4,620 SF
7A	4	4,620 SF
8A	4	4,620 SF
9A	4	4,620 SF
10A	4	4,620 SF
11A	4	4,620 SF
12B	6	8,464 SF
13A	4	4,620 SF
13	58	68,556 SF

LOKAHI WAIEHU MAUKA RENTALS

LOT COVERAGE SUMMARY

BLDG. TYPE	GROUND FLOOR	NO. OF BLDGS.	BLDG. SQ. FTG.
D	2,303 SF	7	4,218 SF
LAUNDRY	740 SF	1	740 SF
MEETING	1,143 SF	1	1,143 SF

UNIT & BLDG. SQ. FOOTAGE SUMMARY

BLDG. NO.	UNIT COUNT	BLDG. SQ. FTG.
14D	6	4,363 SF
15D	6	4,363 SF
16D	6	4,363 SF
17D	6	4,363 SF
18D	6	4,363 SF
19D	6	4,363 SF
20D	6	4,363 SF
LAUNDRY	-	701 SF
MEETING	-	1,140 SF
9	42	32,382 SF

DRAWING INDEX

- T1 TITLE SHEET
- A0 SITE PLAN

LOKAHI WAIEHU MAUKA CONDOS

- A1 SITE RENDERING
- A2 TYPICAL CONDO BUILDING
- A3 UNIT TYPES '3' & '4'

LOKAHI WAIEHU MAUKA RENTALS

- A4 SITE RENDERING
- A5 TYPICAL RENTAL BUILDING
- A6 UNIT TYPE '1' & '2'
- A7 MEETING HALL & LAUNDRY BUILDING

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LOKAHI PACIFIC
WAIEHU MAUKA
WAIEHU, MAUI, HAWAII
TMK: (2) 3-3-01:102

LOKAHI WAIEHU MAUKA CONDOS
LOKAHI WAIEHU MAUKA RENTALS
TITLE SHEET

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LOKAHI WAIIEHU MAUKA CONDOS

SITE RENDERINGS

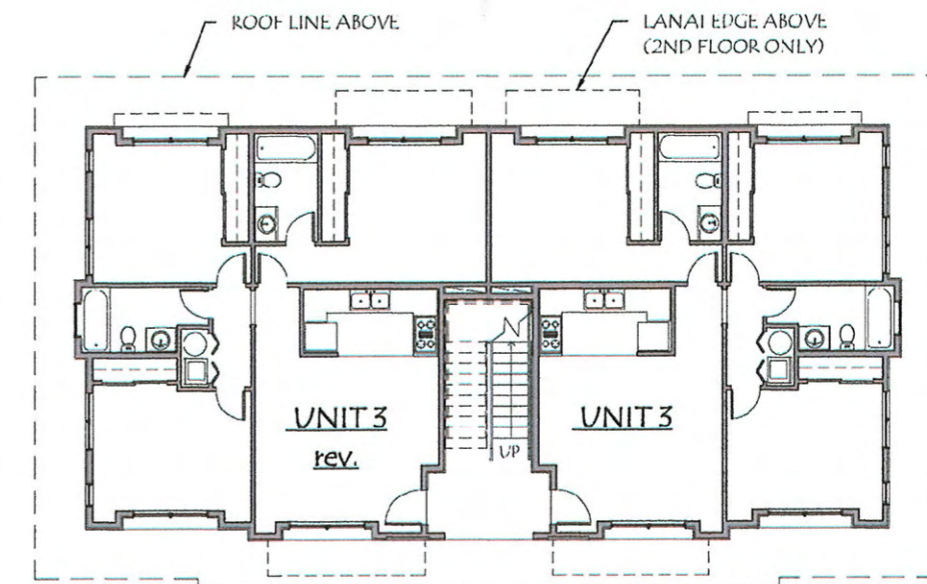
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FRONT ELEVATION



FIRST FLOOR BUILDING PLAN
(SECOND FLOOR SIMILAR)

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WAIIEHU MAUKA
WAIIEHU, MAUI, HAWAII
TMK: (2) 3-3-01:102

LOKAHI WAIIEHU MAUKA CONDOS
TYPICAL CONDO BUILDING

0' 4' 8' 16' 24'
SCALE: 1/16" = 1'-0"

02/17/09

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BUILDING TYPE 'A' - UNIT SQ. FOOTAGE

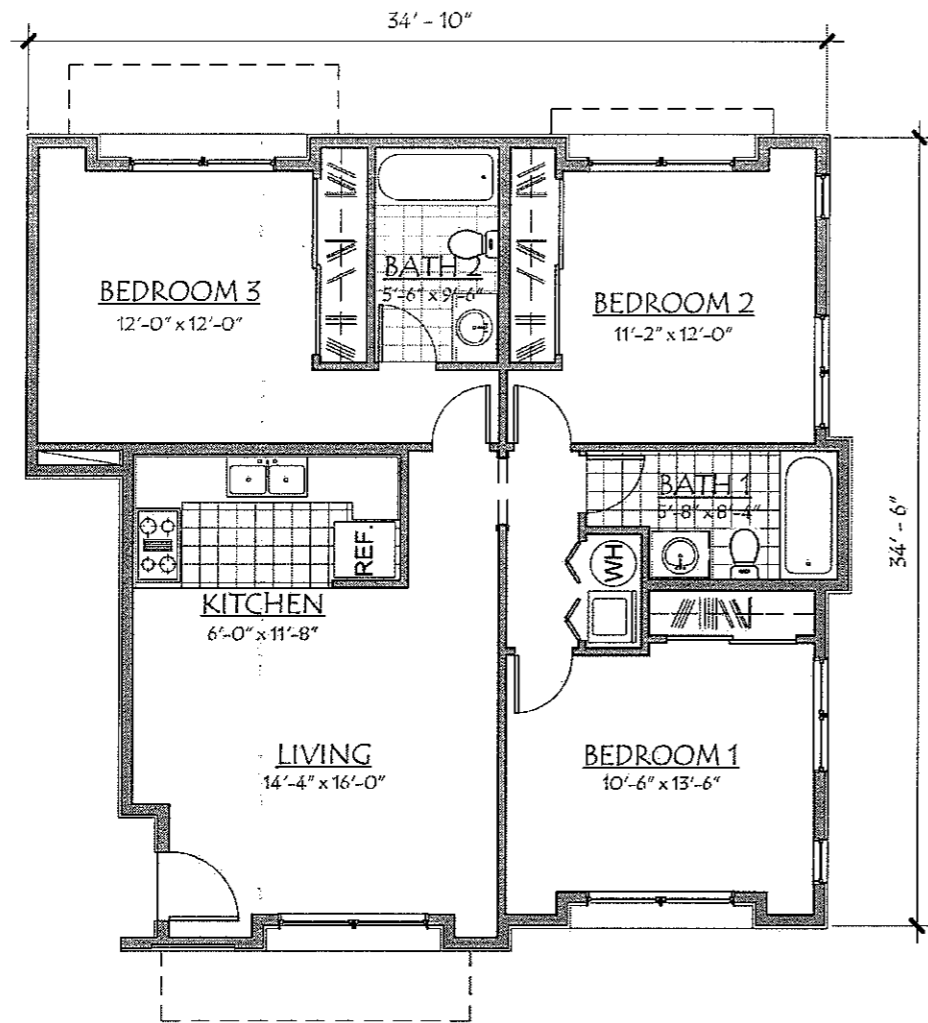
FIRST FLOOR		LIVING	
UNIT 3		1096 SF	
UNIT 3 rev.		1096 SF	
TOTAL		2192 SF	
SECOND FLOOR		LIVING	LANAI
UNIT 3		1096 SF	117 SF
UNIT 3 rev.		1096 SF	117 SF
TOTAL		2192 SF	234 SF
TOTAL BOTH FLOORS		4618 SF	

BUILDING TYPE 'B' - UNIT SQ. FOOTAGE

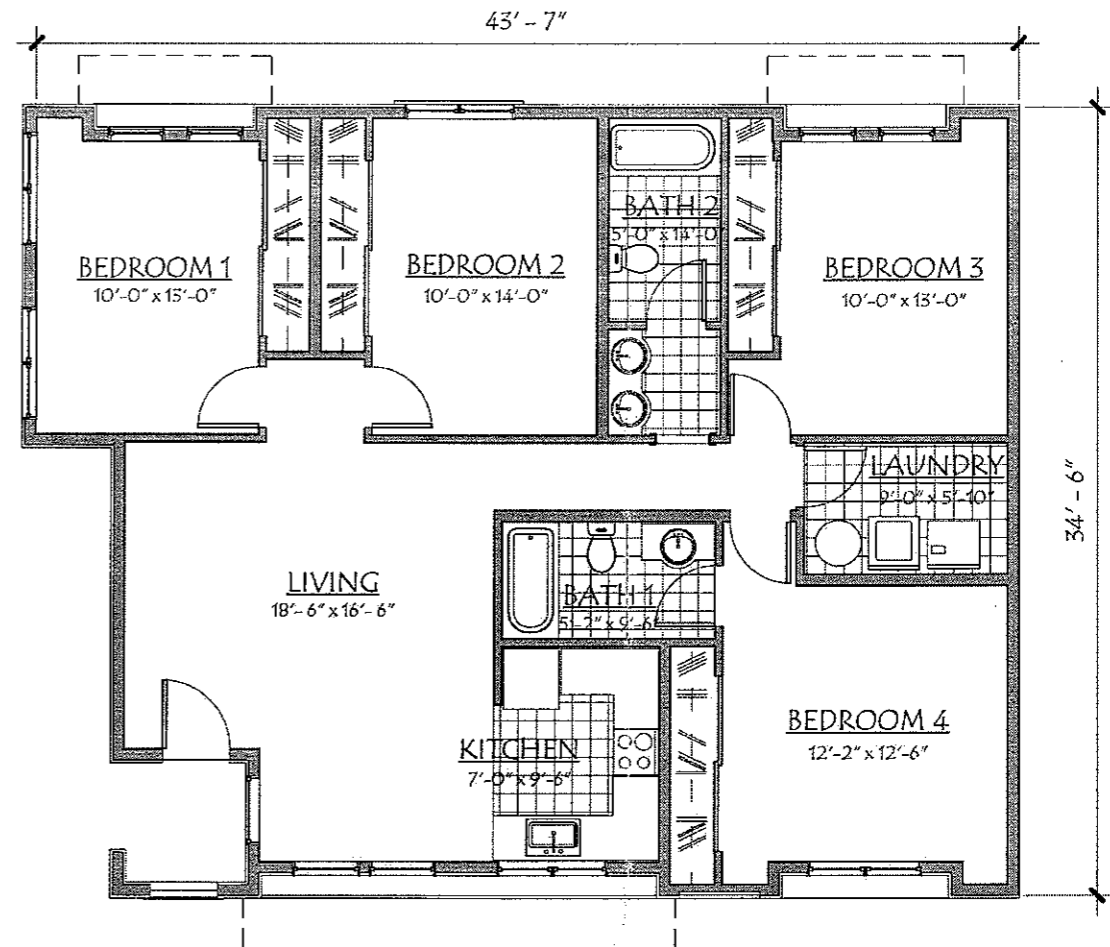
FIRST FLOOR		LIVING	
UNIT 4		1313 SF	
UNIT 4 rev.		1313 SF	
UNIT 4		1313 SF	
TOTAL		3939 SF	
SECOND FLOOR		LIVING	LANAI
UNIT 4		1313 SF	110 SF
UNIT 4 rev.		1313 SF	110 SF
UNIT 4		1313 SF	110 SF
TOTAL		3939 SF	330 SF
TOTAL BOTH FLOORS		8208 SF	

BUILDING TYPE 'C' - UNIT SQ. FOOTAGE

FIRST FLOOR		LIVING	
UNIT 3		1097 SF	
UNIT 3 rev.		1101 SF	
UNIT 3		1097 SF	
TOTAL		3295 SF	
SECOND FLOOR		LIVING	LANAI
UNIT 3		1097 SF	115 SF
UNIT 3 rev.		1101 SF	126 SF
UNIT 3		1097 SF	115 SF
TOTAL		3295 SF	356 SF
TOTAL BOTH FLOORS		6946 SF	



UNIT TYPE '3'
3 BEDROOM / 2 BATH 1097 SF



UNIT TYPE '4'
4 BEDROOM / 2 BATH 1313 SF

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WAIIEHU, MAUI, HAWAII
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LOKAHI WAIIEHU MAUKA CONDOS

UNIT TYPE '3' & '4'

0' 2' 4' 8' 12'
SCALE: 1/8" = 1'-0"

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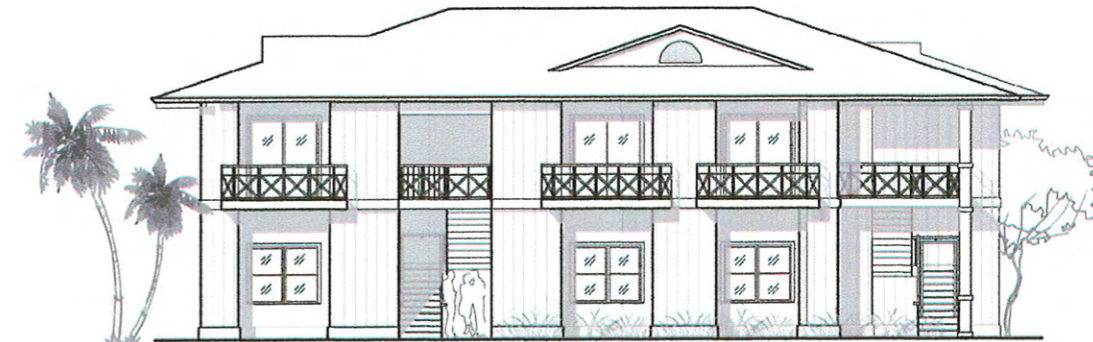
LOKAHI WAIEHU MAUKA RENTALS

SITE RENDERINGS

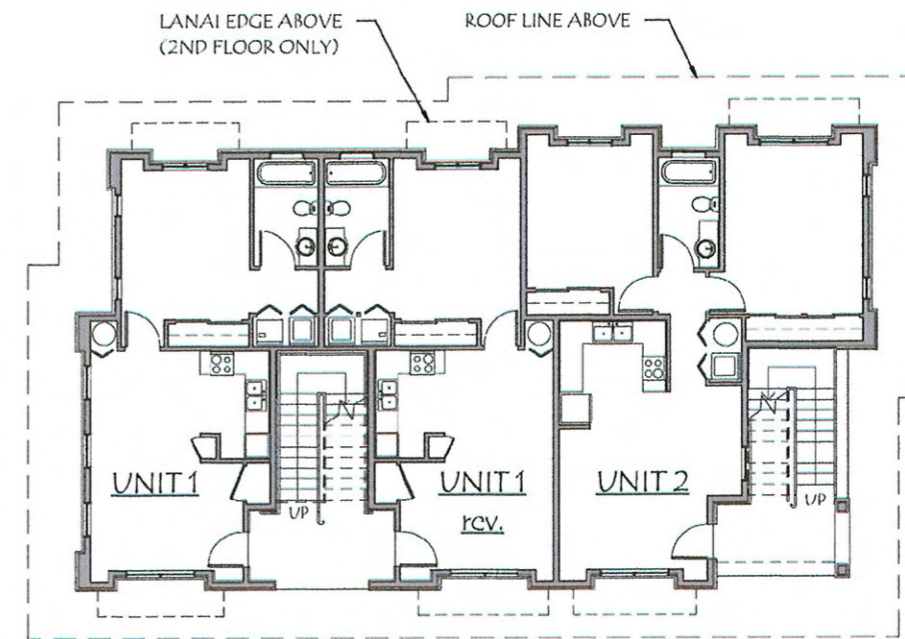
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FRONT ELEVATION



FIRST FLOOR BUILDING PLAN
(SECOND FLOOR SIMILAR)

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LOKAHI PACIFIC
WAIEHU MAUKA
WAIEHU, MAUI, HAWAII
TMK: (2) 3-3-01:102

LOKAHI WAIEHU MAUKA RENTALS
TYPICAL RENTAL BUILDING

0' 4' 8' 16' 24'
SCALE: 1/16" = 1'-0"

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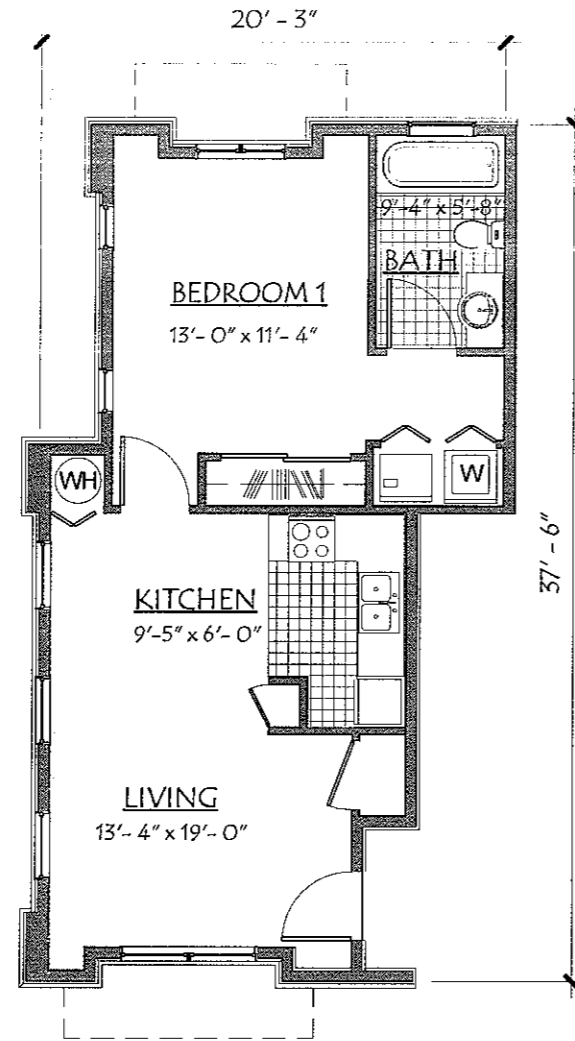
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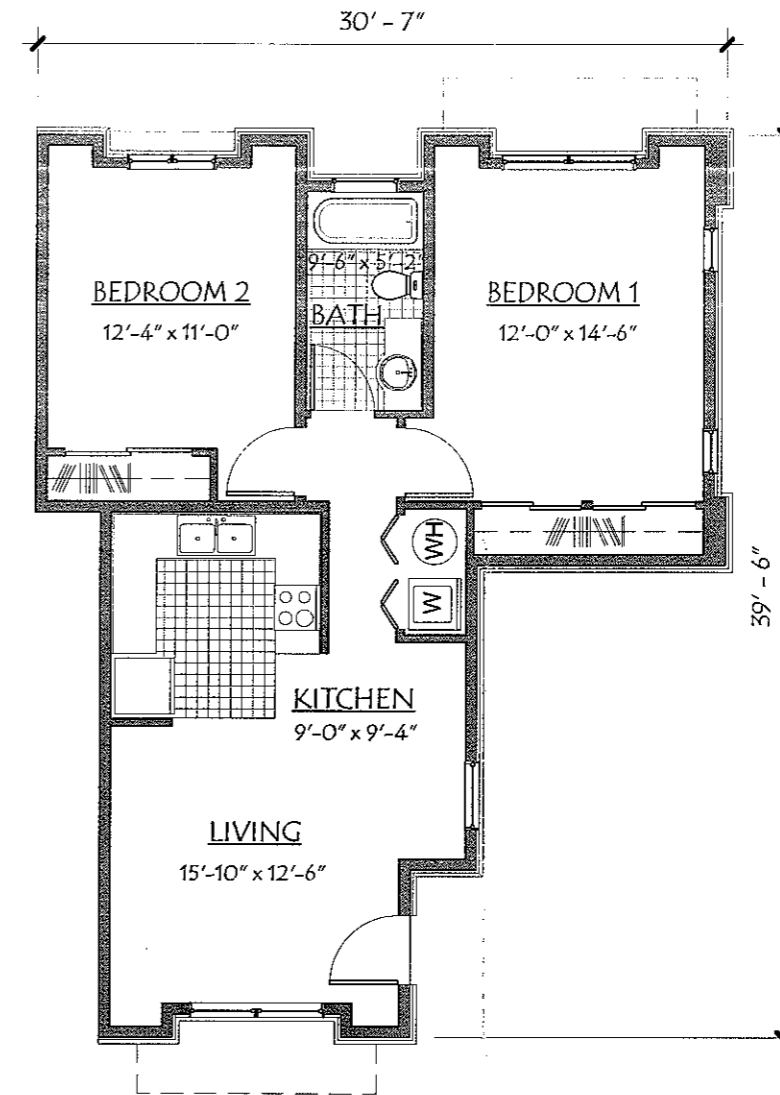
BUILDING TYPE 'D' - UNIT SQ. FOOTAGE

FIRST FLOOR	LIVING
UNIT 2	843 SF
UNIT 1	619 SF
UNIT 1 rev.	619 SF
TOTAL	2081 SF

SECOND FLOOR	LIVING	LANAI	TOTAL
UNIT 2	843 SF	69 SF	912 SF
UNIT 1	619 SF	66 SF	685 SF
UNIT 1 rev.	619 SF	66 SF	685 SF
TOTAL	2081 SF	201 SF	2282 SF
TOTAL BOTH FLOORS			4363 SF



UNIT TYPE '1'
1 BEDROOM / 1 BATH 619 S.F.



UNIT TYPE '2'
2 BEDROOM / 1 BATH 843 S.F.

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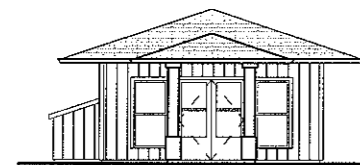
LOKAHI WAIIEHU MAUKA RENTALS
UNIT TYPE '1' & '2'

0' 2' 4' 8' 12'
SCALE: 1/8" = 1'-0"

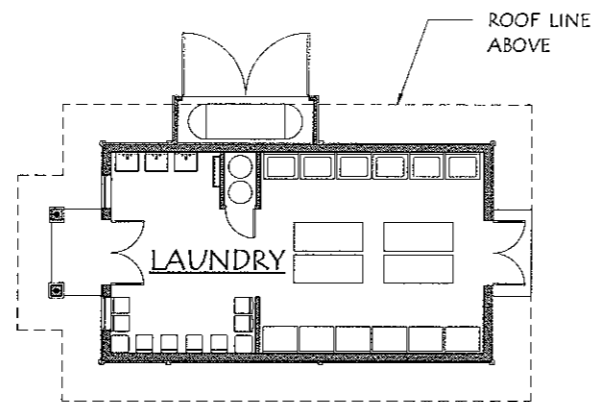
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FRONT ELEVATION



FLOOR PLAN

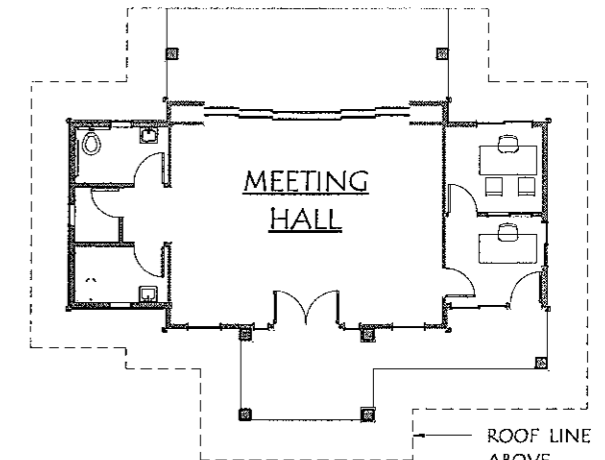
LAUNDRY BUILDING - BLDG. SQ. FOOTAGE

BUILDING	LIVING	LANAI	
LAUNDRY	641 SF	60 SF	
TOTAL GROUND FLOOR	641 SF	60 SF	701 SF

LAUNDRY BLDG.



FRONT ELEVATION



FLOOR PLAN

OFFICE BUILDING - BLDG. SQ. FOOTAGE

BUILDING	LIVING	LANAI	
MEETING	778 SF	362 SF	
TOTAL GROUND FLOOR	778 SF	362 SF	1140 SF

MEETING HALL

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TMK: (2) 3-3-01:102

LOKAHI WAIIEHU MAUKA RENTALS
MEETING HALL & LAUNDRY

0' 4' 8' 16' 24'
SCALE: 1/16" = 1'-0"

02/17/09

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APPENDIX B.

Proposed Section 201H-38 HRS Exemptions

PROPOSED SECTION 201H-38 EXEMPTIONS FOR
AFFORDABLE HOUSING COMPONENT OF
THE WAIEHU MAUKA PROJECT

A. EXEMPTION FROM TITLE 2, MCC, Administration and Personnel

1. An exemption from Chapter 2.80B, MCC, General Plan and Community Plans, shall be granted to permit the project without obtaining a community plan amendment.

B. EXEMPTION FROM TITLE 12, MCC Streets, Sidewalks, and Public Places

1. An exemption from Chapter 12.08 MCC, Driveways, shall be granted to exempt the project from payment of driveway permit and inspection fees.

C. EXEMPTION FROM TITLE 14, MCC, PUBLIC SERVICES

1. An exemption from Chapter 14.12, MCC, Water Availability, shall be granted to exempt the project from verification of a long-term, reliable supply of water.
2. An exemption from Chapter 14.25A, MCC, Service Connections, relating to wastewater connections, shall be granted to exempt the project from wastewater system connection fees.
3. An exemption from Chapter 14.35, MCC, Wastewater Assessment Fees for the Facility Expansion for the Wailuku/Kahului Wastewater Treatment System shall be granted to exempt the project from wastewater assessments.
4. An exemption from Chapter 14.76, MCC, Impact Fees for Traffic and Roadway Improvements in Wailuku-Kahului, Maui, Hawai`i shall be granted to exempt the project from traffic impact fees. Related to this exemption from Chapter 14.76, an exemption shall be granted to exempt the project from regional roadway improvements (i.e., improvements to roadway systems not abutting the subject property).

D. EXEMPTION FROM TITLE 16, MCC, Buildings and Construction

1. Exemption from MCC Chapters 16.04A, Fire Code, 16.18A,

Electrical Code, 16.20A, Plumbing Code, and 16.26, Building Code, shall be granted to exempt the project from fire, electrical, plumbing, building permit fees and demolition permit fees, as well as inspection fees.

2. An exemption from Chapter 16.26.107.2, MCC, Permit Fees, shall be granted to exempt the project from building permit fees.
3. An exemption from Section 16.26.3304, MCC, Improvements to Public Streets, shall be granted so that Title 18 exemptions listed herein are not triggered by the proposed action.

E. EXEMPTIONS FROM TITLE 18, MCC, Subdivisions

1. Exemptions from Section 18.04.030, MCC, Administration, and Section 18.16.020, MCC, Compliance, shall be granted to exempt the project from obtaining a change in zoning and community plan amendment to enable subdivision approval.
2. An exemption from Section 18.16.320, MCC, Parks and Playgrounds, shall be granted to exempt the project from payment of park and playground fees.
3. An exemption from Section 18.20.040 B.3., MCC, Existing Streets, shall be granted to exempt the project from pavement widening and shoulder improvements to Kahekili Highway.
4. An exemption from Section 18.20.070, Sidewalks, shall be granted to permit the provision of a 4-ft. wide sidewalk along the project's access road to Kahekili Highway.
5. An exemption from Section 18.24, MCC, Fees, shall be granted to exempt the project from payment of subdivision filing fees.

F. EXEMPTIONS FROM TITLE 19, MCC, Zoning

1. An exemption from Chapter 19.02, MCC, Interim District, shall be granted to permit the development and use of the parcel for single-family and multi-family residential purposes, including supporting infrastructure requirements. Further, this exemption shall allow the subdivision of the property in the plat configuration shown in Attachment "A". The following zoning standards

shall apply to the proposed multi-family lots and six (6) single-family market lots:

Multi-Family Unit Lots

Minimum Lot Size 10,000 square feet
Minimum Lot Width 70 feet
Front and Rear Yard Setback minimum of 10 feet
Side Yard Setback minimum of 10 feet
Lot Coverage total ground area 25 percent
Floor Area Ratio: Lot 8 maximum of 40 percent
Floor Area Ratio: Lot 9 maximum of 50 percent
Height: No building shall exceed 2-story or 30 feet in height from finished grade of the subdivision.

Market Lots

Minimum Lot Size 10,000 square feet
Average Lot Width 70 feet
Front Yard Setback 15 feet
Garage minimum of 20 feet
One-story homes: side and rear . . . minimum of 6 feet
Two-story homes: side and rear . . . minimum of 10 feet

Height: No building shall exceed 2-story or 30 feet in height from finished grade of the subdivision.

Front Yard Definition

For the purposes of this project, the front yard for the affordable housing project site shall be defined as the property line at 163 degrees 50 minutes declination (345.69'), identified as the southwesterly property line. The rear yard is defined as the most northerly property line.

- 2. An exemption from Chapter 19.36A.010, MCC, Off-Street Parking and Loading, shall be granted to allow for the provision of one (1) parking stall for each one-bedroom unit.

G. EXEMPTIONS FROM TITLE 20, MCC, Environmental Protection

- 1. An exemption from Section 20.08.090, MCC, Grubbing and Grading Permit Fees, shall be granted to exempt the project from payment of grading, grubbing and excavation permit fees, as well as inspection fees.

KEY

Lokahi Waiehu Mauka Condos

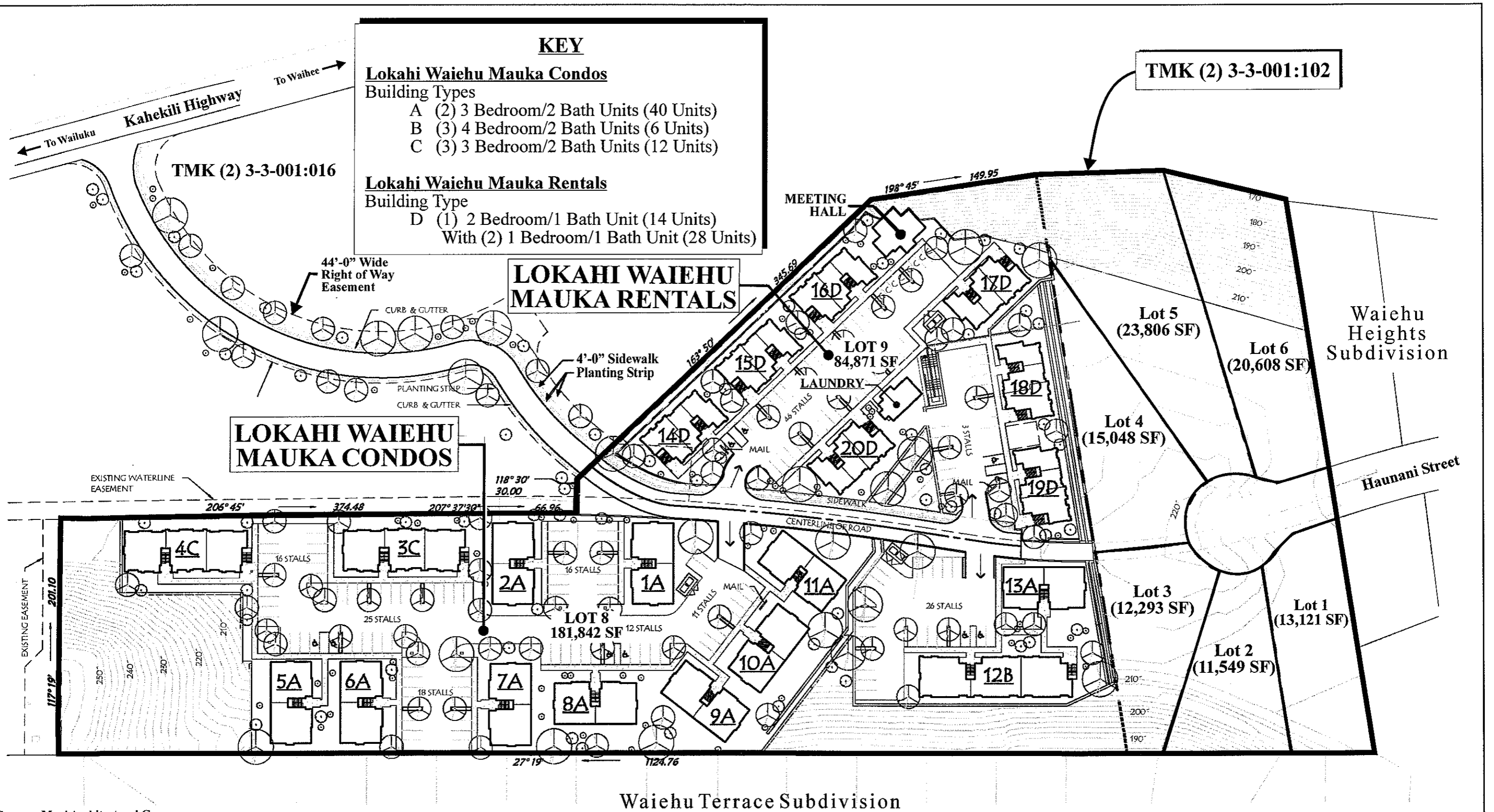
Building Types

- A (2) 3 Bedroom/2 Bath Units (40 Units)
- B (3) 4 Bedroom/2 Bath Units (6 Units)
- C (3) 3 Bedroom/2 Bath Units (12 Units)

Lokahi Waiehu Mauka Rentals

Building Type

- D (1) 2 Bedroom/1 Bath Unit (14 Units)
With (2) 1 Bedroom/1 Bath Unit (28 Units)



Source: Maui Architectural Group

Attachment "A"

**Proposed Waiehu Mauka Affordable Housing Project
Subdivision Lot Configuration**

NOT TO SCALE



Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

APPENDIX C.

Flora and Fauna Survey and Assessment Report

FLORA AND FAUNA SURVEY AND ASSESSMENT

for the

WAIEHU MAUKA RESIDENTIAL PROJECT

WAIEHU, MAUI

by

**ROBERT W. HOB DY
ENVIRONMENTAL CONSULTANT
Kokomo, Maui
May 2008**

**Prepared for:
Maui Architectural Group Inc.**

FLORA AND FAUNA SURVEY AND ASSESSMENT WAIEHU MAUKA RESIDENTIAL PROJECT

INTRODUCTION

The Waiehu Mauka Residential Project lies on 6.5 acres of land at TMK (2) 3-3-001:016 (por.) and 102 on a hilltop just north of Wailuku Town. The project is surrounded on the north and east by a single family residential community and on the south and west by abandoned agricultural orchards. This survey was conducted in response to environmental requirements of the planning process.

SITE DESCRIPTION

This project area is situated on the top of an extensive sand dune just east of Kahekili Highway at elevations ranging from 150-200 feet above sea level. Most of the property is barren sand with sparse, low vegetation, but with a few trees in a hollow in the northwest corner. Soils are uniformly of the Pu'u One Sand, 7-30% slopes series which is loose textured and exceedingly well drained (Foote et al, 1972). Rainfall averages about 25 inches per year with the bulk falling during the winter months (Armstrong, 1983). The area is exposed to gusty trade winds for much of the year.

BIOLOGICAL HISTORY

This sand dune was once vegetated with a distinctive variety of low growing native shrubs and grasses that were well adapted to this harsh site. Little remains of this native vegetation. While the area escaped the direct effects of plantation agriculture, it was used for the grazing of plantation mules and livestock. Almost all native plant species were eliminated by this grazing and were replaced by an array of hardy weed species that now occupy the site. Meanwhile much of the surrounding dunes have now become residential subdivisions.

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Waiehu Mauka Residential Project which was conducted in May 2008. The objectives of the survey were to:

1. Document what plant, bird and mammal species occur on the property or may likely occur in the existing habitat.
2. Document the status and abundance of each species.
3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.
4. Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora and fauna in this part of the island.
5. Note which aspects of the proposed development pose significant concerns for plants or for wildlife and recommend measures that would mitigate or avoid these problems.

BOTANICAL SURVEY REPORT

SURVEY METHODS

A walk-through botanical survey method was used following routes to ensure that all parts of the project area were covered. Areas most likely to harbor native or rare plants such as gullies were more intensively examined. Notes were made on plant species, distribution and abundance as well as terrain and substrate.

DESCRIPTION OF THE VEGETATION

The vegetation of the property is mostly low, sparse and windblown. A few larger shrubs and trees grow at the south end and in a hollow on the northwest corner. Four species are common on the property: Natal redtop (*Melinis repens*), Guinea grass (*Panicum maximum*), Florida beggarweed (*Desmodium tortuosum*) and koa haole (*Leucaena leucocephala*).

A total of 46 plant species were recorded during two site visits to the property. Of these only 'uhaloa (*Waltheria indica*) and 'ilima (*Sida fallax*) were native. Both 'uhaloa and 'ilima are widespread and common in Hawaii and are found on other Pacific islands as well. The remaining 44 species are all non-native in Hawaii and are of no special environmental interest or concern.

DISCUSSION AND RECOMMENDATIONS

The vegetation throughout the project area consists primarily of non-native species with only two common indigenous native species scattered about. No Federally listed Threatened or Endangered species (USFWS, 1999) were found on the property nor were any found that are candidates for such status. No special habitats were found on the property either.

Because of the above existing conditions there is little of botanical concern on this property, and the proposed project is not expected to have a significant negative impact on the botanical resources in this part of Maui.

The only recommendation that is offered is that there are a number of native plants that might be incorporated into the landscape design that would lend a distinctive accent to the project. Ideas for appropriate species can be found in the Maui County Planting Plan or can be obtained from nursery growers who specialize in native plants.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within two groups: Monocots and Dicots. Taxonomy and nomenclature of the plants are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation
2. Common English or Hawaiian name.
3. Bio-geographical status. The following symbols are used:
 - endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
 - indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
 - Polynesian = those plants brought to the islands by the Polynesians in the course of their migrations.
 - non-native = all those plants brought to the islands intentionally or accidentally after western contact.
4. Abundance of each species within the project area:
 - abundant = forming a major part of the vegetation within the project area.
 - common = widely scattered throughout the area or locally abundant within a portion of it.
 - uncommon = scattered sparsely throughout the area or occurring in a few small patches.
 - rare = only a few isolated individuals within the project area.

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>	<u>ABUNDANCE</u>
MONOCOTS			
POACEAE (Grass Family)			
<i>Cenchrus ciliaris</i> L.	buffelgrass	non-native	uncommon
<i>Cenchrus echinatus</i> L.	common sandbur	non-native	rare
<i>Chloris gayana</i> Kunth	Rhodes grass	non-native	rare
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	non-native	uncommon
<i>Eragrostis amabilis</i> (L.) Wight & Arnott Nees	Japanese lovegrass	non-native	uncommon
<i>Melinis repens</i> (Willd.) Zizka	Natal redtop	non-native	common
<i>Panicum maximum</i> Jacq.	Guinea grass	non-native	common
DICOTS			
ACANTHACEAE (Acanthus Family)			
<i>Asystasia gangetica</i> (L.) T. Anderson	Chinese violet	non-native	uncommon
ANACARDIACEAE (Mango Family)			
<i>Schinus terebinthifolius</i> Raddi	Christmas berry	non-native	rare
ARALIACEAE (Ginseng Family)			
<i>Schefflera actinophylla</i> (Endlicher) Harms	octopus tree	non-native	rare
APOCYNACEAE (Dogbane Family)			
<i>Calotropis gigantea</i> (L.) W.T. Aiton	giant crownflower	non-native	rare
<i>Calotropis procera</i> (Aiton) W.T. Aiton	small crownflower	non-native	rare
ASTERACEAE (Sunflower Family)			
<i>Dyssodia tenuiloba</i> (DC.) B.L. Rob.	Dahlberg daisy	non-native	rare
<i>Heterotheca grandiflora</i> Nutt.	telegraph weed	endemic	uncommon
<i>Pluchea carolinensis</i> (Jacq.) G. Don	sourbush	non-native	uncommon
<i>Sonchus oleraceus</i> L.	<i>pualele</i>	non-native	rare
<i>Tridax procumbens</i> L.	coat buttons	non-native	uncommon

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>	<u>ABUNDANCE</u>
<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.	golden crown-beard	non-native	uncommon
BRASSICACEAE (Mustard Family)			
<i>Lepidium virginicum</i> L.	pepperwort	non-native	rare
CASUARINACEAE (She-oak Family)			
<i>Casuarina equisetifolia</i> L.	common ironwood	non-native	uncommon
EUPHORBIACEAE (Spurge Family)			
<i>Aleurites moluccana</i> (L.) Willd.	<i>kukui</i>	Polynesian	rare
<i>Chamaesyce hirta</i> (L.) Millsp.	hairy spurge	non-native	rare
<i>Chamaesyce hypericifolia</i> (L.) Millsp.	graceful spurge	non-native	rare
<i>Chamaesyce prostrata</i> (Aiton) Small	prostrate spurge	non-native	rare
<i>Ricinus communis</i> L.	Castor bean	non-native	rare
FABACEAE (Pea Family)			
<i>Chamaecrista nictitans</i> (L.) Moench	partridge pea	non-native	uncommon
<i>Crotalaria incana</i> L.	fuzzy rattlepod	non-native	uncommon
<i>Crotalaria pallida</i> Aiton	smooth rattlepod	non-native	uncommon
<i>Desmanthus pernambucanus</i> (L.) Thellung	slender mimosa	non-native	uncommon
<i>Desmodium tortuosum</i> (Sw.) DC.	Florida beggarweed	non-native	common
<i>Falcataria moluccana</i> (Miq.) Barneby & Grimes	albizia	non-native	rare
<i>Indigofera suffruticosa</i> Mill.	<i>inikö</i>	non-native	common
<i>Macroptilium atropurpureum</i> (DC.) Urb.	-----	non-native	uncommon
<i>Neonotonia wightii</i> (Wight & Arnott) Lackey	glycine	non-native	rare
<i>Pithecellobium dulce</i> (Roxb.) Benth.	<i>'öpiuma</i>	non-native	rare
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	<i>kiawe</i>	non-native	rare
MALVACEAE (Mallow Family)			
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon	non-native	uncommon

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>	<u>ABUNDANCE</u>
<i>Gossypium hirsutum</i> L.	upland cotton	non-native	rare
<i>Sida fallax</i> Walp.	'ilima	indigenous	rare
<i>Sida rhombifolia</i> L.	Cuban jute	non-native	rare
<i>Waltheria indica</i> L.	'uhaloa	indigenous	uncommon
MORACEAE (Mulberry Family)			
<i>Broussonetia luzonicus</i> (Blanco) Bureau	alokon	non-native	rare
MORINGACEAE (Drumstick Tree Family)			
<i>Moringa oleifera</i> Lamarck	horseradish tree	non-native	rare
MYRTACEAE (Myrtle Family)			
<i>Psidium guajava</i> L.	common guava	non-native	rare
<i>Syzygium cumini</i> (L.) Skeels	Java plum	non-native	rare
VERBENACEAE (Verbena Family)			
<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Jamaica vervain	non-native	uncommon

FAUNA SURVEY REPORT

SURVEY METHODS

A walk-through fauna survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species, abundance, activities and location as well as observations of trails, tracks, scat and signs of feeding. In addition an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

RESULTS

MAMMALS

Only sign of two mammal species were observed during two site visits to the property. Taxonomy and nomenclature follow Tomich (1986).

Domestic cat (*Felis catus*) - Cat tracks were abundant in the sandy soil. These cats are no doubt pets that wander into this area at night to hunt for rodents.

Domestic dog (*Canis familiaris*) - Dogs were heard barking on adjacent properties. These dogs no doubt also wander into this property occasionally.

While not seen during the survey rats (*Rattus rattus*) and mice (*Mus domesticus*) would be common in this type of area where they would feed on seeds, fruits and herbaceous vegetation. Mongoose (*Herpestes auro-punctatus*) would also be expected here. They would hunt for the rodents and birds.

A special effort was made to look for any occurrence of the native Hawaiian hoary bat by making an evening survey on the property. When present in an area these bats can be easily identified as they forage for insects, their distinctive flight patterns clearly visible in the glow of twilight. No evidence of such activity was observed though visibility was excellent. In addition a bat detection device (Batbox IIID) was employed set to the frequency of 27,000 to 28,000 hertz which is typical for this bat species. No bats were detected. The low grass habitat is not suitable for these bats.

BIRDS

Birdlife was fairly sparse in both diversity and numbers due to the dry open character of the habitat. Only nine species of birds were seen during two site visits. All of these were non-native birds that are common throughout Hawaii. Taxonomy and nomenclature follow American Ornithologists' Union (2005).

House finch (*Carpodacus mexicanus*) – Small groups of these finches were common on this property where they associate with and feed on the seeds of common ironwood.

Common myna (*Acridotheres tristis*) – Pairs of mynahs were seen feeding and flying about throughout the property.

Spotted dove (*Streptopelia chinensis*) – Several of these large doves were seen perched on fence posts and flying between trees.

Zebra dove (*Geopelia striata*) – These small doves were seen throughout the corridor feeding in small flocks in clearings.

Northern cardinal (*Cardinalis cardinalis*) – A few cardinals were seen and heard calling from trees during the evening survey.

Rock dove (*Columba livia*) – One flock of these pigeons was seen flying over the property. These are no doubt domestic birds from nearby residences.

Chickens (*Gallus gallus*) – Roosters were heard crowing from brushy land on the margin of the property. This is no doubt a wild population.

Red-crested cardinal (*Paroaria coronata*) – One of these bright red-headed cardinals was heard calling during the evening survey.

Cattle egret (*Bubulcus ibis*) – One of these large white egrets was seen flying over the property during the evening survey.

Had the survey been extended, no doubt other non-native birds would have been seen but the habitat is not suitable for Hawaii's native forest birds which occupy forested uplands beyond the elevational range of mosquitoes and the avian diseases they carry.

INSECTS

While insects in general were not tallied, a good diversity of types were seen that no doubt helped fuel the diversity of birdlife seen. One native Sphingid moth, Blackburn's sphinx moth (*Manduca blackburni*) has been put on the Federal Endangered species list and this designation requires special focus (USFWS 2000). Blackburn's sphinx moth is known to occur in parts of East Maui and Central Maui but its feeding requirements are very specialized. It requires host plants in the nightshade family that are toxic, such as native species of 'aiea (*Nothocestrum spp.*) and such non-native alternative hosts as tobacco (*Nicotiana tabacum*) and tree tobacco (*Nicotiana glauca*). None of these host species were found on the subject property and no Blackburn's sphinx moths or their larvae were seen.

CONCLUSIONS AND RECOMMENDATIONS

All of the fauna observed are common and widespread non-native species. None of these are of any particular environmental interest or concern. No Federally listed Threatened or Endangered mammal, bird or insect species were recorded during the course of the survey and no special fauna habitats were identified. As a result of the above findings, the proposed changes in land use are not expected to have a significant negative impact on the fauna resources in this part of Maui.

No special recommendations are deemed necessary or appropriate with regard to the fauna resources on this property.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within two groups: Mammals and Birds. For each species the following information is provided:

1. Common name
2. Scientific name
3. Bio-geographical status. The following symbols are used:
 - endemic = native only to Hawaii; not naturally occurring anywhere else in the world.
 - indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).
 - non-native = all those animals brought to Hawaii intentionally or accidentally after western contact.
 - migratory = spending a portion of the year in Hawaii and a portion elsewhere. In Hawaii the migratory birds are usually in the overwintering/non-breeding phase of their life cycle.
4. Abundance of each species within the project area:
 - abundant = many flocks or individuals seen throughout the area at all times of day.
 - common = a few flocks or well scattered individuals throughout the area.
 - uncommon = only one flock or several individuals seen within the project area.
 - rare = only one or two seen within the project area.

<u>COMMON NAME</u>	<u>SCIENTIFIC NAME</u>	<u>STATUS</u>	<u>ABUNDANCE</u>
<u>MAMMALS</u>			
Domestic cat	<i>Felis catus</i>	non-native	rare
Domestic dog	<i>Canis familiaris</i>	non-native	rare
<u>BIRDS</u>			
Barred dove	<i>Carpodacus mexicanus</i>	non-native	common
Common myna	<i>Acridotheres tristis</i>	non-native	common
Spotted dove	<i>Streptopelia chinensis</i>	non-native	common
Zebra dove	<i>Geopelia striata</i>	non-native	common
Northern cardinal	<i>Cardinalis cardinalis</i>	non-native	uncommon
Rock dove	<i>Columba livia</i>	non-native	rare
Chicken	<i>Gallus gallus</i>	non-native	rare
Red-crested cardinal	<i>Paroaria coronata</i>	non-native	rare
Cattle egret	<i>Bubulcis ibis</i>	non-native	rare

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APPENDIX D.

Archaeological Assessment Report

**AN ARCHAEOLOGICAL ASSESSMENT OF
APPROXIMATELY 8.5 ACRES FOR
THE PROPOSED WAIEHU MAUKA SUBDIVISION
LOCATED IN WAIEHU HEIGHTS, WAIEHU AHUPUA`A,
WAILUKI DISTRICT, ISLAND OF MAUI, HAWAII
[TMK (2) 3-3-001:102 AND 016 (POR.)]**

Prepared by:
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Michael F. Dega, Ph.D
Revised July 2008

Prepared for,
Pacific Rim Land, Inc.
and
Lokahi Pacific, Inc.

ABSTRACT

An Archaeological Assessment Survey with backhoe trenching was conducted of approximately 8.5 acres of undeveloped land located in Waiehu Heights, Waiehu Ahupua`a, Wailuku District, Island of Maui, Hawai'i [TMK: (2) 3-3-001:102 and 016 (por.)]. This property is located at the border of the Waiehu Heights Subdivision and was Lot 2 of the Paukukalo Large-Lot Subdivision. According to Dr. Melissa Kirkendall, Sate Historic Preservation Division Maui Island Archaeologist, previous use of this property includes mining for sand by Hawaiian Cement and stockpiling of excess materials during the construction of the Waiehu Heights Subdivision (Dr. Melissa Kirkendall, pers. comm.), but is currently vacant and undeveloped. The current landowner is Goodfellows, Inc. with Pacific Rim Land Inc. acting as Agent for the landowner who is proposing a joint subdivision with Lokahi Pacific. The proposed undertaking is to develop the subject property into an affordable housing residential subdivision.

Most of the project area appears to have been extensively disturbed by both previous and on-going activities. The prior land alterations are due to the above-mentioned sand mining operation, bulldozing and filling. The on-going disturbances are due to dirt biking, use of the area as a paint ball field, and small scale excavations performed by bottle hunters and/or children.

No archaeological sites were identified during the Archaeological Assessment. However given the presence of the original sand deposit (suggesting the possibility of subsurface archaeological sites such as burials and/or habitation sites) within the project area, a program of Archaeological Monitoring is recommended as a precautionary measure during the phases of construction which involve ground altering activities.

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INTRODUCTION

Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Assessment Survey with the excavation of 20 backhoe trenches placed over the approximately 8.5 acres of land. The project area is located in Waiehu Heights, Waiehu Ahupua`a, Wailuku District, Island of Maui, Hawai`i [TMK: (2) 3-3-001:102 and 016 (por.) (Figures 1 and 2). This property is located at the border of the Waiehu Heights Subdivision and was Lot 2 of the Paukukalo Large-Lot Subdivision. According to Dr. Melissa Kirkendall, State Historic Preservation Division Maui Island Archaeologist, the property was previously mined for sand by Hawaiian Cement and used as a stockpiling area for excess materials during the construction of the Waiehu Heights Subdivision (Dr. Melissa Kirkendall, pers. comm.), but is currently vacant and undeveloped. The current landowner is Goodfellow Bros., Inc. with Pacific Rim Land Inc. acting as Agent for the landowner. The proposed project is a joint undertaking between Goodfellow Bros. Inc. and Lokahi Pacific to develop the subject property into an affordable housing residential subdivision.

This Archaeological Assessment Survey included historic background research and settlement pattern analysis prior to fieldwork, systematic pedestrian survey of the entire project area, and representative mechanical testing. Fieldwork was conducted over a two day period, August 24 and 25, 2006, by SCS personnel Allison Chun, Ph.D., and Ian Bassford, B.A., under the direct supervision of Michael Dega, Ph.D., who also acted as the Principle Investigator for this project.

The Archaeological Assessment Survey was conducted in accordance with the State of Hawaii Department of Land and Natural Resources Historic Preservation Division (SHPD), as outlined in Hawaii Administrative Rules, Title 13, DLNR, Subtitle 13, and State Historic Preservation Rules in order to determine the presence/absence of archaeological sites and features in surface and subsurface contexts through complete systematic survey and representative subsurface testing. The ultimate goals were to determine the presence/absence of historical sites, to provide adequate recordation and documentation of all historic sites present, to determine the significance of these sites, and to provide recommendations to the SHPD concerning site significance and mitigation in lieu of future land use in the project area.

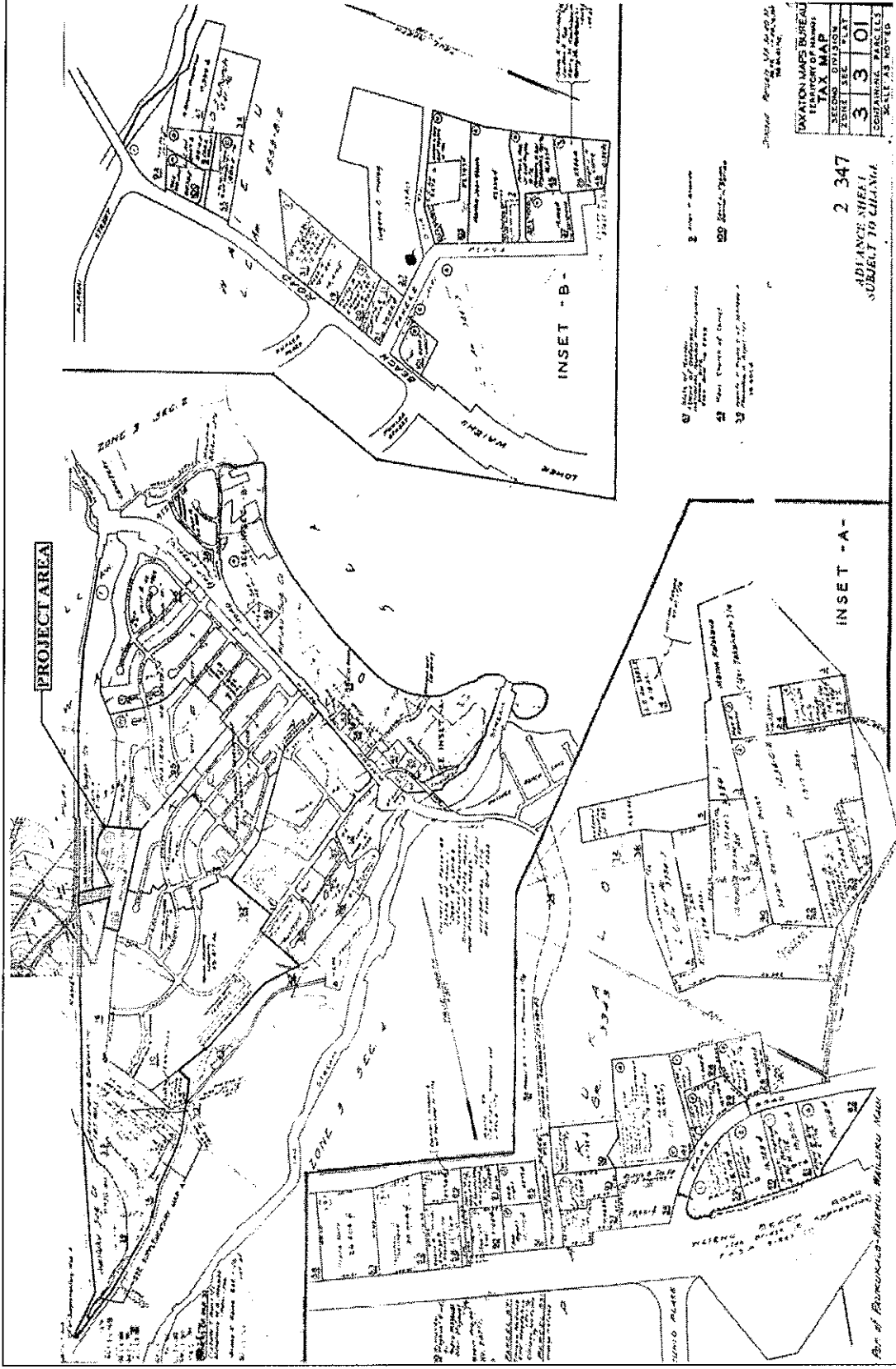


Figure 2: Tax Map Key [TMK] Showing Project Area.

ENVIRONMENTAL SETTING

LOCATION

The current project area is an approximately 8.5 acre property located in Waiehu Ahupua`a, Wailuku District, Island of Maui [TMK (2) 3-3-01:102 and 016 (por.)] (see Figures 1 and 2). The project area is roughly elongate in shape, sort of like an angular chicken drumstick, with its long axis oriented approximately North-South. The fat end of the “drumstick” is toward the north. The entire property is fenced along its boundaries with chain-link, except for the southern edge next to the water tank which is fenced off further down slope and well beyond the property boundary. The project area is primarily comprised of an extensive sand dune with sloping sides. The eastern side of the property slopes down approximately 3.0 to 4.0 m (30-40% slope) to existing residential homes. The southern side ends on top of the sand dune next to the water tank. Modern trash, including an abandoned chicken coop, is present in this area. The northern side is level with a residential cul-de-sac (Haunani Street) and more residential homes. The north half of the western side of the project area slopes down nearly 4.0 to 5.0 m to a large ravine, while the south half of the western side slopes down about 1.0 to 2.0 m (30-40% slope) to a level graded area. In addition to surveying TMK 3-3-001:102, a portion of TMK: 3-3-001:016, the access and utility easement, was also surveyed and trenched. This area is an approximately 10-15 m wide corridor running approximately East-West towards Kahekili Highway from about the middle of the western boundary. The easement corridor is level and within the graded area where the mechanical screen was set up during the period when the property was being mined for sand.

Most of the project area appears to have undergone extensive disturbance by previous sand mining operations, bulldozing and filling. The project area also was utilized as for stockpiling during the construction of the Waiehu Heights Subdivision. Original sand is likely to be present only in the vicinity of the water tank and along the bank along the eastern boundary of the project area. The entire project area also shows signs of recent, on-going human disturbance in the form of dirt biking (trails were observed throughout the project and particularly along the sides of the dune by the water tank), use as a paint ball field (the area where the easement is located), and small scale excavations done by bottle hunters or kids playing fort as suggested by the presence of shallow square “foxholes” covered with wooden pallets.

PROJECT AREA LANDFORM, SOIL, AND CLIMATE

The upper (northern) portion of the project area is mostly level and featureless, with a gentle slope (approximately 10-15% slope) towards the south. The south end of the project area is a sand dune with steeper sides (approximately 45-50% slope).

According to Foote *et al.* (1972) the project area is primarily located in the Puuone Sand (PZUE) deposit (Figure 3). In general, this soil series occurs in the lower uplands of the island of Maui with elevation ranging from 50 to 350 feet above mean sea level (amsl). These soils are comprised of somewhat over-drained soils which have been formed from materials originating in coral and marine shell.

The PZUE soil series is found on coastal sandhills exhibiting moderate to moderately steep slopes, slow runoff, rapid permeability above concretion, with moderate to severe wind erosion. Activities conducted in the PZUE soil series include residences and pasturelands. A representative profile indicates the surface layer is approximately 20 inches thick comprised of a fairly alkaline grayish-brown calcareous sand underlain by grayish-brown concreted sand, which in some areas is 20 inches below the surface. Rainfall in this area ranges from 20 to 30 inches annually, with most of the rainfall occurring during the winter months and the soil temperature averages in the mid 70s.

The easement corridor is located in Iao Cobbly Silty Clay (IbB). Soils in this series are found at elevations ranging from 100 to 500 feet amsl on well drained soils located in valley fill and alluvial fans which are formed of alluvium materials originating from basic igneous rock.

The IbB series occurs on 3 to 7 percent slopes and exhibits moderately slow permeability, medium runoff, and a slight to moderate erosion hazard. A representative profile of this soil series shows a surface layer comprised of dark brown clay approximately 15 inches thick. The subsoil (approximately 45 inches thick) consists of very dark brown, dark brown, and very dark grayish-brown silty clay underlain by clayey alluvium (*ibid*). The climate in which this soil series is found is very similar to that of the PZUE series. Annual rainfall ranges from 25 to 40 inches and the average soil temperature is in the mid-70s.

VEGETATION

Vegetation along the upper portion of the project area is sparse (about 10-15% cover) consisting of small clumps of natal redtop grass (*Rhynchelytrum repens*), buffleggrass (*Cenchrus ciliaris*), and Bermuda grass (*Cynodon dactylon*); scattered stunted shrubs such as *koa haole*

(*Leucaena leucocephala*), indigo (*Indigofera suffruticosa*), fleabane (*Pluchea symphytifolia*), and castor bean (*Ricinus communis*); and various herbaceous weedy invasives including vervain (*Stachytarpheta sp.*), telegraph weed (*Heterotheca grandiflora*), and beggarweed (*Desmodium tortuosum*). The sloped side along the northwestern boundary and the easement are more heavily vegetated (80-90% cover) with a thick growth of the same as above with the addition of giant guinea grass (*Panicum maximum*), coat buttons (*Tridax procumbens*), partridge pea (*Chamaecrista nictitans*), cow pea (*Macroptilium lathyroides*), slender mimosa (*Desmanthus virgatus*), glycine vine (*Glycine wightii*) and native weedy `uhaloa (*Waltheria Indica*). The sand dune next to the water tank is the only part of the project area with ironwood trees (*Casuarina sp.*) and several specimens of cotton, possibly the native *Gossypium tomentosum*, but more probably a hybrid or some other introduced variety. Overall, this is an introduced alien ecosystem, as the area has been totally disturbed.

TRADITIONAL AND HISTORIC SETTING

Archaeological settlement pattern data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas between the A.D. 4th and 11th centuries of the main islands, with populations eventually settling into drier leeward areas at later periods (Kirch 1985). Coastal settlement was still dominant, but populations began exploiting and living in the upland *kula* zones. Greater population expansion to inland areas did not occur until the c. A.D. 12th century but continued through the 16th century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands.

THE TRADITIONAL PERIOD

According to W.D. Alexander (in Sterling 1998:91) the *ahupua`a* of Waiehu and Waihe`e were independent lands which did not belong to a particular district (*moku*). Thus, they were referred to as Na Poko. It was only during modern times that these lands were divided into a district. In reference to the origination and meaning of the name Waiehu, Sterling quotes Cheever (in Sterling 1998:63) who states that the name Waiehu translates as "...where the combatants smoked with dust and perspiration..." and refers to a battle or battles which occurred in the area. Pukui *et al.* (1974:221) offer another interpretation of Waiehu as meaning "water spray". This area is also known for having strong winds. The winds of Waiehu are said to be "Makani-hoo`eha-ili, the winds that hurt the skin" (Rebecca Nuuhiwa, Audio Collection in Sterling 1998:62). Although Pukui (*ibid*) interprets the meaning of Makani-hoo`eha-ili as "love disturbance" and the rains of Waiehu have been called "the fine mist" [Ka wai Kilioopu o Waihee] (Hyde in Sterling 1998:5).

Traditionally, the entire area from Wailuku Valley north to Waihe`e Valley was part of an old land division named Na Wai Eha ('The Four Streams'), referring to several great valleys draining the slopes of West Maui. This was said to be the most expansive area of continuous *kalo* (*taro*) pond-field agriculture in the Hawaiian Islands.

Waiehu is the second valley of the famous Na Wai Eha of western Maui, and it is watered by twin streams. The cane fields now extend throughout this region, continuously from Waihe`e on the lower slopes; but above Waiehu and Puakala from the upper roads following the irrigation ditches well toward the upper limits of the cane, a few old plantations still persisted in 1934. Some were used for raising wet taro, some for truck gardening. However, except for these few patches the old terraces of the upper slopes are entirely ploughed under (Handy and Handy 1972:496-7).

Before the historic era, it is highly likely that much of Waiehu Ahupua`a was extensively modified by terraces and irrigation ditches, from just mauka the near-coastal sand dunes to the high upper valleys. The present project area is situated *makai* of the probable lower limits of this extensive *lo`i* system. Later in time, much of these uplands were transformed into commercial sugar cane fields, which resulted in the destruction of innumerable terraces, irrigation ditches, and associated features.

We can infer from Walker's discussion in Sterling (1998:66) regarding the sandy ground in neighboring Waihe`e Ahupua`a being frequently used as a burial site that the same may be true for the sandy soils of Waiehu Ahupua`a:

The long sandy ridge near the shore at Waihee was another favorite burial ground. The erosion of the sand banks frequently exposes burials, but the bones are quickly disturbed and scattered so that their original position of burial cannot be determined. Modern graveyards occupy several sites along the crest of this ridge.

KNOWN HEIAU IN THE VICINITY

A large number of *heiau* were recorded by Thrum and Walker (1931) between Waihe`e and Wailuku which attest the importance of this area during traditional times. All of the documented *heiau* in Waiehu Ahupua`a, are located inland and *mauka* of the project area. The relatively large number and variety of named *heiau*, which included a *luakini heiau* (high chief-sacrificial shrine) in Paukūkalo built by Kahekili, indicates a substantial settled population in the

region. Most of these *heiau* were completely or almost completely destroyed by the early 20th century.

Documented *heiau* in Waiehu Ahupua`a include:

- Halelau Heiau (Walker Site 37), located well inland (*mauka*) of the coast—apparently destroyed by a more recent cemetery.
- Malumaluakua Heiau (Walker Site 39), located at the head of the Waiehu Gulch, well inland (*mauka*) of the coast—possibly a sacrificial shrine, although there was no stone construction (e.g., walls and/or platforms) present, which Walker suggested may have been a local variant: “In this region a *heiau* seems to mean merely a scared spot not marked necessarily by either walls or platforms of stone” (Walker 1931:142).
- Kukuikomo Heiau (Walker Site 40), located on the ridge between North and South Waiehu Gulches, well inland (*mauka*) of the coast—another possible example of a shrine lacking observable rock architecture.
- Puukoa Heiau (Walker Site 41), located “[n]ear pond on ridge south of Waiehu Camp. Destroyed.” (Walker 1931:144)
- Kamakoa Heiau (Walker Site 38), located “[i]n a grove of eucalyptus at about 600 ft. elevation. At head of Waiehu road. (Walker 1931:80).

In addition, Poaiwa Pu`uhonua (a place of refuge) was located in Waiehu Ahupua`a (Thrum in Sterling 1998:12). Walker also documented Pihani and Haleki`i Heiau within Wailuku Ahupua`a (southeast of the current project area), on the north side of `Īao Valley near the mouth of `Īao Stream (*ibid.* 31–144). In more recent decades, the archaeological significance of these important *heiau* has been determined through testing (Yent 1983), restoration, and preservation.

HISTORIC SETTING OF THE PROJECT AREA AND ENVIRONS

LAND TENURE

The land tenure system in prehistoric Hawai`i was rooted in a different epistemological framework than the subsequent colonially-imposed framework that is understood today as land ownership. The idea of holding land was not synonymous with owning it, but is described as closer to a trusteeship between the *ali`i nui* (ruling chiefs) of the island and the traditional Hawaiian *akua* (gods) Lono and Kane (Handy and Handy 1972:41). Each island was divided into *moku* (districts) that were solely geographical subdivisions. The number of these *moku* depended upon the size of each island. *Moku* were partitioned into smaller landholding units

known as *ahupua`a* that were governed by *ali`i* or designated *konohiki*. The *ahupua`a* varied in size, but ideally encompassed land from the mountain to the sea, providing the chiefs and *maka`ainana* (people who cultivated the land) with the opportunity to recover both terrestrial and marine resources. All persons from chiefs to commoners were entitled to portions of these resources (Chinen 1958:5).

The prehistoric/traditional period in the Hawaiian Islands came to an end with the arrival of Captain Cook on Kaua`i in 1778. The years to follow would drastically change the political, agricultural, and social relationships and patterns of the Hawaiian Kingdom. Destabilization of Hawaiian society was further intensified by the profound reformation of traditional land systems. In 1848, the Māhele curtailed communal access to land. The Māhele system led to the introduction and implementation of privatization that required both chiefs and commoners to retain private land title (Kame`eleihiwa 1992). If properly informed of the procedures, Hawaiians were permitted to claim lands on which they had worked or lived.

While LCA (Land Court Awards) establish historic land utilization in Hawai`i (during the Māhele), documented testimony from many land recipients have also demonstrated continuous generational occupation of the land. Settlement patterns illustrated in the LCA records highlight the multi-functional land use practices related to habitation and agriculture and perhaps the clear connection of these strategies. By mid-century, the fledgling [Hawaiian] Kingdom undertook the single most significant inducement to cultural change, the Great Māhele or division of lands between the king, chiefs, and government, establishing land ownership on a Western-style, fee-simple basis. From this single act, an entire restructuring of the ancient social, economic, and political order followed [Kirch 1985:309].

Under the Māhele and the first Land Commission of the Trust Territory of Hawai`i, lands were allocated in three ways. A third of all lands became Crown Lands belonging to the *ali`i*, a third was distributed to the chiefs, and a third was awarded to the general populace, which were represented by a large portion of foreigners as well as Hawaiians during this time. The first Land Commission was formed in 1845, during which time all individuals holding land were now required by new Western notions of law to submit their claims or forfeit their land.

Archival research (Waihona `Aina 2003) indicates 123 LCA's were awarded in Waiehu Ahupua`a. However, none were found to be located in or near the current project area.

HISTORIC ERA

According to Dorrance and Morgan (2000), the entire Na Wai Eha area from Wailuku Valley north to Waihe`e Valley, including Waiehu, was a major sugar cane cultivation zone from the lower slopes of the West Maui highlands to the near-coast area. The destruction of pre-Contact and early historic sites by commercial sugar cane operations was widespread and highly effective, as probably hundreds (if not thousands) of rock formations (e.g., habitations, agricultural features, *heiau*, burials, and other types of sites) were ploughed to create fields.

Commercial sugar cane cultivation in the neighboring Waihe`e Valley began in 1862 when Captain J. Hobron acquired land from T.H. Hobron to build the Waihe`e Sugar Mill (Donham 1989). By 1865, the Waihee Sugar Company was producing over 700 tons of sugar and 45,000 gallons of molasses per year. Production continued into the early 20th century. The Waihee Dairy and Farm, located along the coast, was established in 1919. The dairy closed in 1967. Sugar cane production was widespread throughout this region by the late 19th century to early 20th century. As a result of growth in the sugar cane industry, two irrigation ditches (Spreckels Ditch and the Waihe`e Ditch) were constructed in the late 19th century to early 20th century to channel water south from the Waihe`e Stream to nearby fields.

PREVIOUS ARCHAEOLOGY

OVERVIEW

As the project area is situated just *mauka* (west) of Paukukalo, south of Waihe`e Ahupua`a, and north of Wailuku Ahupua`a, these areas are broadly relevant to a review of previous archaeological research. The northern terminus of Wailuku Ahupua`a, which borders Waiehu Ahupua`a to the south, is relevant since a significant number of important sites have been identified. Cordy *et al.* (1978) have proposed a general settlement model for the area that includes temporary habitation and wetland agriculture in the upper valleys and elevations. Permanent habitation associated with *heiau* and burials are said to be found in the lower valleys and at the coast. Cordy *et al.* (1978) suggest that the coast and lower valleys were first settled by A.D. 300 to 600, although thus far the earliest radiocarbon dates are significantly later than this. Emory and Hommon (1972) and Bordner (1983) stated that the sand dunes of Waiehu and environs were a prime location for burials, and, in general, that extreme caution should be taken in developing these areas. As described above, Walker (1931) recorded many religious shrines within Waiehu Ahupua`a the vicinity of the project area, as well as villages and burial grounds in coastal settings just north of the project area.

The current study stands to gain more insight into the project area's historical and traditional land use via an examination of previous archaeology in the northeastern reaches of Wailuku District (Figure 4) (Table 1).

Table 1: Selected Archaeological Research in the Vicinity of the Project Area.

Year	Author	Project / Location within Wai`ehu, Paukukalo, or Wailuku Ahupua`a	Nature of Work	Findings (Site #)
2006	Fortini, W.R. and M.F. Dega	Residential Construction at 955 Puuloa Street, Waiehu TMK: 3-3-10:12	Monitoring	No new sites.
2005	Monahan, C.	Wai`ehu Golf Course (Maintenance Building Project) TMK: 3-2-13: 06 With Addendum Added	Inventory Survey	Test units and backhoe trenches found nothing of archaeological significance on 1.5 acres. Addendum discusses two additional areas of subsurface testing in and near project area. Two new sites identified (50-50-04-5661, subsurface possible platform probably dating to late 18 th or early 19 th century, and 50-50-04-5662, subsurface asphalt road/cart path remnant dating to or around 1930).
2004	Wilson, J and M.F. Dega	240.087 Acres Located in Wai`ehu and Wailuku TMK: 3-3-02:001 por	Inventory Survey	1 previously id'd site (50-50-07-1508, Spreckels Ditch) & 6 new sites (50-50-04-5522 through -5527) Sites include plantation-era sites, isolated lithic and marine shell finds, historic complex. C-14 data
2004	Fredericksen, D. and E.	Phase II of the Paukukalo 8-inch Waterline Replacement along Lilihua Place, Wailuku	Inventory Survey	Relocated previously identified site (50-50-04-5005, pre-Contact near coastal habitation site with associated human burials. Site utilized into early post-Contact period. Includes C-14 data
2003	Dr. Melissa Kirkendall, SHPD Maui Island Archaeologist, personal communication	Waiehu	Monitoring	In June 2003 Archaeological Services Hawaii, LLC conducted archaeological monitoring on the current project area during sand mining operations performed by Hawaiian Cement. During the monitoring activities human skeletal remains were identified
2003	Fredericksen, E.	Portion of Land in Wai`ehu. Wai`ehu Ahupua`a, Wailuku District TMK: 3-2-20: Por 47, Lot 9A	Monitoring	No new sites.
2003	Dega, M.F.	Kehalani Mauka Subdivision, in Wailuku near Waikapu TMK: 3-5-001:001	Inventory Survey	8 historic sites documented on 349 acres, two of which were previously recorded (50-50-04-5473, -5474, -5197, -5489, -5490, -5491, -5492, -5493), including a reservoir, ditches, historic-modern roadways, historic artifact scatter, plantation-era clearing mounds
2003	Donham, T.K.	Residential Construction at 1376 Kakae Place, Waiehu. TMK: 3-2-20:64	Archaeological Assessment	Negative results: no evidence of cultural material; monitoring not recommended
2002	Fredericksen, E. and D.	Puuohala Mauka Residential Subdivision, Wailuku Ahupua`a TMK: 3-3-2:001	Inventory Survey	4 sites, two previously unrecorded: a plantation-era boulder/retaining wall/platform (-5195), and coral/shell surface midden scatter (-5196); also the known historic Waihee Ditch (-5197) and Spreckels Ditch (-1508)
2002	Fredericksen, E. and D.	Wai`ehu Kou Residential Development, Drainage and Diversion Easement	Data Recovery	309 features associated with (-4731); 19 disturbed burials; A.D. 1200-1650
2000	Fredericksen, D. and E.	Wai`ehu Kou Residential Sewer Line Corridor TMK: 3-2-3	Inventory Survey	Habitation site with 3 burials (-4759)
1999	Fredericksen, E. and D.	Wai`ehu Kou 2 Residential Development and Diversion Easement for DHHL TMK: 3-2-13:por 1 and 9	Inventory Survey	Extensive habitation (-4731) near Wai`ehu Dune; 2 burials; A.D. 1195 to late 1700s
1998	Fredericksen, E. and D.	North Waihe`e Water Source Project, Phases I and II, along Kahekili Highway through both Waihe`e and Wai`ehu Ahupua`a	Monitoring	6 historic sites: 2 rock walls (-4473 and -4512), former along Kahekili Highway; Old Waihee Sugar Mill (-4409); <i>kuleana</i> water flume (-4371); the Old Poi Factory (-4372) 1 pre-Contact habitation (-4374) with associated burials, which extends 300 m along K. Highway at toe of Waihee Dune: dated c. A.D. 1500 to late 1700s
1997	Fredericksen, E.	North Waihee Water Source Project, Phases I and II, along Kahekili Highway through both Waihee and Wai`ehu Ahupua`a. (Area mauka of highway to water tank.)	Monitoring	No cultural deposits: Area under sugarcane cultivation for more than a century
1996	Dixon, B.	Inadvertent Discovery of Human Skeletal Remains at	Field Inspection	Site 50-50-04-1812, human skeletal remains representing single individual. Remains partially removed in 1985.

Year	Author	Project / Location within Wai`ehu, Paukukalo, or Wailuku Ahupua`a	Nature of Work	Findings (Site #)
		741 Kuhio Place, Wailuku TMK: 3-3-06:47		
1996	Donham, T.	Wai`ehu Golf Course	Inventory Survey	Mapped human remains found in 27 locations on the dune, 16 of which appeared to represent primary burials
1996	Jones, B., J. Pantaleo, and A. Sinoto	North Waihee Wells Waterline Project	Inventory Survey	5 Sites: rock terrace (-3196); rock terrace along Waihee Stream (-3199); 3 surface scatters of artifacts, midden, and `ili `ili stones (-3197); 533 m long wall (-3198); Waihee Bridge foundation (-4097)
1993	Griffin, A.	Inadvertent Burial Discovery	Field Inspection	Site 50-50-04-3139, human skeletal remains representing 2 individuals
1992	Donham, T.	Wai`ehu Golf Course	Data Recovery	2 flexed burials were removed from eroding sand dune (-1189)
1992	Donham, T.	Wai`ehu Kou I Residential Development	Data Recovery	Burial (-2917) found in storm drain line excavation and reinterred 3.3 mbs
1992	Folk, W. and H. Hammatt	Wai`ehu Beach lots TMK: 3-2-13:05	Inventory Survey	Surface survey and 9 backhoe trenches produce no cultural material other than 2 buried charcoal lenses (-3115) ranging from A.D. 1300s-1600s
1991	Griffin, A.	Archaeological Assessment of a 3.1 Acre Parcel Proposed Phase 4 Residential Lots, Paukukalo TMK: 3-3-06:52 por	Field Inspection	Identified 2 new sites (2 caves and surface shell midden and artifact scatter. Determined area significant and important to understanding sociopolitical history of Maui. Recommended relocating development site.
1990	Kennedy, J.	Portion of the Piihana District, Piihana TMK: 3-3-1:16 Por.	Subsurface Testing	No new sites.
1990	Kennedy, J.	TMK: 3-4-30:11 Subdivision "C" Located at Paukukalo	Inventory Survey	No new sites.
1990	Kennedy, J.	Archaeological Activities Surrounding Piihana District #2 TMK: 3-3-01:por.16, 33, 39 and TMK: 3-4-32:10, 18, 01 Por.	Reconnaissance Survey, auger testing, monitoring, backhoe trenching, hand trenching	Site 50-50-04-2995 <i>In situ</i> burials, secondary burials, fragmented and previously disturbed human skeletal remains, historic bottle fragments, stone terraces.
1989	Donham, T.	Waihee Golf Club	Inventory Survey	270-acre project area found 88 sites with 195 components, including structures, surface midden, lithic scatters, agricultural and residential complexes, ceremonial features, 4 cemeteries, and 4 isolated human graves. Dates from A.D. 960-1330 to modern times.
1989	Kennedy, J.	Survey and Subsurface Testing for Proposed Grading Project TMK: 3-3-01:16 por.	Archaeological Survey	No new sites.
1988	Clark, D. and J.F. Baliki	Waihee Midden Site	Inventory Survey	Coastal dune site: 4 fire hearths, 4 fire floors, an <i>imu</i> , a rock alignment, and artifact clusters. One date of A.D. 1010-1150 from 2.0 mbs
1987	Trembly, D.	Wai`ehu Planned Development	Monitoring	Remains of 6 individuals displaced by construction along Wai`ehu Beach Road
1983-1984	Yent, M.	Halekii-Piihana State Monument: Phase I, Wai`ehu	Survey, Test Coring	Halekii (-4592): <i>ili-ili</i> stones, shell, charcoal. No evidence of cultural deposit earlier than construction date. Piihana (-4592): <i>ili-ili</i> stones, shell, human and pig bone, human burial left <i>in situ</i>
1983	Bordner, R.	Wai`ehu housing Development, Environmental TMK: 3-3-01:10, 92	Survey, Excavation	Historic military features only.
1982	Han, T.	Wai`ehu Heights Subdivision	Inventory Survey	4 additional sites—2 burials, a lithic/midden scatter, and a possible quarry, as well as located a walled <i>ka`a</i> fishpond—are added to previous fieldwork which revealed (2 sites) a burial and a walled terrace
1978	Cordy, R.	Waihee Stream Hydroelectric power project	Survey	Numerous sites. Formulated model for predicting general location for 6 functional sites types: temporary and permanent habitation sites, dryland and wetland agriculture, burials, and <i>heiau</i>
1978	Kelly, M., Y. Sinoto, and R. Cordy	Wai`ehu Heights Subdivision	Survey, Data Recovery	Over 20 historic coffin burials exposed during bulldozer activity in dune area

Year	Author	Project / Location within Wai`ehu, Pankukalo, or Wailuku Ahupua`a	Nature of Work	Findings (Site #)
1973	Hommon, R. and R. Connolly	State Register of Historic Places	Survey	Limited fieldwork on 4 sites: Wai`ehu Dune burials (-1185); burial cave (-1186); Wai`ehu Golf Course burials (-1188); Wai`ehu midden site (-1189)
1931	Walker, W.	<i>Archaeology of Maui</i>	Island-wide investigation	Among other records, documents 5 <i>heiau</i> in Wai`ehu and 13 <i>heiau</i> in Wailuku
1918	Stokes, J.F.G.	"... Heiau of Maui."	Island-wide investigation	Among other records, documents <i>heiau</i> in Wailuku District
1917	Thrum, T.G.	"Maui's Heiau ..."	Island-wide investigation	Description of Wailuku's Pihana Heiau, among other records

(Table 1: Adapted from Fredericksen and Fredericksen 2000:12–13, 2002:12–13).

Previous archaeological research in the eastern portion of Wailuku, Wai`ehu, and Waihe`e Ahupua`a is more relevant to the current study than research in areas to the south or west due to a shared topography, climate, land use, and settlement pattern.

Research at the State Historic Preservation Division (SHPD) indicated that the 1973 statewide inventory of known historic sites provided documentation on several burial sites in what is now the Waiehu Golf Course (see also Emory and Hommon 1972). The following descriptions are based on original site files available at the SHPD (in Kapolei). Site 50-50-04-1185 (designated the Waiehu Dune burials on original feature forms) was a burial site containing the remains of at least 33 human burials. The site is located at the top of the consolidated sand dune immediately west of the fairway of the fifth hole, at the Waiehu Municipal Golf Course, and the burials were exposed by natural, aeolian (wind) erosion. Some of the burials were associated traditional artifacts and midden. According to Donham (2003), this site has been preserved to prevent further erosion.

Site 50-50-04-1188 (designated the 'Golf Course Burials' on the original feature forms; designated Ma-D10-13 in B.P. Bishop Museum files) was a burial site consisting of "human skeletal remains eroding out of a sand bank along the northwest side of the service road in the Waiehu Municipal Golf Course. Human remains were found in three places along a 14-m stretch of the sand bank located about 65 m northwest of the maintenance building near the middle of the golf course" (SHPD 1973). The remains were reported as "fragmentary" (SHPD 1973).

The earliest archaeological endeavors in the Wailuku-Waiehu environs were undertaken by Thrum (1917), Stokes (1918), Emory (1921), and Walker (1931). Although their archaeological finds directly do not directly pertain to the current project area, their data allows for a deeper understanding of the traditional use of the Wailuku-Waiehu area.

EXPECTED FINDINGS

Based on traditional Hawaiian settlement patterns, previous archaeological research, and historical activities in the project area, expected findings of this Inventory Survey are as follows:

1. There was a relatively high probability of finding pre-Contact (and possibly early Historic Period) Native Hawaiian burials due to the project area is located in the Puuone Sand deposit which is known to be a traditional internment site for Native Hawaiian burials. There was also a relatively high probability of finding redeposited (i.e., previously disturbed) human skeletal remains, given that previous use of the project area involved ground disturbing activities including, sand mining by Hawaiian Cement and stockpiling of excess materials during the construction of the Waiehu Heights Subdivision (Dr. Melissa Kirkendall, pers. comm.).
2. There was a relatively high probability of finding subsurface evidence of traditional Native Hawaiian and/or early historic activities including: hearths, postholes, midden deposits, and other occupation debris (e.g., stone tool waste, discarded fishing gear).
3. There was essentially no expectation of finding any historically-significant sites or features on the present ground surface.

METHODOLOGY

FIELD METHODOLOGY

Multiple tasks were completed during this survey. First, full, systematic pedestrian survey of the entire project area was conducted by Scientific Consultant Service archaeologists, Allison Chun, Ph.D. and Ian Bassford, B.A. in order to identify any archaeological structures or surface scatters and to assess project area geographical and topographical features. In addition, written and photographic documentation occurred during each phase of research. Depending on the density of the vegetation and the steepness of the terrain, the survey was conducted by the two crewmembers spaced 10 to 20 meters apart walking parallel transects. The objectives of the pedestrian survey were to identify and document any and all historic and/or archaeological features, and assess the nature and extent of landscape modification. A total of 20 Backhoe Trenches (BT) measuring 5.0 by 1.0 meters (m) were excavated to an average depth of 1.70 m. The trenches, designated BT-1 through BT-20 were positioned to randomly sample the entire project area (Figure 5). All excavations were monitored by SCS archaeologists Chun and Bassford. None of the excavated sediments were screened, as the trenches were mechanically excavated and no artifacts or cultural deposits were encountered during the excavations. Photodocumentation and detailed stratigraphic profiles were completed following the termination of the backhoe excavations.

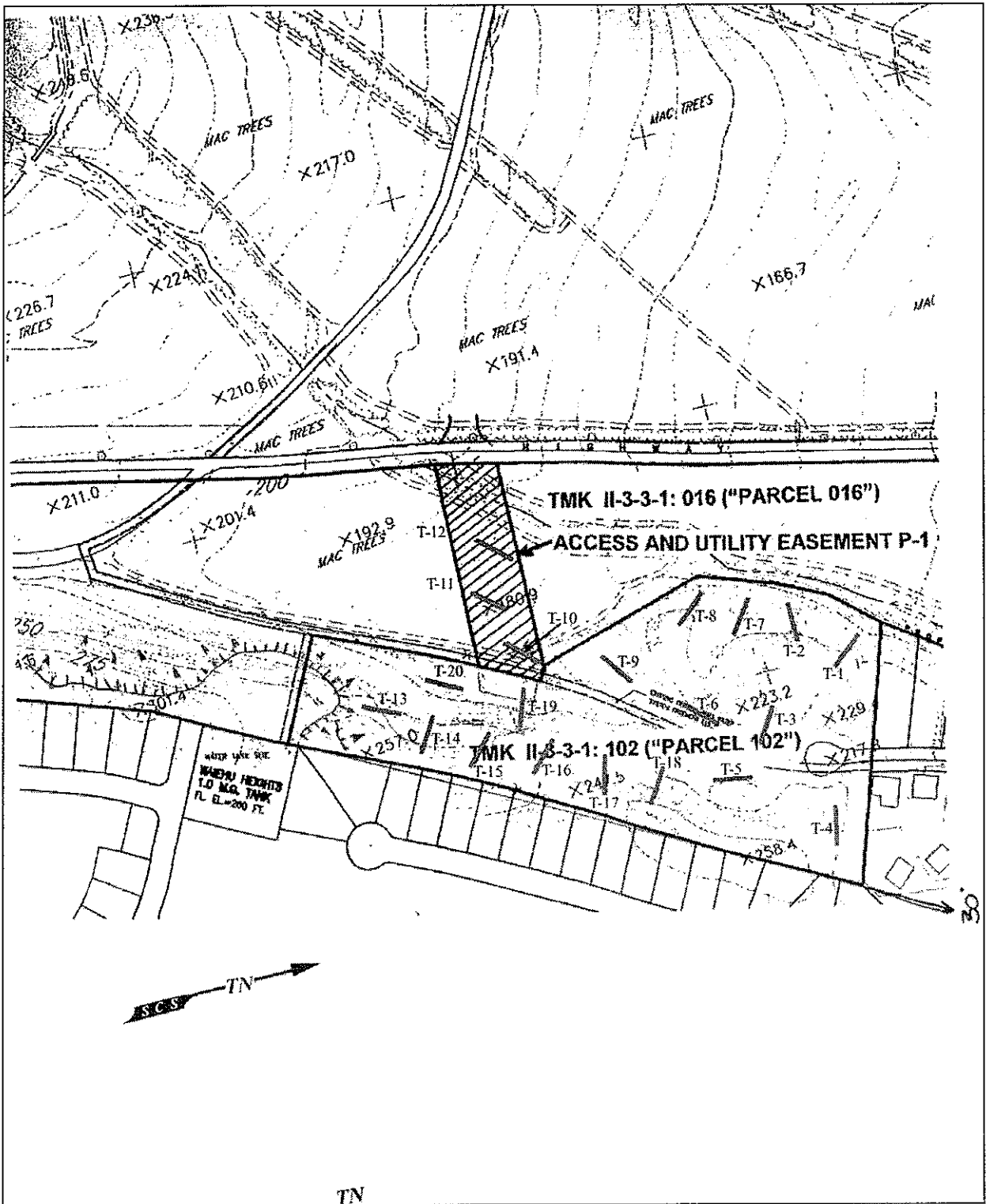


Figure 5: Location of Backhoe Trenches 1 through 20.

If structures, artifacts, or intriguing topographical changes had been identified, they would have been plotted on an overall site map and flagged. Surface artifact assemblages, surface features, or anomalies would have been assigned temporary site numbers which would have been converted to State Site Numbers upon a cursory project review by SHPD following the completion of fieldwork.

LABORATORY METHODOLOGY

All field notes, digital photographs, and collected archaeological materials from this project are being temporarily curated at the SCS laboratory in Honolulu. All stratigraphic profiles have been photographed for presentation within this report. Representative profile sketches showing backhoe trench locations and the stratigraphy of the deposits are also illustrated. All retrieved potential artifact and midden samples were cleaned, sorted, and analyzed. Marine gastropods and bivalves are identified using applicable references.

FINDINGS

There were no archaeological features identified either on the ground surface or in the subsurface deposits during the Archaeological Survey.

BACKHOE TRENCH EXCAVATIONS SUMMARY

A total of 20 backhoe trench excavations were placed over the entire project area as part of the Archaeological Survey (see Figure 5). Backhoe Trench (BT) -1 through BT-9 were located in the north end of the project area. All of these trenches, except BT-4 and BT-8, were located in an imported fill deposit. BT-4 was located at the northeastern end of the project area in the original sand deposit. BT-8, located in the center of the northern portion of the property near the western property boundary, also appears to be in the original sand deposit. BT-10, -11, and -12 were placed in the easement corridor [TMK: (2) 3-3-001:016]. Excavation of these trenches terminated when a deposit of silty clay, which underlies the sand dune, was encountered. BT-13 was placed at the northern base of the sand dune below the water tank, as far up the sand dune as the backhoe could maneuver. This trench was in the original sand deposit with a thick layer of previously disturbed sand comprising Layer I. Backhoe Trenches 14, 15, 16, 17, and 18 were placed perpendicular to a low bank extending along the eastern side of the project area, above the existing residential homes. These trenches were also mostly in the original sand deposit. Backhoe Trenches 19 and 20 were located along the upper southwestern edge of the project area. These trenches were also located in the original sand. There were no subsurface cultural deposits or human skeletal remains observed during the Archaeological Survey.

BACKHOE TRENCH 1 (BT -1)

Backhoe Trench 1 (BT-1) is positioned along a 40/320° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.50 meters, and exhibits two stratigraphic layers (Figure 6 and Figure 7). The ground surface of BT-1 appears to have undergone previous disturbance. Layer I (0-20 cmbs) consists of a pale brown (10 YR 6/3) sand deposit. Layer II (20 -150 cmbs) consists of an imported fill deposit comprised of grayish brown sand (10 YR 5/2). No cultural or datable materials were encountered in BT-1.

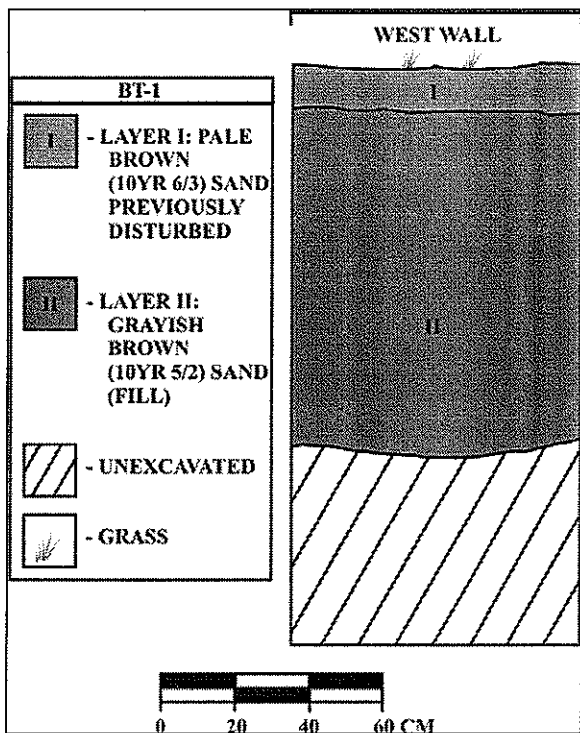


Figure 6: Backhoe Trench 1 West Wall Profile.

BACKHOE TRENCH 2 (BT-2)

Backhoe Trench 2 (BT-2) is positioned along a 90/270° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.60 meters, and exhibits three stratigraphic layers (Figure 8 and Figure 9). The ground surface of BT-2 has been previously disturbed. Layer I (0-25 cmbs) consists of a pale brown (10 YR 6/3) sand deposit. Layer II (25-90 cmbs) consists of pale brown (10 YR 6/3) hard and crumbly imported fill material comprised of sand. Layer III (90-160 cmbs) is an imported fill deposit comprised of grayish brown (10 YR 5/2) sand. No cultural or datable materials were encountered in BT-2.

BACKHOE TRENCH 3 (BT-3)

Backhoe Trench 3 (BT-3) is positioned along a 120/300° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.90 meters, and exhibits three stratigraphic layers (Figure 10 and Figure 11). The ground surface of BT-3 exhibits previous disturbance. Layer I (0-10 cmbs) consists of a pale brown (10 YR 6/3) sand deposit. Numerous roots and rootlets were present in

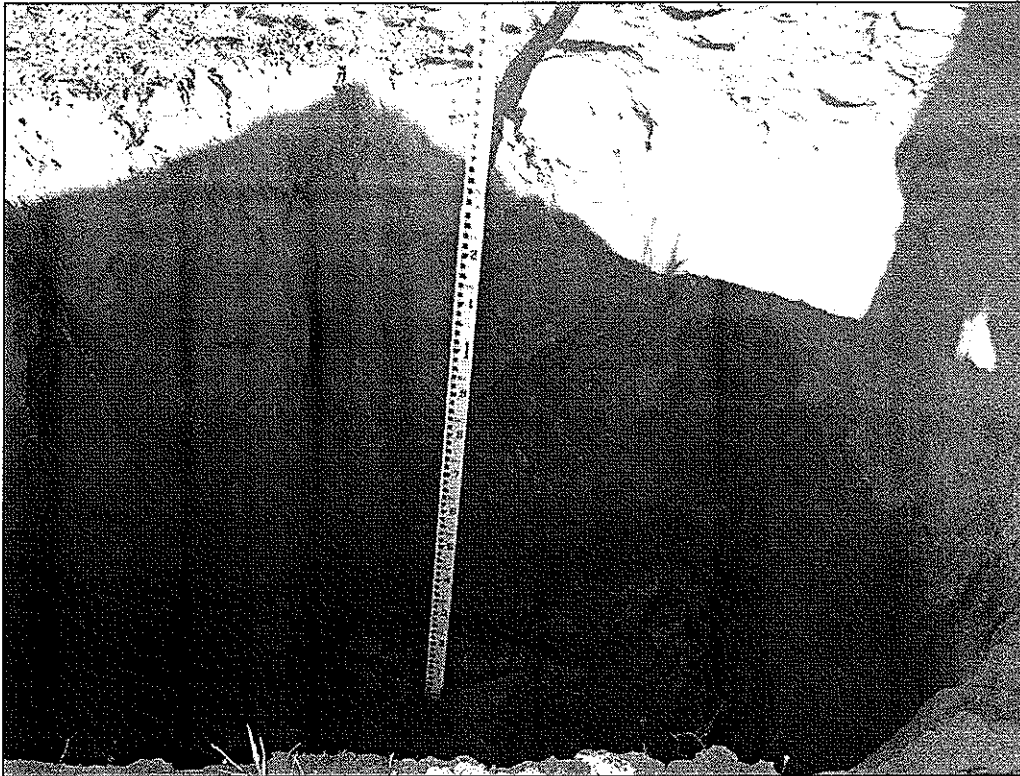


Figure 7: Photograph of Backhoe Trench 1 West Wall Profile To West.

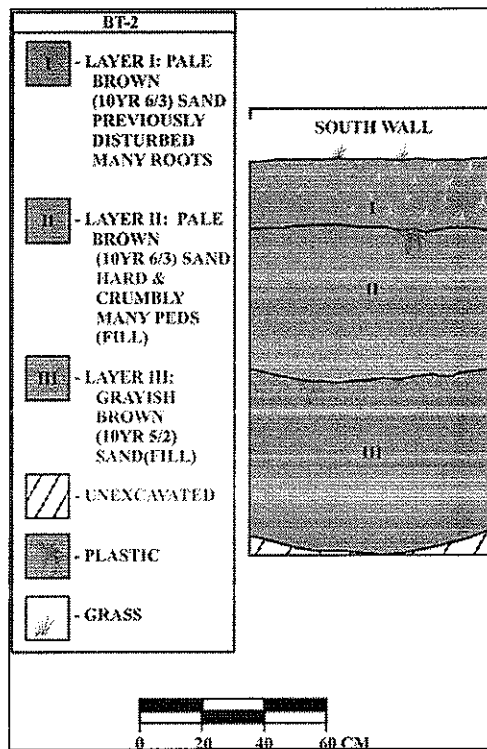


Figure 8: Backhoe Trench 2 South Wall Profile.

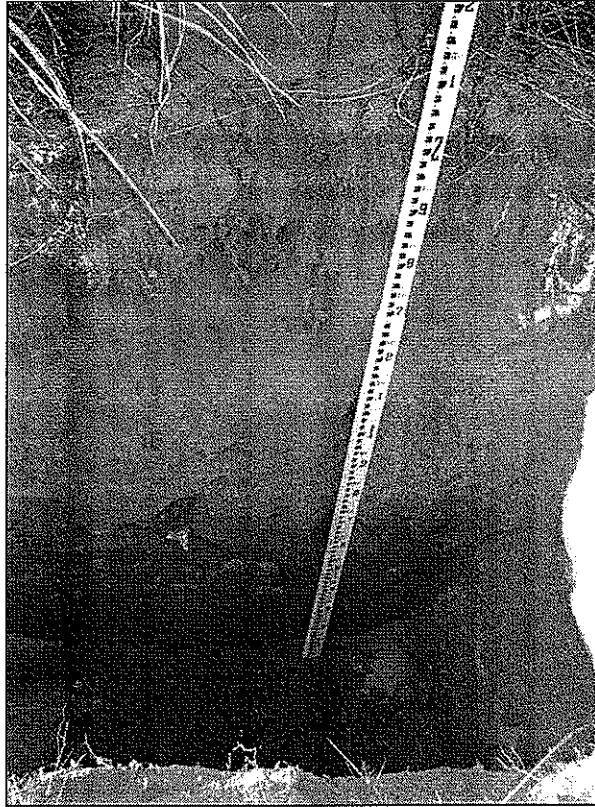


Figure 9: Photograph of Backhoe Trench 2 South Wall Profile To South.

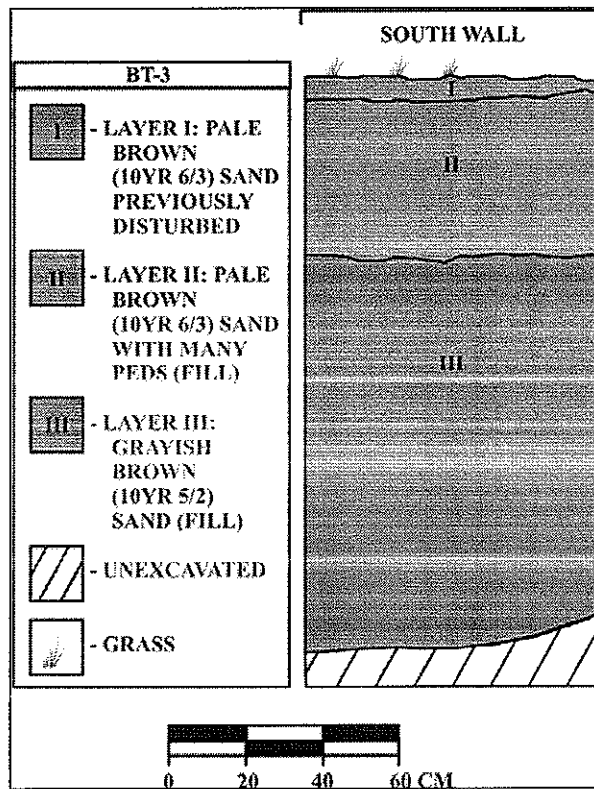


Figure 10: Backhoe Trench 3 South Wall Profile.

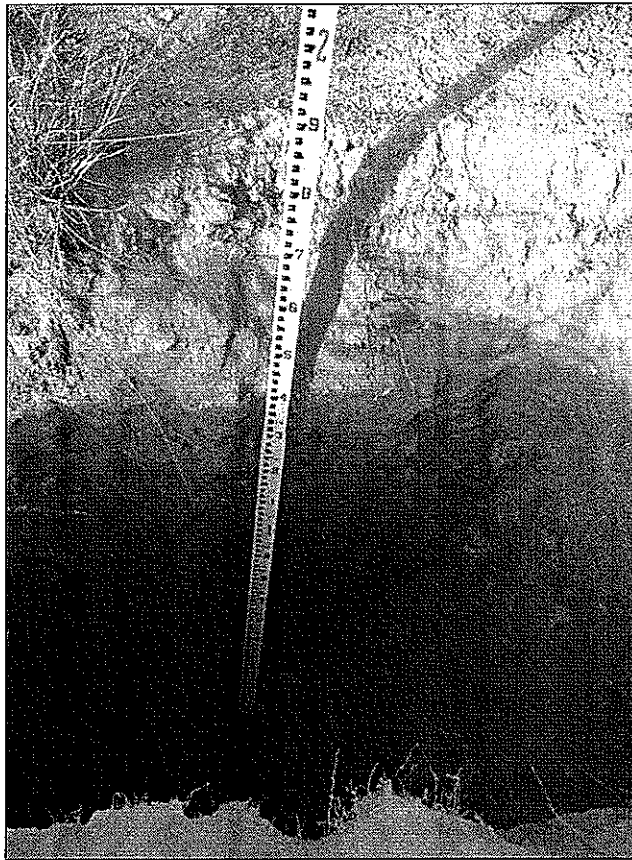


Figure 11: Photograph of Backhoe Trench 3 South Wall Profile To South.

Layer I. Layer II (10-60 cmbs) consists of pale brown (10 YR 6/3) imported fill deposit comprised of sand. Plastic material was encountered at the interface of Layers I and II at a depth of 10 cmbs and also at the interface of Layers II and III at a depth of 60 cmbs. Layer III (60-190 cmbs) consists of an imported fill comprised of a grayish brown (10 YR 5/2) sand. No cultural or datable materials were encountered in BT-3.

BACKHOE TRENCH 4 (BT-4)

Backhoe Trench 4 (BT-4) is situated along a 100/280° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.90 meters, and exhibits two stratigraphic layers (Figure 12 and Figure 13). The surface of BT-4 has been subject to previous ground disturbance. Layer I (0-20 cmbs) consists of pale brown (10 YR/6/3) sand. Layer II (20-190cmbs) consists of the original grayish brown (10 YR 5/2) sand deposit. No cultural or datable materials were encountered in BT-4.

BACKHOE TRENCH 5 (BT-5)

Backhoe Trench 5 (BT-5) is positioned along a 10/190° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.90 meters, and exhibits three stratigraphic layers (Figure 14 and Figure 15). The ground surface of BT-5 has undergone previous ground alterations. Layer I (0-20 cmbs) consists of pale brown (10 YR 6/3) sand. Layer II (20-93 cmbs) consists of a pale brown (10 YR 6/3) imported fill material comprised of sand. Layer III (93-190 cmbs) consists of an imported fill material comprised of yellowish brown sand (10 YR 5/2). Pockets of the Layer II material are present within Layer III. No cultural or datable materials were encountered in BT-5.

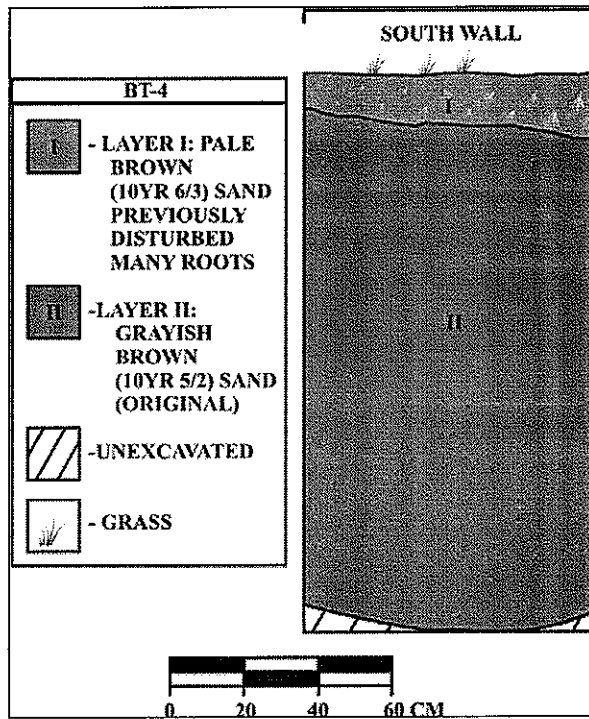


Figure 12: Backhoe Trench 4 South Wall Profile.

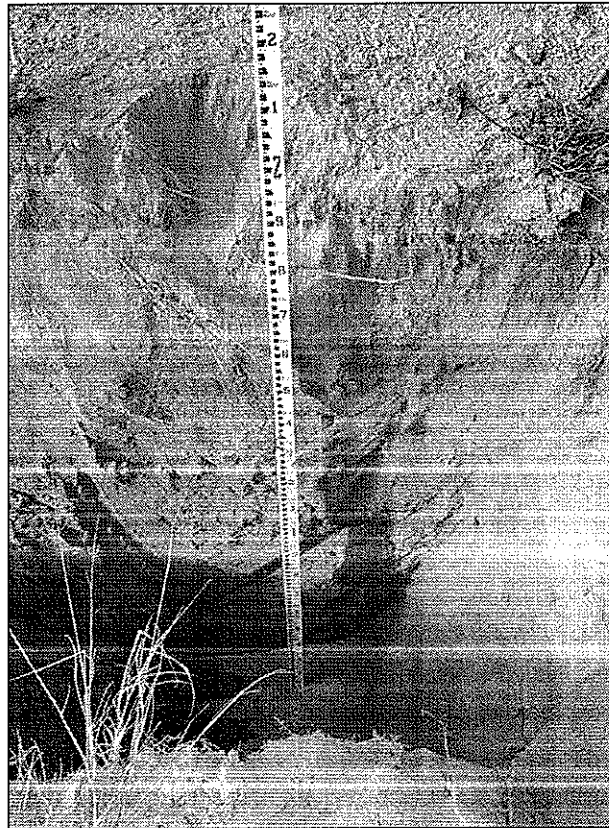


Figure 13: Photograph of Backhoe Trench 4 South Wall Profile To South.

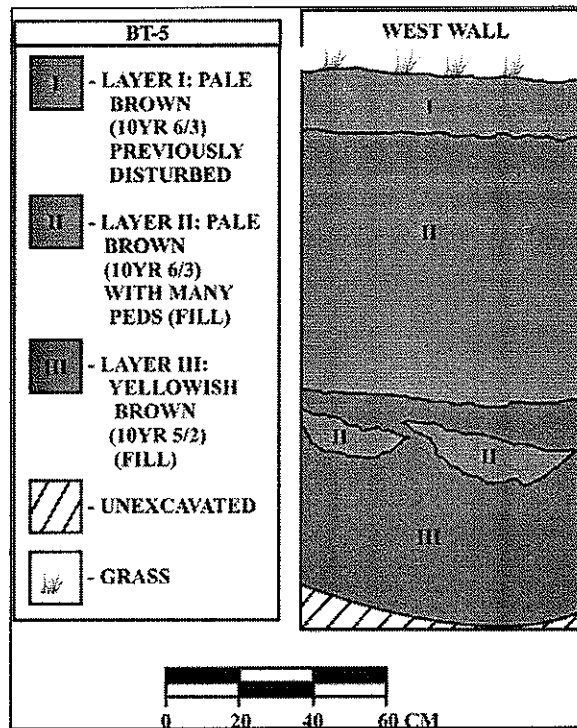


Figure 14: Backhoe Trench 5 West Wall Profile.

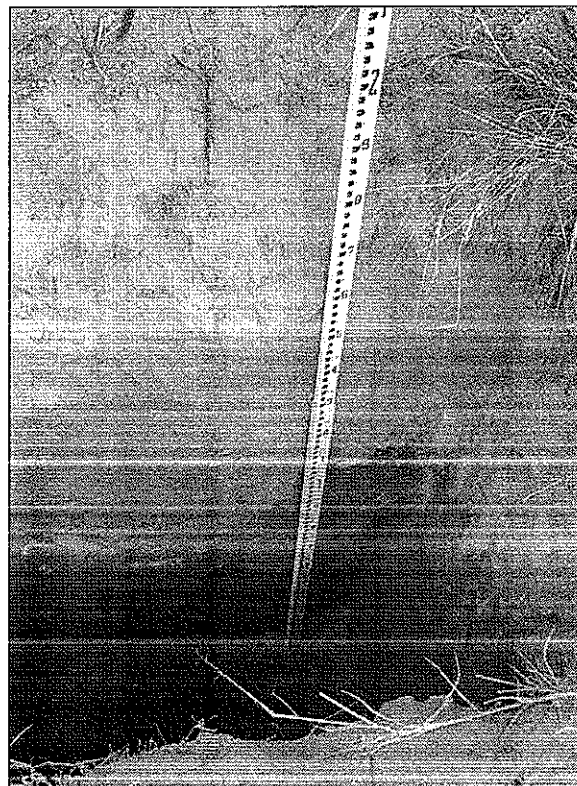


Figure 15: Photograph of Backhoe Trench 5 West Wall Profile To West.

BACKHOE TRENCH 6 (BT-6)

Backhoe Trench 6 (BT-6) is situated along a 120/300° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.70 meters, and exhibits three stratigraphic layers (Figure 16 and Figure 17). The ground surface of BT-6 has undergone previous disturbance. Layer I (0-30 cmbs) consists of pale brown (10 YR6/3) sand. Numerous roots and rootlets are present Layer I. Layer II (30-85 cmbs) consists of an imported fill material comprised pale brown (10 YR 6/3) sand. Layer III (70-170 cmbs) consists of an imported fill material comprised of grayish brown (10 YR 5/2) sand. No cultural or datable materials were encountered in BT-6.

BACKHOE TRENCH 7 (BT-7)

Backhoe Trench 7 (BT-7) is positioned along a 40/220° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.90 meters, and exhibits three stratigraphic layers (Figure 18 and Figure 19). The ground surface of BT-7 has undergone previous disturbance. Layer I (0-20 cmbs) consists of pale brown (10 YR 6/3) sand. Layer II (0-40 cmbs) consists of an imported fill deposit comprised of pale brown (10 YR 6/3) sand. Layer III (40-190 cmbs) consists of an imported fill deposit comprised of grayish brown sand (10 YR 5/2). No cultural or datable materials were encountered in BT-7.

BACKHOE TRENCH 8 (BT-8)

Backhoe Trench 8 (BT-8) is positioned along a 140/320° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.40 meters, and exhibits two stratigraphic layers (Figure 20 and Figure 21). The ground surface of BT-8 has been subjected to previous alterations. Layer I (0-16 cmbs) consists of pale brown (10 YR 6/3) sand. Layer II (16-140 cmbs) consists of the original sand deposit which is comprised of yellowish brown (10 YY 5/4) sand. No cultural or datable materials were encountered in BT-8.

BACKHOE TRENCH 9 (BT-9)

Backhoe Trench 9 (BT-9) is positioned along a 60/230° azimuth (see Figure 5) measures 5.00 by 1.00 by 1.30 meters, and exhibits two stratigraphic layers (Figure 22 and Figure 23). The ground surface of BT-9 has been subjected to previous alterations. Layer I (0-8 cmbs) consists of pale brown (10 YR 6/3) sand. Layer II (8 -130 cmbs). Layer II (8 -130 cmbs) consists of an imported fill deposit comprised of pale brown (10 YR 6/3) sand. A small piece of black irrigation pipe was present in Layer II, further suggesting that Layer II is fill material. No cultural or datable materials were encountered in BT-9.

BACKHOE TRENCH 10 (BT-10)

Backhoe Trench 10 (BT-10) is positioned along a 40/220° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.60 meters, and exhibits one stratigraphic layer (Figure 24 and Figure 25). Layer I (0-160 cmbs) consists of an imported fill deposit comprised of pale brown (10 YR 6/3) sand. A small piece of trash, possibly a piece of window screen, was present in Layer I, further suggesting that this deposit is fill material. No cultural or datable materials were encountered in BT-10.

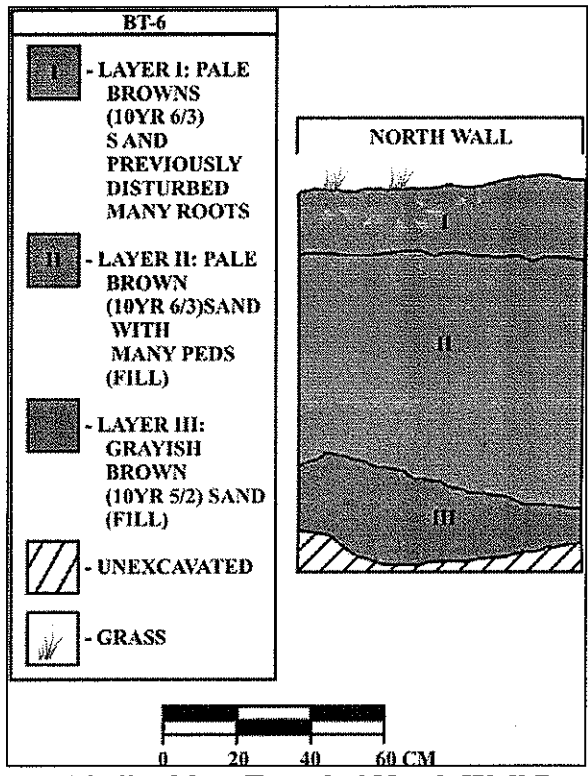


Figure 16: Backhoe Trench 6 North Wall Profile.

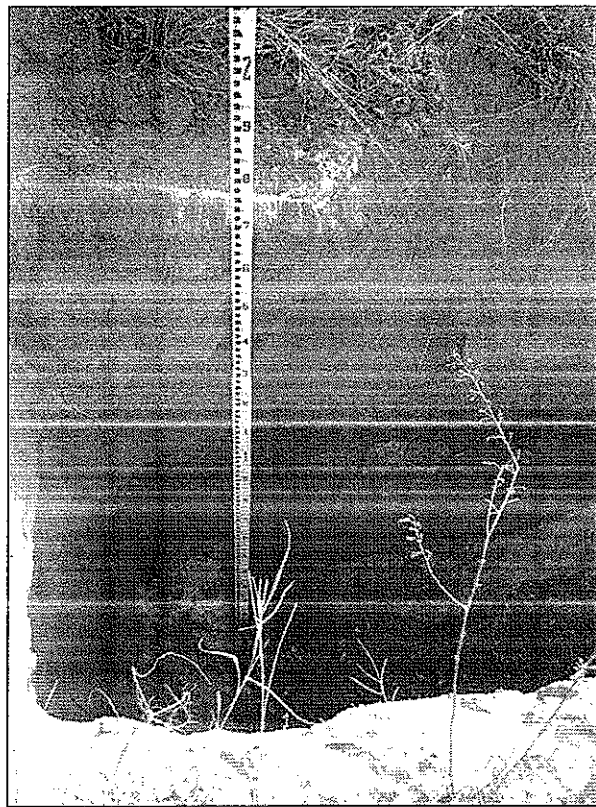


Figure 17: Photograph of Backhoe Trench 6 North Wall Profile To North.

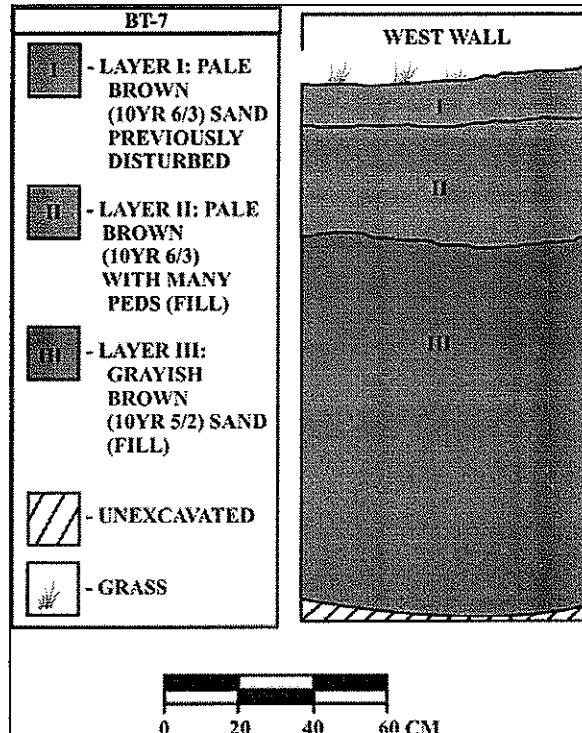


Figure 18: Backhoe Trench 7 West Wall Profile.

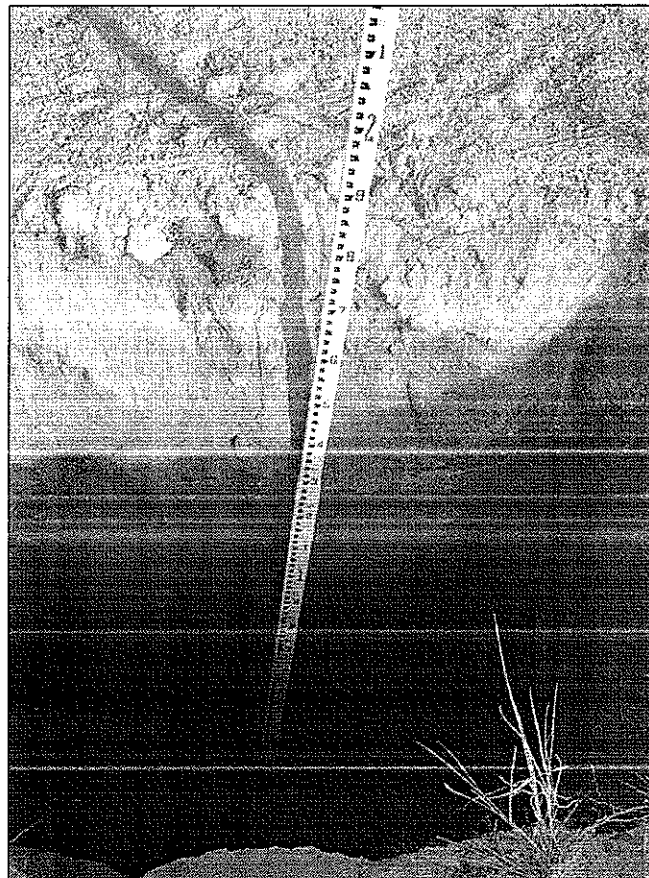


Figure 19: Photograph of Backhoe Trench 7 West Wall Profile To West.

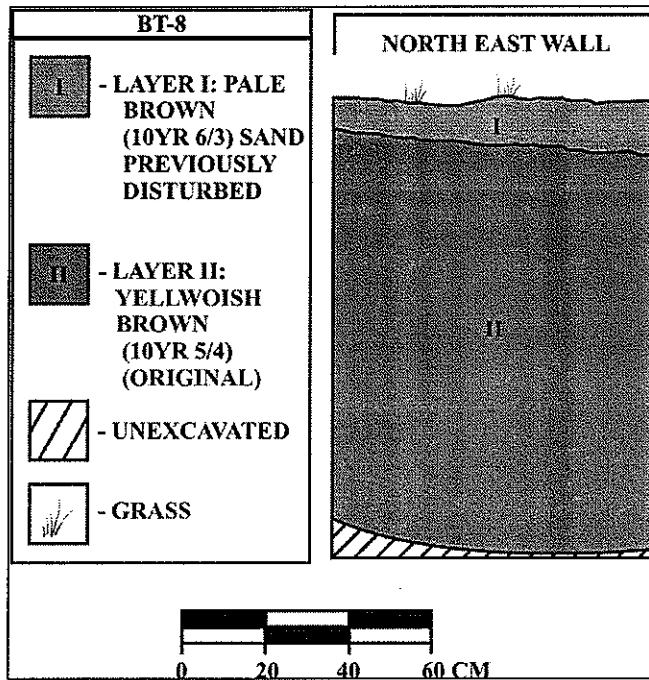


Figure 20: Backhoe Trench 8 Northeast Wall Profile.

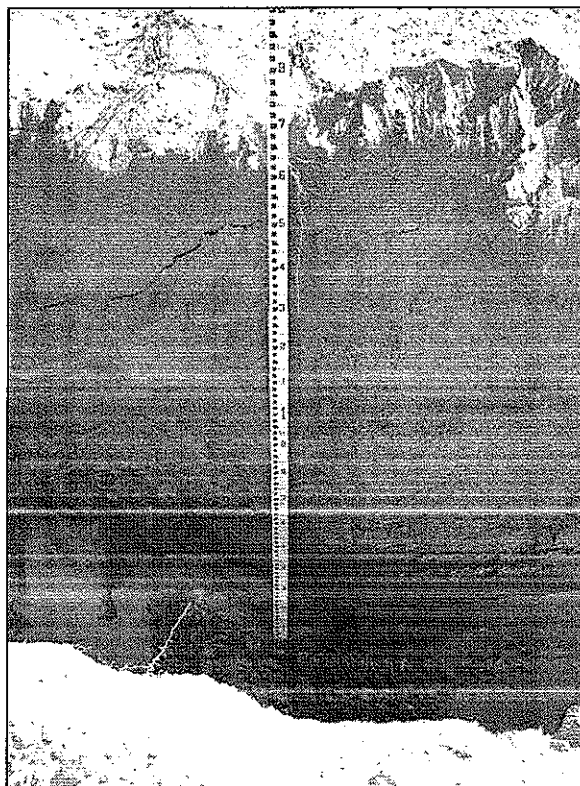


Figure 21: Photograph of Backhoe Trench 8 Northeast Wall Profile To Northeast.

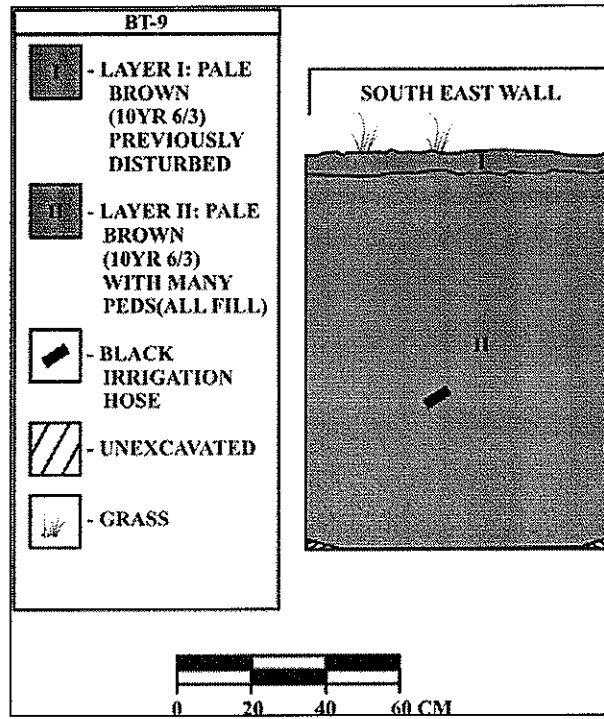


Figure 22: Backhoe Trench 9 Southeast Wall Profile.

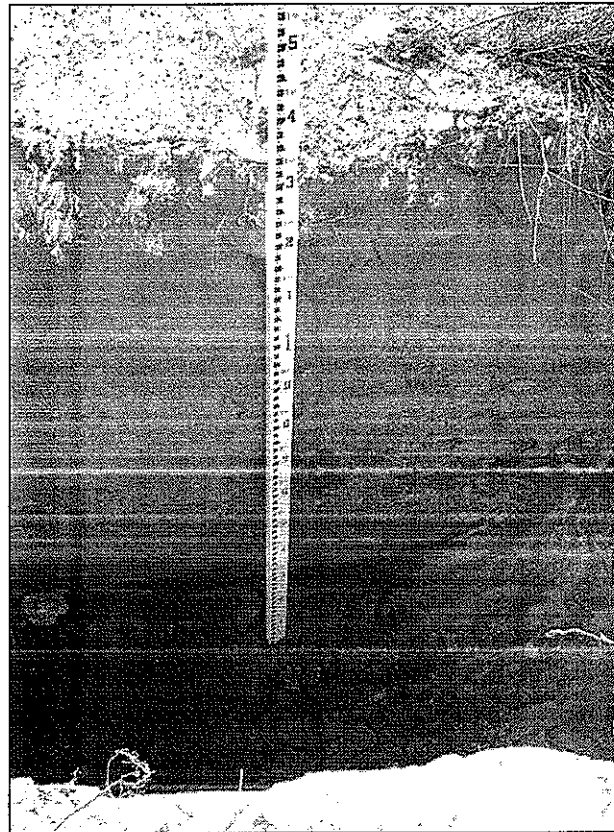


Figure 23: Photograph of Backhoe Trench 9 Southeast Wall Profile To Southeast.

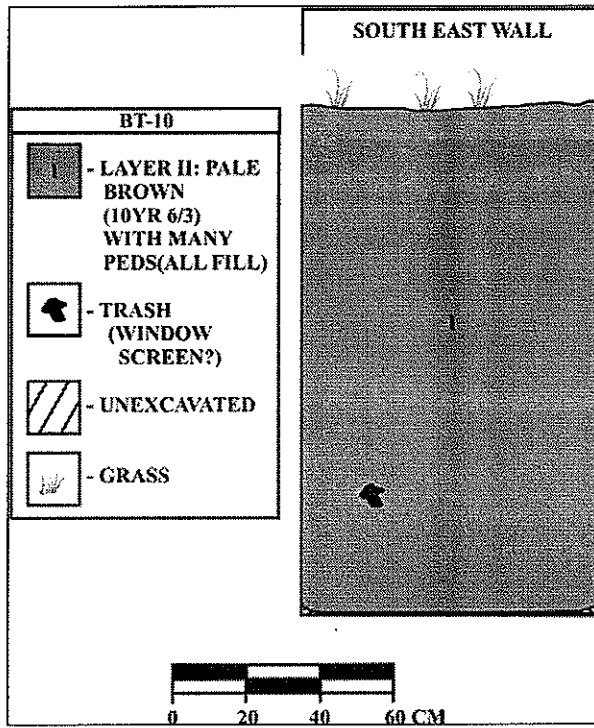


Figure 24: Backhoe Trench 10 Southeast Wall Profile.

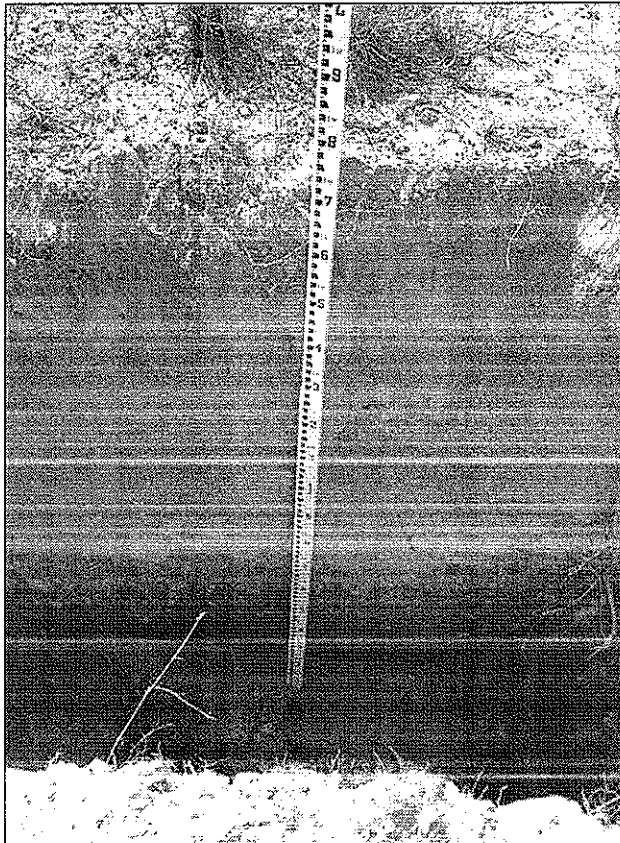


Figure 25: Photograph of Backhoe Trench 10 Southeast Wall Profile To Southeast.

BACKHOE TRENCH 11 (BT-11)

Backhoe Trench 11 (BT-11) is positioned along a 40/220° azimuth (see Figure 5), measures 5.00 by 1.00 by 1.10 meters, and exhibits two stratigraphic (Figure 26 and Figure 27). Layer I (0-105 cmbs) consists of an imported fill deposit comprised of light brownish gray (10 YR 6/2 sand. Layer II (105 -110 cmbs) consists of the original deposit which consists of very dark brown (7.5 YR 2.5/2) silty clay. No cultural or datable materials were encountered in BT-11.

BACKHOE TRENCH 12 (BT-12)

Backhoe Trench 12 (BT-12) is positioned along a 40/220° azimuth (see Figure 5), measures 4.00 by 1.00 by 0.80 meters, and exhibits two stratigraphic layers (Figure 28 and Figure 29). Layer I (0-60 cmbs) consists of an imported fill deposit comprised of light brownish gray (10 YR 6/2 sand. Layer II (60 - 80 cmbs) consists of the original deposit which consists of very dark brown (7.5 YR 2.5/2) silty clay. No cultural or datable materials were encountered in BT-12.

BACKHOE TRENCH 13 (BT-13)

Backhoe Trench 13 (BT-13) is positioned along a 25/205° azimuth (see Figure 5) measures 5.00 by 1.50 by 1.90 meters, and exhibits two stratigraphic layers (Figure 30 and Figure 31). Layer I (0-60/110 cmbs) consists of pale brown (10 YR 6/3) sand. Layer II (60/110 – 190 cmbs) consists of the original deposit which consists of very dark brown (10 YR 5/4) sand. No cultural or datable materials were encountered in BT-13.

BACKHOE TRENCH 14 (BT-14)

Backhoe Trench 14 (BT-14) is positioned along a 125/305° azimuth (see Figure 5), measures 5.00 by 1.00 by 2.00 meters, and exhibits two stratigraphic layers (Figure 32 and Figure 33). Layer I (0- 40 cmbs) consists of pale brown (10 YR 6/3) sand. Layer II (40 - 200 cmbs) consists of the original deposit which consists of yellowish brown (10 YR 5/4) sand. No cultural or datable materials were encountered in BT-14.

BACKHOE TRENCH 15 (BT-15)

Backhoe Trench 15 (BT-15) is positioned along a 130/310° azimuth (see Figure 5), measures 5.00 by 1.00 by 2.00 meters, and exhibits two stratigraphic layers (Figure 34 and Figure 35). Layer I (0- 46 cmbs) consists of a previously disturbed deposit comprised of pale brown (10 YR 6/3) sand. Layer II (46 - 200 cmbs) consists of the original deposit which consists of yellowish brown (10 YR 5/4) sand. No cultural or datable materials were encountered in BT-15.

BACKHOE TRENCH 16 (BT-16)

Backhoe Trench 16 (BT-16) is positioned along a 130/310° azimuth (see Figure 5), measures 5.00 by 1.00 by 2.20 meters, and exhibits two stratigraphic layers. (Figure 36 and Figure 37). Layer I (0 - 16 cmbs) consists of a previously disturbed deposit comprised of pale brown (10 YR 6/3) sand. Layer II (16- 220 cmbs) consists of the original deposit which consists of yellowish brown (10 YR 5/4) sand. No cultural or datable materials were encountered in BT-16.

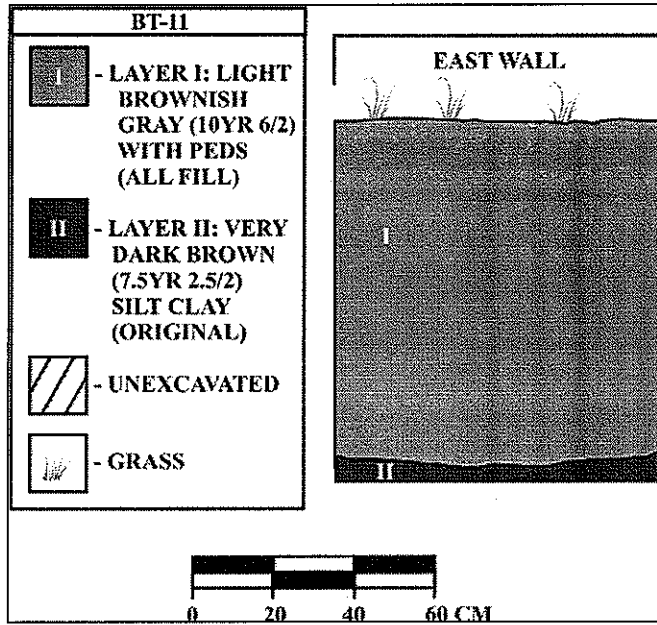


Figure 26: Backhoe Trench 11 East Wall Profile.

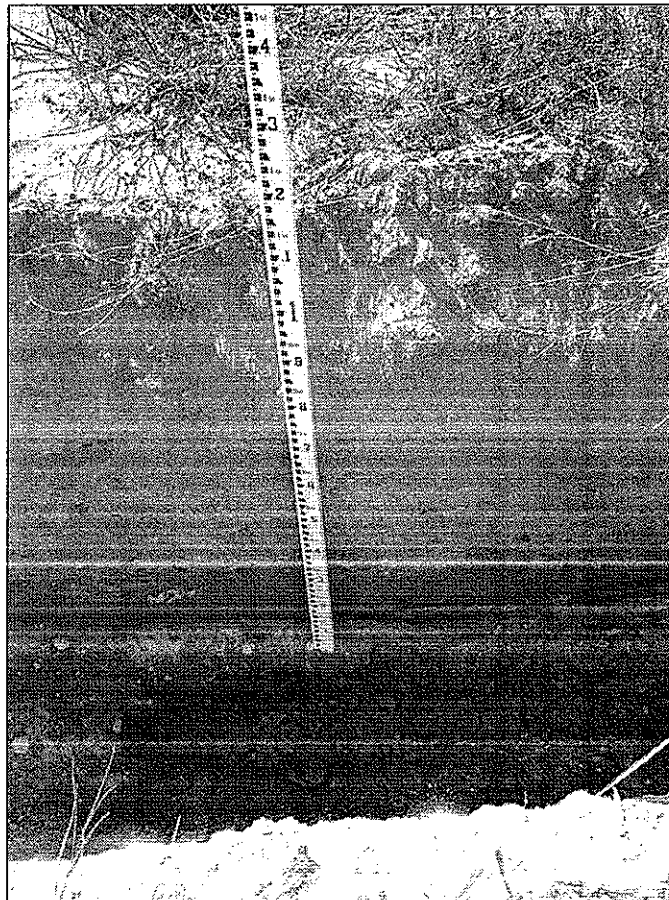


Figure 27: Photograph of Backhoe Trench 11 East Wall Profile To East.

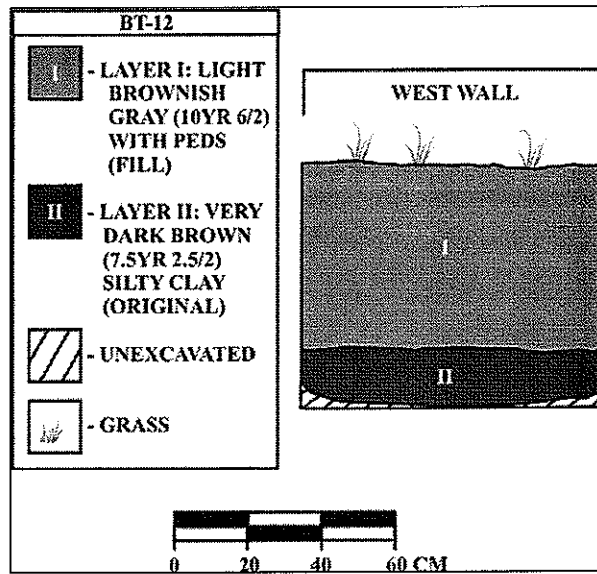


Figure 28: Backhoe Trench 12 West Wall Profile.

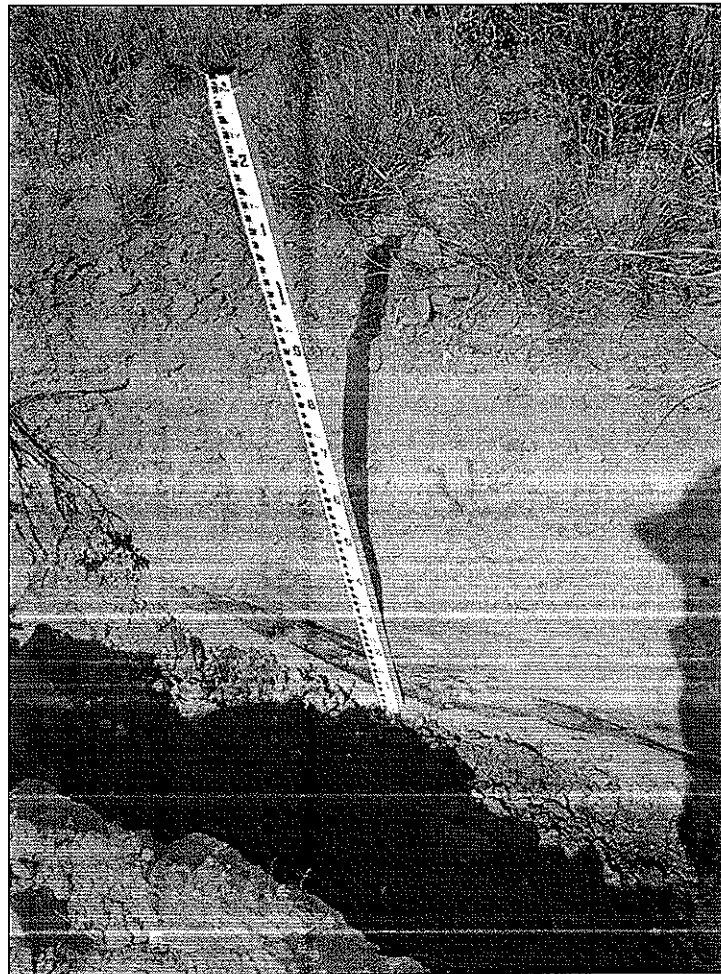


Figure 29: Photograph of Backhoe Trench 12 West Wall Profile To West.

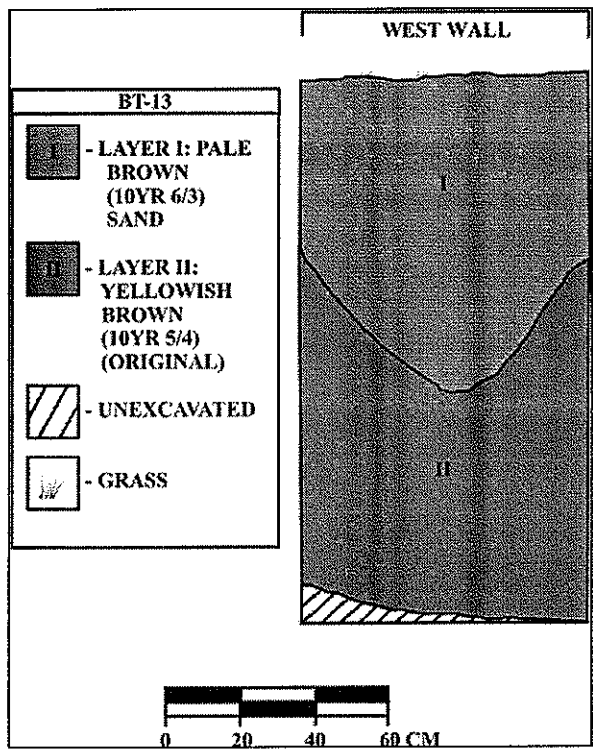


Figure 30: Backhoe Trench 13 West Wall Profile.

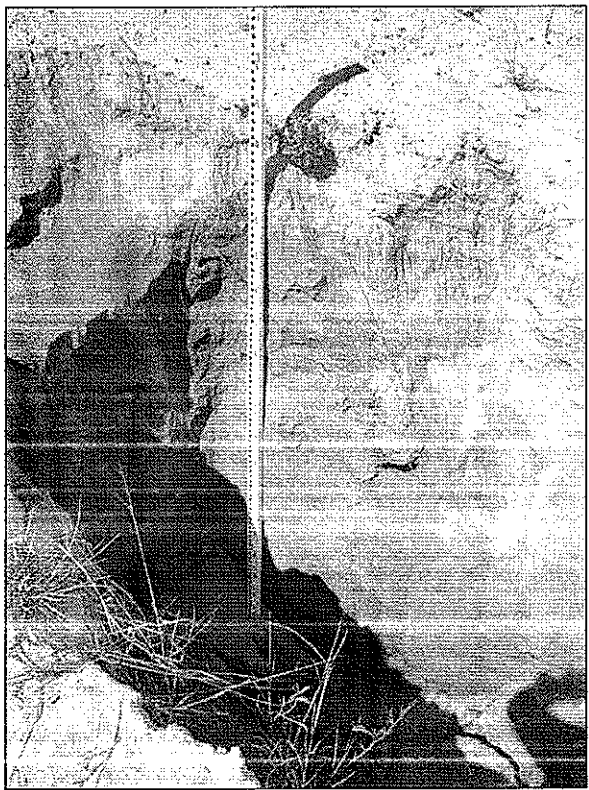


Figure 31: Photograph of Backhoe Trench 13 West Wall Profile To Southwest.

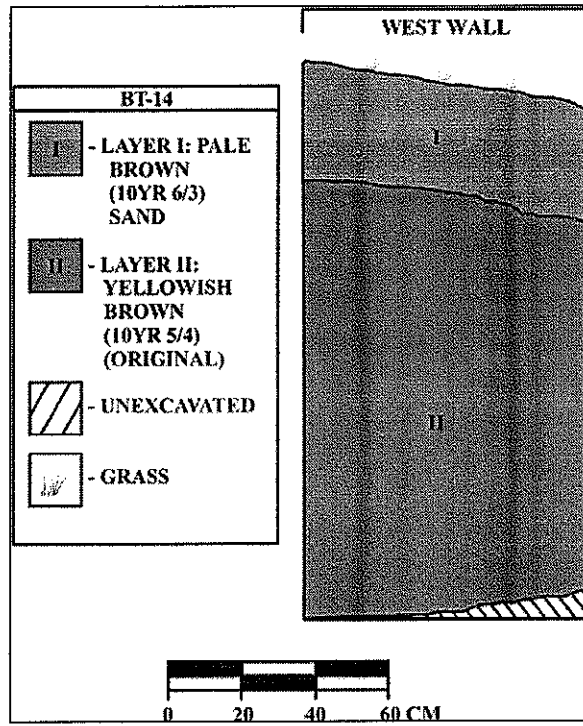


Figure 32: Backhoe Trench 14 West Wall Profile.

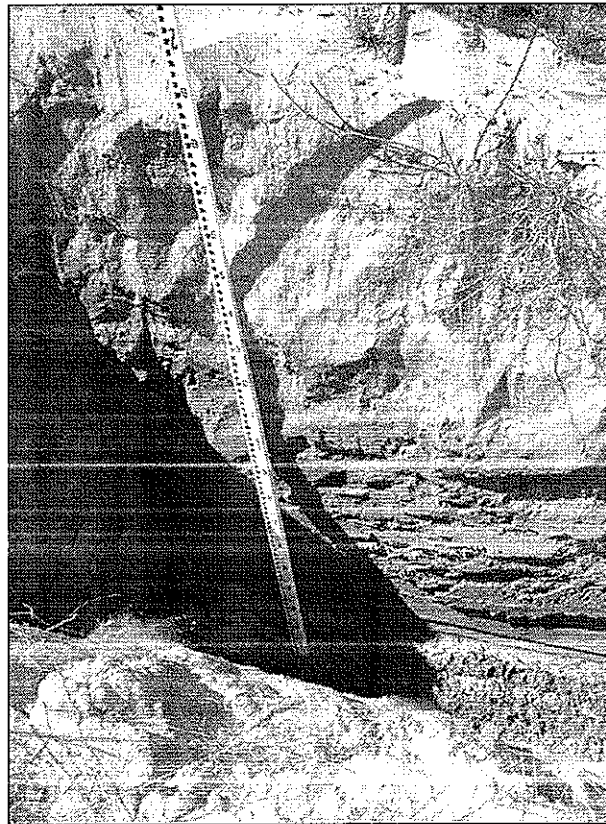


Figure 33: Photograph of Backhoe Trench 14 West Wall Profile To Southwest.

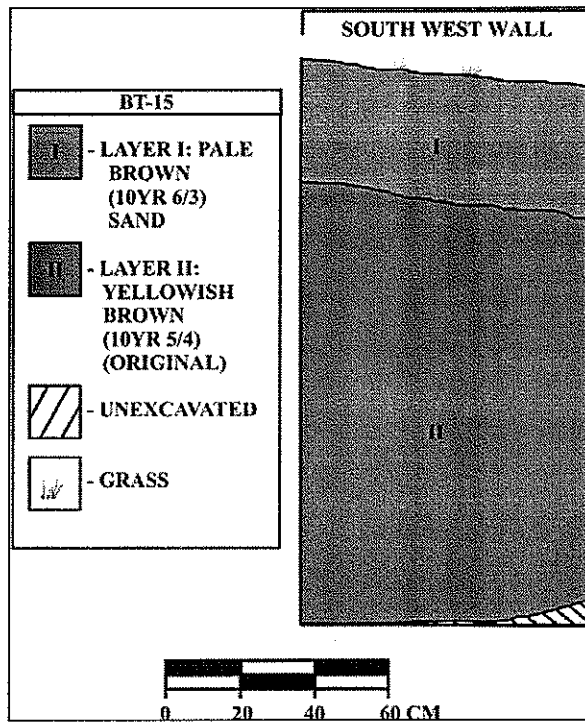


Figure 34: Backhoe Trench 15 Southwest Wall Profile.

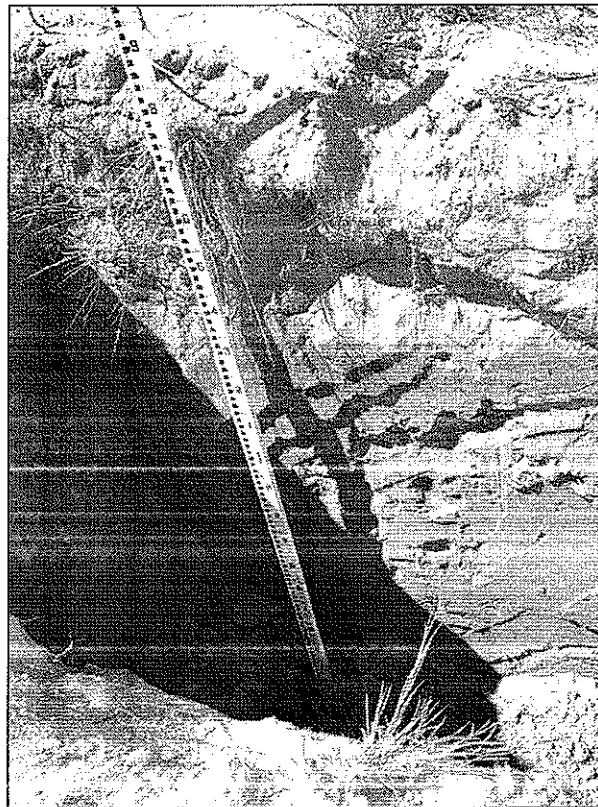


Figure 35: Photograph of Backhoe Trench 15 Southwest Wall Profile To Southwest.

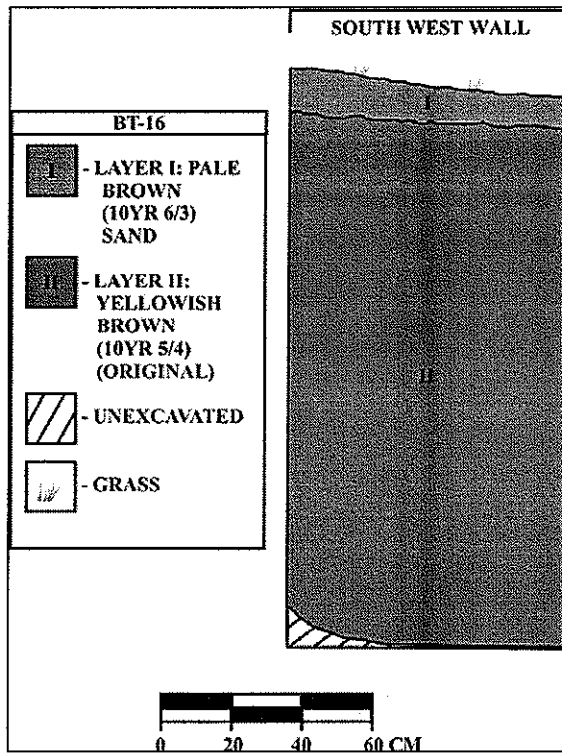


Figure 36: Backhoe Trench 16 Southwest Wall Profile.

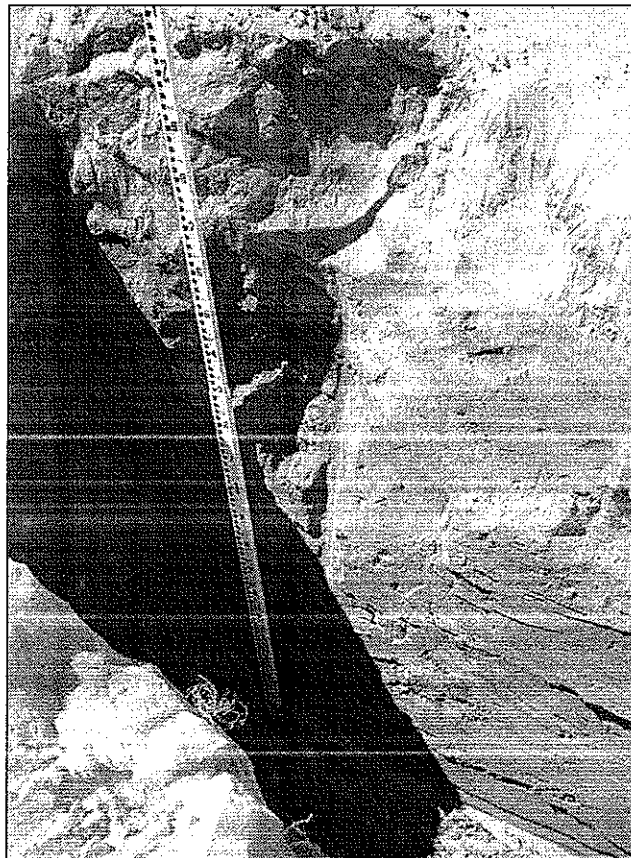


Figure 37: Photograph of Backhoe Trench 16 Southwest Wall Profile To Southwest.

BACKHOE TRENCH 17 (BT-17)

Backhoe Trench 17 (BT-17) is positioned along a 125/305° azimuth (see Figure 5), measures 5.50 by 1.00 by 1.70 meters, and exhibits two stratigraphic layers (Figure 38 and Figure 39). Layer I (0 - 30 cmbs) consists of a previously disturbed deposit comprised of pale brown (10 YR 6/3) sand. Layer II (30 - 170 cmbs) consists of the original deposit which consists of yellowish brown (10 YR 5/4) sand. No cultural or datable materials were encountered in BT-17.

BACKHOE TRENCH 18 (BT-18)

Backhoe Trench 18 (BT-18) is positioned along a 120/300° azimuth (see Figure 5), measures 6.00 by 1.00 by 1.80 meters, and exhibits two stratigraphic layers (Figure 40 and Figure 41). Layer I (0 - 40 cmbs) consists of a previously disturbed deposit comprised of pale brown (10 YR 6/3) sand. Layer II (40 - 180 cmbs) consists of the original deposit which consists of yellowish brown (10 YR 5/4) sand. No cultural or datable materials were encountered in BT-18.

BACKHOE TRENCH 19 (BT-19)

Backhoe Trench 19 (BT-19) is positioned along a 120/300° azimuth (see Figure 5), measures 5.50 by 1.00 by 1.85 meters, and exhibits two stratigraphic layers (Figure 42 and Figure 43). The surface of BT - 19 has undergone previous disturbance. Layer I (0 - 17 cmbs) consists of a pale brown (10 YR 6/3) sand. Layer II (40 - 180 cmbs) consists of the original deposit which consists of pale brown (10 YR6/3) sand. No cultural or datable materials were encountered in BT-19.

BACKHOE TRENCH 20 (BT-20)

Backhoe Trench 20 (BT-20) is positioned along a 30/210° azimuth (see Figure 5), measures 5.50 by 1.00 by 2.00 meters, and exhibits two stratigraphic layers (Figure 44 and Figure 45). The surface of BT - 20 has undergone previous disturbance. Layer I (0 - 10 cmbs) consists of a pale brown (10 YR 6/3) sand. Layer II (10 - 200 cmbs) consists of the original deposit which consists of pale brown (10 YR6/3) sand. No cultural or datable materials were encountered in BT-19.

RECOMMENDATIONS

The findings of the Archaeological Assessment Survey indicate the original sand (Puuone Sand) deposit is present within the project area. The presence of the original sand deposit suggests archaeological sites such as burials and/or habitation sites may be present in the subsurface deposits of the project area. In addition, the findings of the Archaeological Assessment Survey also indicate the depth of the imported fill deposit is not known, as the depth of the deposit varies throughout the project area. Given the above information, a program of Archaeological Monitoring is recommended as a precautionary measure during the phases of construction which involve ground altering activities.

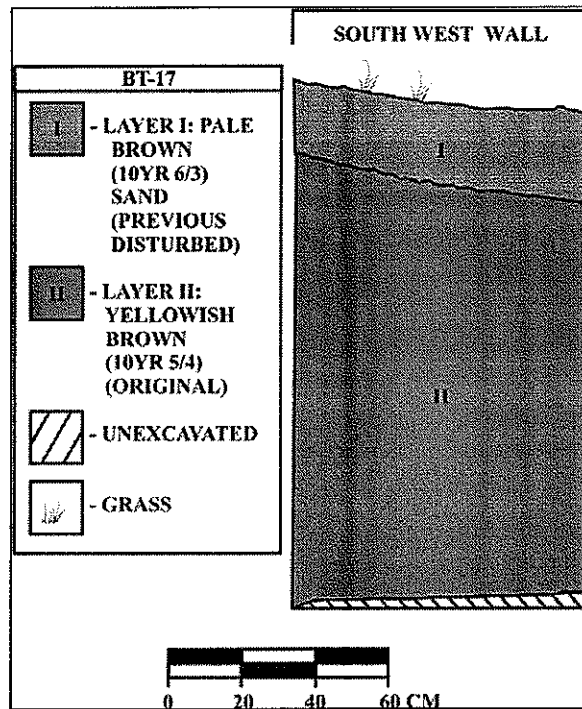


Figure 38: Backhoe Trench 17 Southwest Wall Profile.

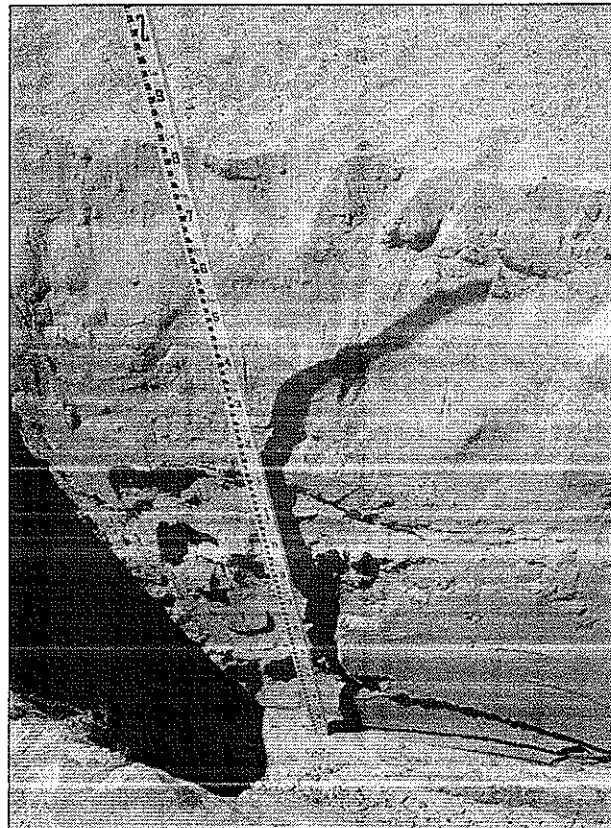


Figure 39: Photograph of Backhoe Trench 17 Southwest Wall Profile To Southwest.

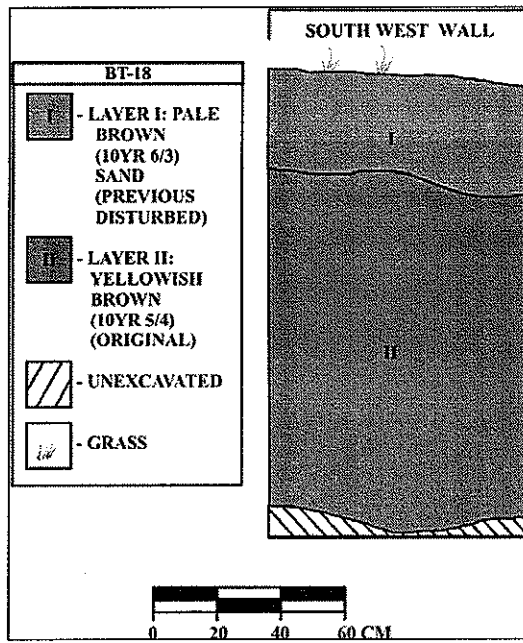


Figure 40: Backhoe Trench 18 Southwest Wall Profile.

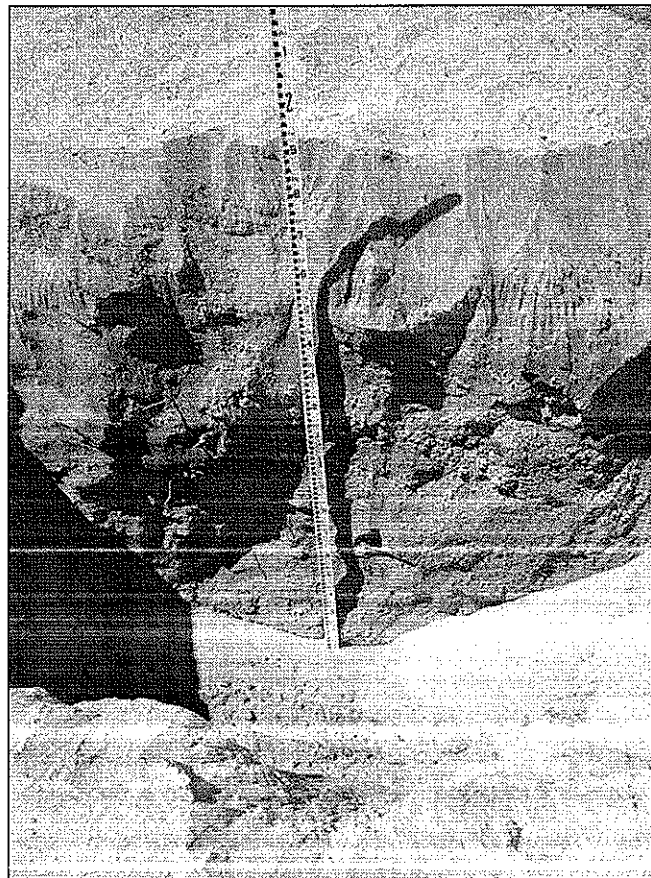


Figure 41: Photograph of Backhoe Trench 18 Southwest Profile To Southwest.

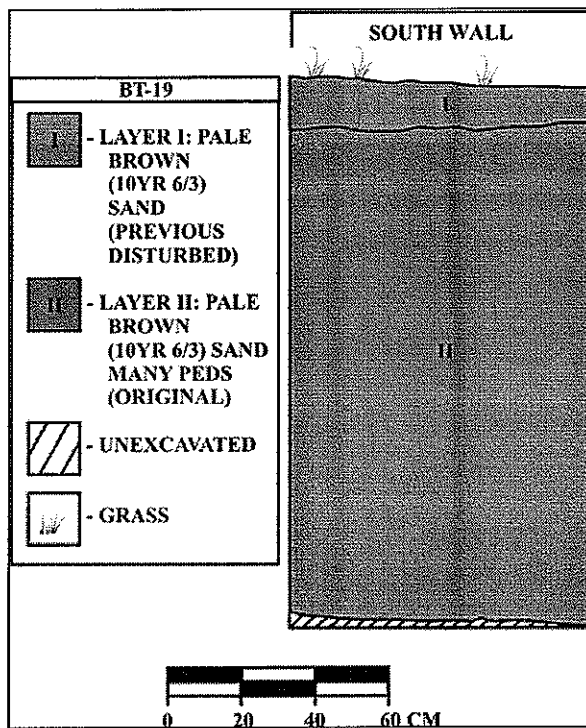


Figure 42: Backhoe Trench 19 South Wall Profile.

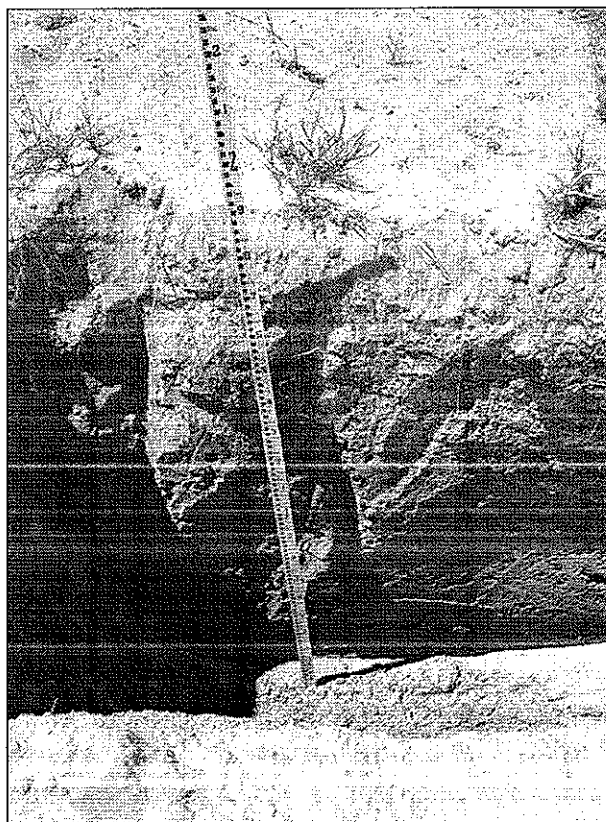


Figure 43: Photograph of Backhoe Trench 19 South Wall Profile To South.

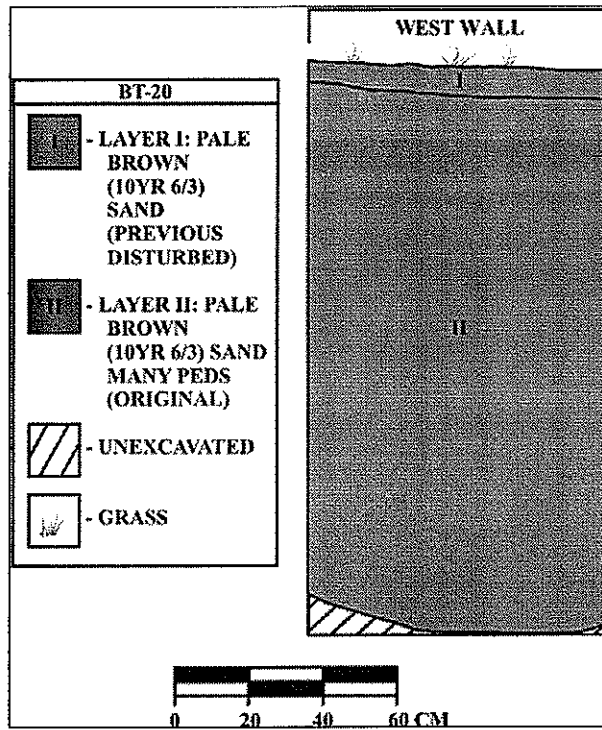


Figure 44: Backhoe Trench 20 South Wall Profile.

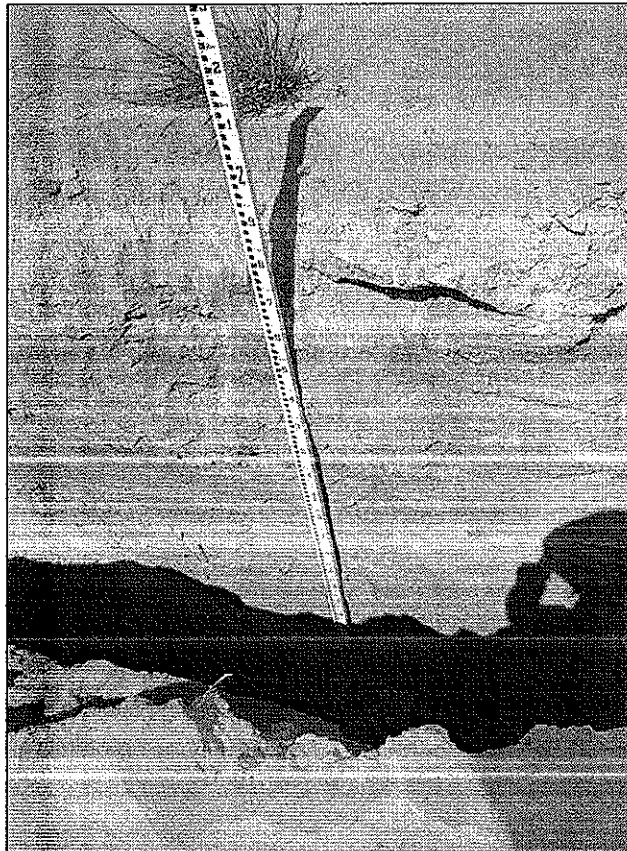


Figure 45: Photograph of Backhoe Trench 20 South Wall Profile To South.

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APPENDIX D-1.

Archaeological Monitoring Plan

**AN ARCHAEOLOGICAL MONITORING PLAN FOR
APPROXIMATELY 8.5 ACRES OF THE PROPOSED
WAIEHU HEIGHTS HOUSING PROJECT LOCATED IN
WAIEHU HEIGHTS, WAIEHU AHUPUA`A,
WAILUKI DISTRICT, ISLAND OF MAUI, HAWAII
[TMK: (2) 3-3-001:102 AND 016 (POR.)]**

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June 2008

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INTRODUCTION

Scientific Consultant Services (SCS), Inc. has prepared this Archaeological Monitoring Plan (AMP) in advance of construction work to occur at the proposed Waiehu Heights Housing Project. The project area is located on approximately 8.5 acres of land in Waiehu Heights, Waiehu Ahupua`a, Wailuku District, Island of Maui, Hawai`i [TMK: (2) 3-3-001:102 and 016 (por.) (Figures 1 and 2). This property is located at the border of the Waiehu Heights Subdivision and was Lot 2 of the Paukukalo Large-Lot Subdivision. According to Dr. Melissa Kirkendall, formerly the State Historic Preservation Division Maui Island Archaeologist, the property was previously mined for sand by Hawaiian Cement and used as a stockpiling area for excess materials during the construction of the Waiehu Heights Subdivision (Dr. Melissa Kirkendall, pers. comm.). Currently, the project area is vacant and undeveloped. The current landowner is Goodfellow Bros., Inc. with Pacific Rim Land Inc. acting as Agent for the landowner. The proposed project is a joint undertaking between Goodfellow Bros. Inc. and Lokahi Pacific to develop the subject property into an affordable housing residential subdivision.

Most of the project area appears to have been extensively disturbed by both previous and on-going activities. The prior land alterations are due to the above-mentioned sand mining operation, bulldozing and filling. On-going disturbances are due to dirt biking, use of the area as a paint ball field, and small scale excavations performed by bottle hunters and/or children.

This Archaeological Monitoring Plan follows an Archaeological Assessment (AA) conducted in the form of the mechanical (backhoe) excavation of 20 stratigraphic trenches placed over the entire project area. No archaeological sites were identified during the Archaeological Assessment, which was performed over a two day period in August 2006 by SCS (Dagher and Dega 2006).

Based on consultation with the State Historic Preservation Division, Archaeological Monitoring will be conducted as a precautionary measure due to the potential for the inadvertent discovery of human remains and traditional or historic cultural deposits in sandy substrate. Sandy substrata in the Hawaiian Islands are known to contain pre-Contact Native Hawaiian burials and evidence of habitation as indicated by previous archaeological work conducted in sandy strata in the vicinity of Waiehu Beach Road and the greater Wailuku Town. Also, two known historic sites are present in the

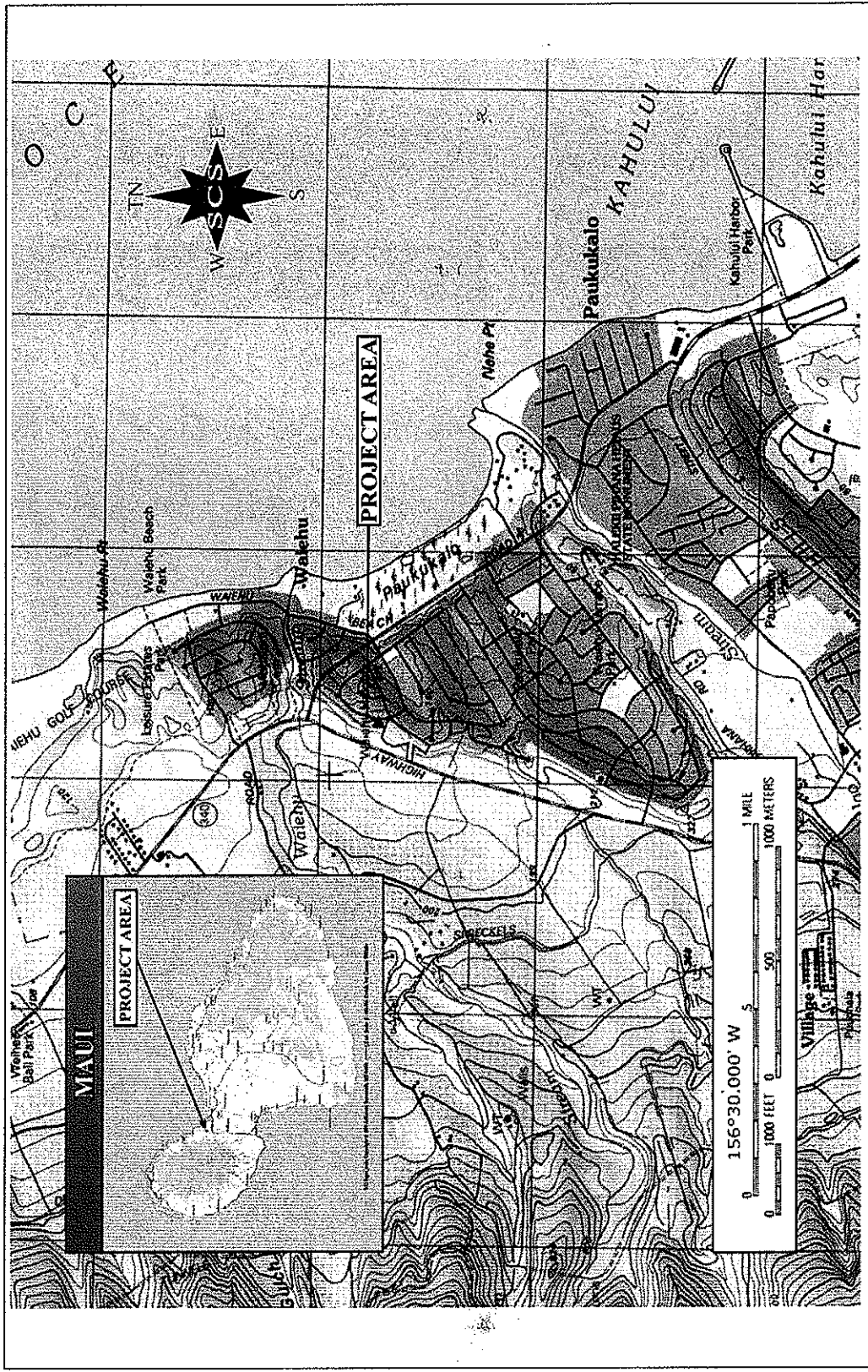


Figure 1: USGS (Wailuku) Quadrangle Showing Project Area Location.

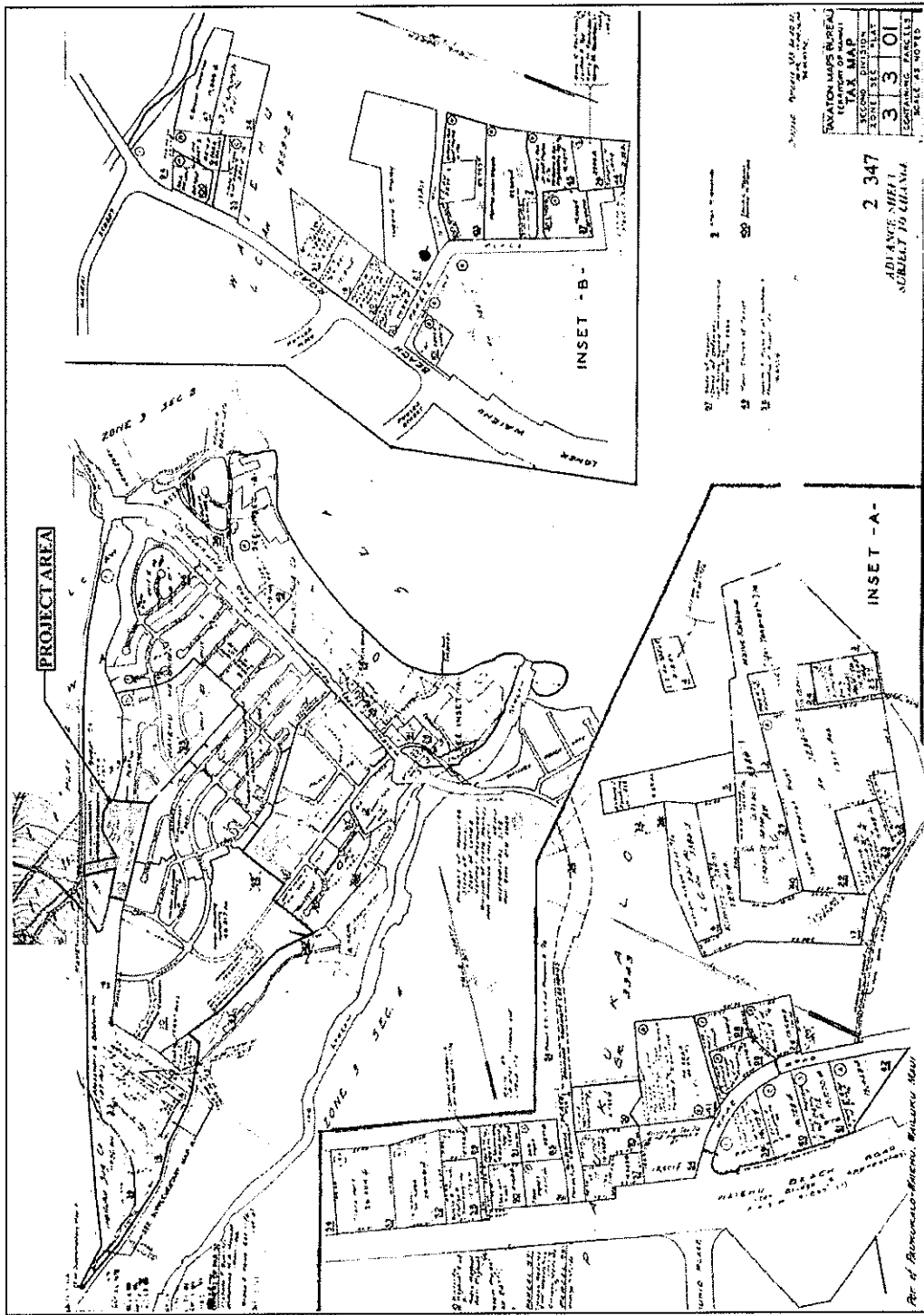


Figure 2: Tax Map Key [TMK (2) 3-3-001: 102 and 016 (por.)]

near vicinity of the parcel: Pi`ihana Heiau and Haleki`i Heiau. Both have been restored and are designated as the Haleki`i Pihana Heiau State Monument. The subject parcel itself does not represent a Land Commission Award (LCA).

Monitoring will be conducted to ensure that if human remains are identified during subsurface work, appropriate and lawful protocol concerning the Inadvertant Discovery of Human Remains (pursuant to 13-300-40a, b, c, HAR) will be followed. Archaeological Monitoring will also ensure that if in the event significant cultural resources are identified on the property, they will be sampled, adequately documented, and evaluated for their historical significance, per SHPD recommendations.

Prior to the initiation of any subsurface construction activity, this AMP will require approval from the SHPD. Details on the reasons for monitoring, potential site types that may be encountered during excavation, monitoring conventions and methodologies for both fieldwork and laboratory work, and curation and reporting follow in the text below.

REASONS FOR MONITORING

The present project area is situated entirely within a coastal environmental zone, an area subject to many traditional and historic activities. It is these coastal areas that were first thought to have been settled and also subject to sustained habitation (see Cordy 1981).

As mentioned briefly above, the main reason for conducting Archaeological Monitoring during construction activities in the project area is due to the assumed presence of Puuone Sand (PZUE) deposits beneath existing fill deposits. Typically, within sandy substrate, there is a high potential for discovering intact and disarticulated burials and scattered pre-Contact habitation deposits. This is a pattern that has been evident for many land parcels in the wider Wailuku- Paukūkalo-Waihe`e-Waiehu region, particularly during recent times. Fredericksen (2001) conducted Archaeological Monitoring at the intersection of Ho`okahi and Lower Main Street that led to the identification of two historic sites including a cultural soil layer and previously disturbed skeletal remains. The current project area is in close proximity to the Paukūkalo area where Traditional burials have been encountered and identified with some frequency.

ENVIRONMENTAL SETTING

LOCATION

The current project area is an approximately 8.5 acre property located in Waiehu Ahupua`a, Wailuku District, Island of Maui [TMK (2) 3-3-01:102 and 016 (por.)] (see Figures 1 and 2). The project area is roughly elongate in shape, resembling an angular chicken drumstick, with its long axis oriented approximately north-south. The fat end of the “drumstick” is toward the north. The property boundaries are fenced with chain-link, except for the southern edge, next to the water tank, which is fenced off further down slope and well beyond the property boundary. The project area is primarily comprised of an extensive sand dune with sloping sides. The eastern side of the property slopes down approximately 3.0 to 4.0 m (30–40% slope) to existing residential homes. The southern side ends on top of the sand dune next to the water tank. Modern trash, including an abandoned chicken coop, is present in this area. The northern side is level with a residential *cul-de-sac* (Haunani Street) and more residential homes. The northern-half of the western side of the project area slopes down nearly 4.0 to 5.0 m to a large ravine, while the southern-half of the western side slopes down about 1.0 to 2.0 m (30–40% slope) to a level graded area. In addition to surveying TMK: (2) 3-3-001:102, a portion of TMK: (2) 3-3-001:016, the access and utility easement, was also surveyed and trenched. This area is an approximately 10 to 15 m wide corridor running approximately east-west towards Kahekili Highway from about the middle of the western boundary. The easement corridor is level and within the graded area where the mechanical screen was set up during the period when the property was being mined for sand.

Most of the project area appears to have undergone extensive disturbance by previous sand mining operations, bulldozing and filling. The project area also was utilized as for stockpiling during the construction of the Waiehu Heights Subdivision. Original sand is likely to be present only in the vicinity of the water tank and along the bank along the eastern boundary of the project area. The entire project area also shows signs of recent, on-going human disturbance in the form of dirt biking (trails were observed throughout the project and particularly along the sides of the dune by the water tank), use as a paint ball field (the area where the easement is located), and small scale excavations done by bottle hunters or kids playing “fort” as suggested by the presence of shallow square “foxholes” covered with wooden pallets.

PROJECT AREA LANDFORM, SOIL, AND CLIMATE

The upper (northern) portion of the project area is mostly level and featureless, with a gentle slope (approximately 10–15%) towards the south. The southern end of the project area is a sand dune with steeper sides (approximately 45–50% slope).

According to Foote *et al.* (1972: Map 98) the project area is primarily located in the Puuone Sand (PZUE) deposit (Figure 3). In general, this soil series occurs in the lower uplands of the island of Maui with elevation ranging from 50 to 350 feet above mean sea level (amsl). These soils are comprised of somewhat over-drained soils which have been formed from materials originating in coral and marine shell (*ibid*: 117).

The PZUE soil series is found on coastal sandhills exhibiting moderate to moderately steep slopes, slow runoff, rapid permeability above concretion, with moderate to severe wind erosion. Activities conducted in the PZUE soil series include residences and pasturelands. A representative profile indicates the surface layer is approximately 20 inches thick comprised of a fairly alkaline grayish-brown calcareous sand underlain by grayish-brown concreted sand, which in some areas is 20 inches below the surface. Rainfall in this area ranges from 20 to 30 inches annually, with most of the rainfall occurring during the winter months and the soil temperature averages in the mid 70s (*ibid*).

The easement corridor is located in the Cobby Silty Clay (IbB). Soils in this series are found at elevations ranging from 100 to 500 feet amsl on well drained soils located in valley fill and alluvial fans which are formed of alluvium materials originating from basic igneous rock (*ibid*: 144, 172–173).

The IbB series occurs on 3 to 7 percent slopes and exhibits moderately slow permeability, medium runoff, and a slight to moderate erosion hazard. A representative profile of this soil series shows a surface layer comprised of dark brown clay approximately 15 inches thick. The subsoil (approximately 45 inches thick) consists of very dark brown, dark brown, and very dark grayish-brown silty clay underlain by clayey alluvium (*ibid*). The climate in which this soil series is found is very similar to that of the PZUE series. Annual rainfall ranges from 25 to 40 inches and the average soil temperature is in the mid-70s.



Figure 3: USDA Soil Survey Map Showing Soil Series within Project Area (from Foote et al. 1972)

VEGETATION

Vegetation along the upper portion of the project area is sparse (about 10-15% cover) consisting of small clumps of natal redtop grass (*Rhynchelytrum repens*), buffleggrass (*Cenchrus ciliaris*), and Bermuda grass (*Cynodon dactylon*); scattered stunted shrubs such as *koa haole* (*Leucaena leucocephala*), indigo (*Indigofera suffruticosa*), fleabane (*Pluchea symphytifolia*), and castor bean (*Ricinis communis*); and various herbaceous weedy invasives including vervain (*Stachytarpheta* sp.), telegraph weed (*Heterotheca grandiflora*), and beggar weed (*Desmodium tortuosum*). The sloped side along the northwestern boundary and the easement are more heavily vegetated (80–90% cover) with a thick growth of the same as above with the addition of giant guinea grass (*Panicum maximum*), coat buttons (*Tridax procumbens*), partridge pea (*Chamaecrista nictitans*), cow pea (*Macroptilium lathyroides*), slender mimosa (*Desmanthus virgatus*), glycine vine (*Glycine wightii*) and native weedy *uhaloa* (*Waltheria Indica*). The sand dune next to the water tank is the only part of the project area with ironwood trees (*Casuarina* sp.) and several specimens of cotton, possibly the native *Gossypium tomentosum*, but more probably a hybrid or some other introduced variety. Overall, this is an introduced alien ecosystem, as the area has been totally disturbed.

PRE-CONTACT AND HISTORIC SETTING

Archaeological settlement pattern data indicates that initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas between the A.D. fourth and eleventh centuries of the main islands, with populations eventually settling into drier leeward areas at later periods (Kirch 1985). Coastal settlement was still dominant, but populations began exploiting and living in the upland *kula* (plain, open country) zones. Greater population expansion to inland areas began in the ca. A.D. twelfth century and continued through the sixteenth century. Large scale or intensive agricultural endeavors were implemented in association with habitation. Coastal lands were used for settlement and taro was cultivated in near-coastal reaches and in the uplands.

THE PRE-CONTACT PERIOD

According to W.D. Alexander (in Sterling 1998: 91) the *ahupua`a* of Waiehu and Waihe`e were independent lands which did not belong to a particular district (*moku*). Thus, they were referred to as Nā Poko. It was only during modern times that these lands were divided into districts. In reference to the origination and meaning of the name

Waiehu, Sterling quotes Cheever (in Sterling 1998: 63) who states that the name Waiehu translates as "... where the combatants smoked with dust and perspiration..." and refers to a battle or battles which occurred in the area. Pukui *et al.* (1974: 221) offer another interpretation of Waiehu as meaning "water spray". This area is also known for having strong winds. The winds of Waiehu are said to be "Makani-hoo`eha-ili, the winds that hurt the skin" (Rebecca Nuuhiwa, Audio Collection in Sterling 1998: 62). Pukui *et al.* (*ibid*) interprets the meaning of Makani-hoo`eha-ili as "love disturbance" and the rains of Waiehu have been called "the fine mist" [Ka wai Kilioopu o Waihee] (Hyde in Sterling 1998: 5).

Traditionally, the entire area from Wailuku Valley north to Waihe`e Valley was part of an old land division named Nā Wai Eha ('The Four Streams'), referring to several great valleys draining the slopes of West Maui. This was said to be the most expansive area of continuous *kalo* (*taro*) pond-field agriculture in the Hawaiian Islands. According to Handy and Handy (1972: 496–497),

Waiehu is the second valley of the famous Na Wai Eha of western Maui, and it is watered by twin streams. The cane fields now extend throughout this region, continuously from Waihe`e on the lower slopes; but above Waiehu and Puakala from the upper roads following the irrigation ditches well toward the upper limits of the cane, a few old plantations still persisted in 1934. Some were used for raising wet taro, some for truck gardening. However, except for these few patches the old terraces of the upper slopes are entirely ploughed under.

Before the Historic era, it is highly likely that much of Waiehu Ahupua`a was extensively modified by terraces and irrigation ditches, from just *mauka* the near-coastal sand dunes to the high upper valleys. The present project area is situated *makai* of the probable lower limits of this extensive *lo`i* (irrigated terrace) system. Later in time, much of these uplands were transformed into commercial sugar cane fields, which resulted in the destruction of innumerable terraces, irrigation ditches, and associated features.

In Sterling (1998: 66), Walker discusses the sandy ground in neighboring Waihe`e Ahupua`a as being frequently used for burial sites:

The long sandy ridge near the shore at Waihee was another favorite burial ground. The erosion of the sand banks

frequently exposes burials, but the bones are quickly disturbed and scattered so that their original position of burial cannot be determined. Modern graveyards occupy several sites along the crest of this ridge.

This may also be true for the sandy soils of Waiehu Ahupua`a.

KNOWN HEIAU IN THE VICINITY

A large number of *heiau* (place of worship) were recorded by Thrum (1917) and Walker (1931) between Waihe`e and Wailuku, attesting to the importance of this area during Traditional times. All of the documented *heiau* in Waiehu Ahupua`a are located inland and *mauka* of the project area. The relatively large number and variety of named *heiau*, which included a *luakini heiau* (high chief-sacrificial shrine) in Paukūkalo built by Kahekili, indicates a substantial settled population in the region. Most of these *heiau* were completely or almost completely destroyed by the early twentieth century.

Documented *heiau* in Waiehu Ahupua`a include:

- Halelau Heiau (Walker Site 37), located well inland (*mauka*) of the coast—apparently destroyed by a more recent cemetery.
- Malumaluakua Heiau (Walker Site 39), located at the head of the Waiehu Gulch, well inland (*mauka*) of the coast—possibly a sacrificial shrine, although there was no stone construction (*e.g.*, walls and/or platforms) present, which Walker suggested may have been a local variant: “In this region a *heiau* seems to mean merely a scared spot not marked necessarily by either walls or platforms of stone” (Walker 1931:142).
- Kukuikomo Heiau (Walker Site 40), located on the ridge between North and South Waiehu Gulches, well inland (*mauka*) of the coast—another possible example of a shrine lacking observable rock architecture.
- Puukoa Heiau (Walker Site 41), located “[n]ear pond on ridge south of Waiehu Camp. Destroyed.” (Walker 1931:144)

In addition, Poaiwa Pu`uhonua (a place of refuge) was located in Waiehu Ahupua`a (Thrum in Sterling 1998:12). Walker also documented Pihani and Haleki`i Heiau within Wailuku Ahupua`a (southeast of the current project area), on the north side of `Iao Valley near the mouth of `Iao Stream (*ibid*: 31–144). In more recent decades, the archaeological significance of these important *heiau* has been determined through testing (Yent 1983), restoration, and preservation.

HISTORIC SETTING OF THE PROJECT AREA AND ENVIRONS

LAND TENURE

The land tenure system in prehistoric Hawai'i was rooted in a different epistemological framework than the subsequent colonially-imposed framework that is understood today as land ownership. The idea of holding land was not synonymous with owning it, but is described as closer to a trusteeship between the *ali'i nui* (ruling chiefs) of the island and the traditional Hawaiian *akua* (gods) Lono and Kane (Handy and Handy 1972: 41). Each island was divided into *moku* (districts) that were solely geographical subdivisions. The number of these *moku* depended upon the size of each island. *Moku* were partitioned into smaller landholding units known as *ahupua'a* that were governed by *ali'i* (chief) or designated *konohiki*. The *ahupua'a* varied in size, but ideally encompassed land from the mountain to the sea, which provided the chiefs and *maka'ainana* (people who cultivated the land) with the opportunity to harvest both terrestrial and marine resources. All persons from chiefs to commoners were entitled to portions of these resources (Chinen 1958:5).

The pre-Contact Period, in the Hawaiian Islands came to an end with the arrival of Captain Cook on Kaua'i in 1778. The years to follow would drastically change the political, agricultural, and social relationships and patterns of the Hawaiian Kingdom. Destabilization of Hawaiian society was further intensified by the profound reformation of traditional land systems. In 1848, the Māhele (Division) curtailed communal access to land. The Māhele system led to the introduction and implementation of privatization that required both chiefs and commoners to retain private land title (Kame'eleihiwa 1992). If properly informed of the procedures, Hawaiians were permitted to claim lands on which they had worked or lived. According to P. Kirch (1985: 309),

While LCA (Land Court Awards) establish historic land utilization in Hawai'i (during the Māhele), documented testimony from many land recipients have also demonstrated continuous generational occupation of the land. Settlement patterns illustrated in the LCA records highlight the multi-functional land use practices related to habitation and agriculture and perhaps the clear connection of these strategies. By mid-century, the fledgling [Hawaiian] Kingdom undertook the single most significant inducement to cultural change, the Great Māhele or division of lands between the king, chiefs, and government, establishing land ownership on a Western-style, fee-simple

basis. From this single act, an entire restructuring of the ancient social, economic, and political order followed.

Under the Māhele and the first Land Commission of the Trust Territory of Hawai`i, lands were allocated in three ways. According to HawaiiHistory the land was divided such that twenty-three percent of all lands became Crown Lands, belonging to the *ali`i*, forty percent was distributed to and to be divided among 245 chiefs, and thirty-seven percent was declared government lands which was awarded to the general populace, which were represented by a large portion of foreigners as well as Hawaiians during this time (Info Grafix 2008). The first Land Commission was formed in 1845, during which time all individuals holding land were now required by new Western notions of law to submit their claims or forfeit their land.

Archival research (Waihona `Aina 2003) indicates 123 LCAs were awarded in Waiehu Ahupua`a. However, none were found to be located in or near the current project area.

HISTORIC ERA

According to Dorrance and Morgan (2000), the entire Nā Wai Eha area from Wailuku Valley north to Waihe`e Valley, including Waiehu, was a major sugar cane cultivation zone from the lower slopes of the West Maui highlands to the near-coast area. The destruction of pre-Contact and early Historic sites by commercial sugar cane operations was widespread and highly effective, as probably hundreds (if not thousands) of rock formations (*e.g.*, habitations, agricultural features, *heiau*, burials, and other types of sites) were ploughed to create fields.

When Captain J. Hobron acquired land from T.H. Hobron to build the Waihe`e Sugar Mill Commercial in 1862, sugar cane cultivation in the neighboring Waihe`e Valley began (Donham 1989). By 1865, the Waihee Sugar Company was producing over 700 tons of sugar and 45,000 gallons of molasses per year. Production continued into the early twentieth century. The Waihee Dairy and Farm, located along the coast, was established in 1919; it closed in 1967. Sugar cane production was widespread throughout this region by the late nineteenth to early twentieth centuries. As a result of growth in the sugar cane industry, two irrigation ditches (Spreckels Ditch and the Waihe`e Ditch) were constructed in the late nineteenth to early twentieth centuries to channel water south from the Waihe`e Stream to nearby fields.

PREVIOUS ARCHAEOLOGY

OVERVIEW

As the project area is situated just *mauka* (west) of Paukūkalo, south of Waihe'e Ahupua'a, and north of Wailuku Ahupua'a, these areas are broadly relevant to a review of previous archaeological research. The northern terminus of Wailuku Ahupua'a, which borders Waiehu Ahupua'a to the south, is relevant since a significant number of important sites have been identified. Cordy *et al.* (1978) proposed a general settlement model for the area that includes temporary habitation and wetland agriculture in the upper valleys and elevations. Permanent habitation associated with *heiau* and burials are said to be found in the lower valleys and at the coast. Cordy *et al.* (1978) suggest that the coast and lower valleys were first settled by A.D. 300 to 600, although thus far the earliest radiocarbon dates are significantly later than this. Emory and Hammatt (1972) and Bordner (1983) stated that the sand dunes of Waiehu and environs were a prime location for burials, and, in general, that extreme caution should be taken in developing these areas. As described above, Walker (1931) recorded many religious shrines within Waiehu Ahupua'a and the vicinity of the project area, as well as villages and burial grounds in coastal settings, just north of the project area.

Please refer to Table 1 below for a more comprehensive presentation of the previous archaeology of the northeastern reaches of Wailuku District and to Figure 4 to view the location of selected significant sites in the Wailuku area.

Previous archaeological research in the eastern portion of Wailuku, Waiehu, and Waihe'e Ahupua'a is more relevant to the current study than research in areas to the south or west due to a shared topography, climate, land use, and settlement pattern.

Research at the State Historic Preservation Division (SHPD) indicated that the 1973 statewide inventory of known historic sites provided documentation on several burial sites in what is now the Waiehu Golf Course (see also Emory and Hommon 1972). The following descriptions are based on original site files available at the SHPD in Kapolei at the time of the production of this report.

Site 50-50-04-1185 (designated the Waiehu Dune burials on original feature forms) is a burial site containing the remains of at least 33 human burials. The site is located at the top of the consolidated sand dune immediately west of the fairway of the fifth hole, at the Waiehu Municipal Golf Course, and the burials have been exposed by

Table 1: Summary of Previous Archaeology in Project Area (Adapted from Frederickson and Frederickson 2000: 12-13; 2002 12-13)

Year	Author	Project / Location within Waiehu, Paukūkalo, or Wailuku Ahupua'a	Nature of Work	Findings (Site #)
2006	Fortini, W.R. and M.F. Dega	Residential Construction at 955 Puuloa Street, Waiehu TMK: 3-3-10:12	Monitoring	No new sites.
2005	Monahan, C.	Waiehu Golf Course (Maintenance Building Project) TMK: 3-2-13: 06 With Addendum Added	Inventory Survey	Test units and backhoe trenches found nothing of archaeological significance on 1.5 acres. Addendum discusses two additional areas of subsurface testing in and near project area. Two new sites identified (50-50-04-5661, subsurface possible platform probably dating to late 18 th or early 19 th century, and 50-50-04-5662, subsurface asphalt road/cart path remnant dating to or around 1930).
2004	Wilson, J and M.F. Dega	240.087 Acres Located in Waiehu and Wailuku TMK: 3-3-02:001 por	Inventory Survey	1 previously identified site (50-50-07-1508, Spreckels Ditch) & 6 new sites (50-50-04-5522 through -5527), including Plantation era sites, isolated lithic and marine shell finds, historic complex. C-14 data
2004	Frederickson, D. and E.	Phase II of the Paukūkalo 8-inch Waterline Replacement along Lilihua Place, Wailuku	Inventory Survey	Relocated previously identified site (50-50-04-5005, pre-Contact near coastal habitation site with associated human burials). Site utilized into early post-Contact period. Includes C-14 data
2003	Dr. Melissa Kirkendall, formerly SHPD Maui Island Archaeologist, personal communication	Waiehu	Monitoring	In June 2003 Archaeological Services Hawaii, LLC conducted archaeological monitoring on the current project area during sand mining operations performed by Hawaiian Cement. During the monitoring activities human skeletal remains were identified
2003	Frederickson, E.	Portion of Land in Waiehu. Waiehu Ahupua'a, Wailuku District TMK: 3-2-20: Por 47, Lot 9A	Monitoring	No new sites.
2003	Dega, M.F.	Kehalani Mauka Subdivision, in Wailuku near Waikapu TMK: 3-5-001:001	Inventory Survey	8 historic sites documented on 349 acres, two of which were previously recorded (50-50-04-5473, -5474, -5197, -5489, -5490, -5491, -5492, -5493).

Year	Author	Project / Location within Waiehu, Paukūkalo, or Wailuku Ahupua`a	Nature of Work	Findings (Site #)
2003	Donham, T.K.	Residential Construction at 1376 Kakae Place, Waiehu. TMK: 3-2-20-64	Archaeological Assessment	including a reservoir, ditches, historic-modern roadways, historic artifact scatter, plantation-era clearing mounds
2002	Fredericksen, E. and D.	Puuhala Mauka Residential Subdivision, Wailuku Ahupua`a TMK: 3-3-2-001	Inventory Survey	Negative results: no evidence of cultural material; monitoring not recommended 4 sites, 2 previously unrecorded: a Plantation era boulder/retaining wall/platform (-5195), and coral/shell surface midden scatter (-5196); also the known historic Waihe`e Ditch (-5197) and Spreckels Ditch (-1508)
2000	Fredericksen, E.M. and D. L.	Waiehu Kou Residential Sewer Line Corridor TMK: 3-2-3	Inventory Survey	Habitation site with 3 burials (-4759)
1999	Fredericksen, E. and D.	Waiehu Kou 2 Residential Development and Diversion Easement for DHHL TMK: 3-2-13:por 1 and 9	Inventory Survey	Extensive habitation (-4731) near Waiehu Dune; 2 burials; A.D. 1195 to late 1700s
1998	Fredericksen, E. and D.	North Waihe`e Water Source Project, Phases I and II, along Kahekili Highway through both Waihe`e and Waiehu Ahupua`a	Monitoring	6 historic sites: 2 rock walls (-4473 and -4512), former along Kahekili Highway; Old Waihe`e Sugar Mill (-4409); <i>kuleana</i> water flume (-4371); the Old Poi Factory (-4372) 1 pre-Contact habitation (-4374) with associated burials, which extends 300 m along K. Highway at toe of Waihe`e Dune: dated c. A.D. 1500 to late 1700s
1997	Fredericksen, E.	North Waihe`e Water Source Project, Phases I and II, along Kahekili Highway through both Waihe`e and Waiehu Ahupua`a. (Area <i>mauka</i> of highway to water tank.)	Monitoring	No cultural deposits: Area under sugarcane cultivation for more than a century
1996	Dixon, B.	Inadvertent Discovery of Human Skeletal Remains at 741 Kuhio Place, Wailuku TMK: 3-3-06:47	Field Inspection	Site 50-50-04-1812, human skeletal remains representing single individual. Remains partially removed in 1985.
1996	Donham, T.	Waiehu Golf Course	Inventory Survey	Mapped human remains found in 27 locations on the dune, 16 of which appeared to represent primary burials
1996	Jones, B., J. Pantaleo, and A. Sinoto	North Waihe`e Wells Waterline Project	Inventory Survey	5 Sites: rock terrace (-3196); rock terrace along Waihe`e Stream (-3199); 3 surface scatters of artifacts, midden, and <i>ili`ili</i> stones (-3197); 533 m long wall (-3198); Waihee Bridge foundation (-4097)

Year	Author	Project / Location within Waiehu, Paukūkalo, or Wailuku Ahupua'a	Nature of Work	Findings (Site #)
1993	Griffin, A.	Inadvertent Burial Discovery	Field Inspection	Site 50-50-04-3139, human skeletal remains representing 2 individuals
1992	Folk, W. and H. Hammatt	Waiehu Beach lots TMK: 3-2-13:05	Inventory Survey	Surface survey and 9 backhoe trenches produce no cultural material other than 2 buried charcoal lenses (-3115) ranging from A.D. 1300s-1600s
1991	Griffin, A.	Archaeological Assessment of a 3.1 Acre Parcel Proposed Phase 4 Residential Lots, Paukūkalo TMK: 3-3-06:52 por	Field Inspection	Identified 2 new sites (2 caves and surface shell midden and artifact scatter. Determined area significant and important to understanding sociopolitical history of Maui. Recommended relocating development site.
1990 a	Kennedy, J.	Portion of the Piihaha District, Piihaha TMK: 3-3-1:16 Por.	Subsurface Testing	No new sites.
1990 b	Kennedy, J.	TMK: 3-4-30:11 Subdivision "C" Located at Paukūkalo	Inventory Survey	No new sites.
1990 c	Kennedy, J.	Archaeological Activities Surrounding Piihaha District #2 TMK: 3-3-01: por.16, 33, 39 and TMK: 3-4-32:10, 18, 01 por.	Reconnaissance Survey, auger testing, monitoring, backhoe trenching, hand trenching	Site 50-50-04-2995 <i>In situ</i> burials, secondary burials, fragmented and previously disturbed human skeletal remains, historic bottle fragments, stone terraces.
1989	Donham, T.	Waiehu Golf Club	Inventory Survey	270-acre project area found 88 sites with 195 components, including structures, surface midden, lithic scatters, agricultural and residential complexes, ceremonial features, 4 cemeteries, and 4 isolated human graves. Dates from A.D. 960-1330 to modern times.
1988	Clark, D. and J.F. Baliki	Waiehu Midden Site	Inventory Survey	Coastal dune site: 4 fire hearths, 4 fire floors, an <i>imu</i> , a rock alignment, and artifact clusters. One date of A.D. 1010-1150 from 2.0 mbs
1987	Trembly, D.	Waiehu Planned Development	Monitoring	Remains of 6 individuals displaced by construction along Wai'ehu Beach Road
1983-1984	Yent, M.	Halekii-Piihaha State Monument: Phase I, Waiehu	Survey, Test Coring	Halekii (-4592): <i>ili-ili</i> stones, shell, charcoal. No evidence of cultural deposit earlier than construction date. Piihaha (-4592): <i>ili-ili</i> stones, shell, human and pig bone, human burial left <i>in situ</i>
1983	Bordner, R.	Waiehu housing Development, Environmental TMK: 3-3-01:10, 92	Survey, Excavation	Historic military features only.

Year	Author	Project / Location within Waiehu, Paukūkalo, or Waituku Ahupua`a	Nature of Work	Findings (Site #)
1982	Han, T.	Waiehu Heights Subdivision	Inventory Survey	4 additional sites—2 burials, a lithic/midden scatter, and a possible quarry; as well as located a walled <i>ko`a</i> fishpond—are added to previous fieldwork which revealed (2 sites) a burial and a walled terrace
1978	Cordy, R.	Waihe`e Stream Hydroelectric power project	Survey	Numerous sites. Formulated model for predicting general location for 6 functional sites types: temporary and permanent habitation sites, dryland and wetland agriculture, burials, and <i>Heiau</i>
1978	Kelly, M., Y. Sinoto, and R. Cordy	Waiehu Heights Subdivision	Survey, Data Recovery	Over 20 historic coffin burials exposed during bulldozer activity in dune area
1973	Hommon, R. and R. Connolly	State Register of Historic Places	Survey	Limited fieldwork on 4 sites: Waiehu Dune burials (-1185); burial cave (-1186); Waiehu Golf Course burials (-1188); Waiehu midden site (-1189)
1931	Walker, W.	<i>Archaeology of Maui</i>	Island-wide investigation	Among other records, documents 5 <i>heiau</i> in Waiehu and 13 <i>heiau</i> in Waituku
1918	Stokes, J.F.G.	"... Heiau of Maui."	Island-wide investigation	Among other records, documents <i>heiau</i> in Waituku District
1917	Thrum, T.G.	"Maui's Heiau ..."	Island-wide investigation	Description of Waituku's Pihana Heiau, among other records

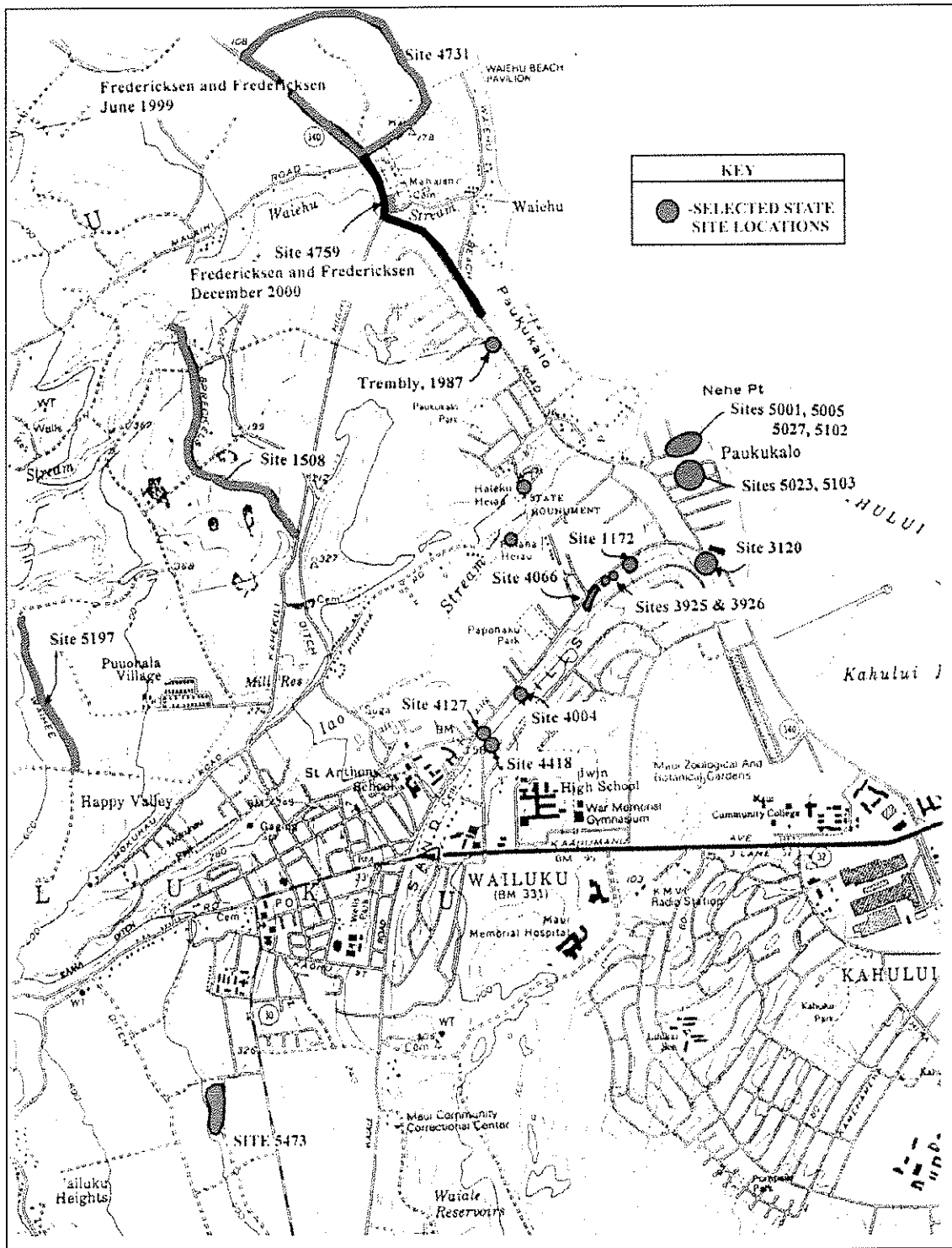


Figure 4: Selected State Site Locations in the Vicinity of the Project Area (Adapted from Fredericksen and Fredericksen 2002: Map 5).

natural, aeolian (wind) erosion. Some of the burials are associated with traditional artifacts and midden. According to Donham (2003), this site has been preserved to prevent further erosion.

Site 50-50-04-1188 (designated the ‘Golf Course Burials’ on the original feature forms; designated Ma-D10-13 in B.P. Bishop Museum files) is a burial site consisting of “human skeletal remains eroding out of a sand bank along the northwest side of the service road in the Waiehu Municipal Golf Course. Human remains were found in three places along a 14-m stretch of the sand bank located about 65 m northwest of the maintenance building near the middle of the golf course” (Hommon and Connolly 1973). The remains were reported as “fragmentary” (*ibid.*).

The earliest archaeological endeavors in the Wailuku-Waiehu environs were undertaken by Thrum (1917), Stokes (1918), Emory (1921), and Walker (1931). Although their archaeological finds do not directly pertain to the current project area, their data allows for a deeper understanding of the traditional use of the Wailuku-Waiehu area.

EXPECTED FINDINGS

Based on traditional Hawaiian settlement patterns, previous archaeological research, and historical activities in the project area, expected findings of the Monitoring Program are as follows:

1. There is a relatively high probability of finding pre-Contact (and possibly early Historic Period) Native Hawaiian burials due to the project area’s location in the Puuone Sand deposit, which is known to be a traditional internment site for Native Hawaiian burials. There is also a relatively high probability of finding re-deposited (*i.e.*, previously disturbed) human skeletal remains, given that previous use of the project area involved ground disturbing activities including sand mining by Hawaiian Cement and stockpiling of excess materials during the construction of the Waiehu Heights Subdivision (Dr. Melissa Kirkendall, pers. comm.).
2. There is a relatively high probability of finding subsurface evidence of traditional Native Hawaiian and/or early historic activities including hearths, postholes, midden deposits, and other occupation debris (*e.g.*, stone tool waste, discarded fishing gear).

3. There is essentially no expectation of finding any historically-significant sites or features on the present ground surface.

MONITORING CONVENTIONS AND METHODOLOGY

This AMP has been produced in accordance with DLNR/SHPD Administrative Rule §13-279 (2002). Archaeological monitors will adhere to the following guidelines during monitoring procedures:

1. A qualified archaeologist familiar with the project area and the results of previous archaeological work conducted in the general area will monitor subsurface construction activities on the parcel. If significant deposits or features are identified and additional field personnel are required, the archaeologist will notify the contractor or representatives before additional personnel are brought to the site.
2. If features or cultural deposits are identified during Archaeological Monitoring, the on-site archaeologist will have the authority to temporarily suspend construction activities at the significant location so that the cultural feature(s) or deposit(s) may be fully evaluated and appropriate treatment of the cultural deposit(s) is conducted. SHPD will be consulted to establish feature significance and potential mitigation procedures. Treatment activities primarily include documenting the feature/deposit through plotting its location on an overall site map, illustrating a plan view map of the feature/deposit, profiling the deposit in three dimensions, photographing the finds (with the exception of human burials), artifact and soil sample collection, and triangulation of the finds. Construction work will only continue in the significant location when all documentation has been completed.
3. Control stratigraphy, in association with subsurface cultural deposits, will be noted and photographed, particularly those containing significant quantities or qualities of cultural materials. If deemed significant by SHPD and the archaeologist, these deposits will be sampled.
4. In the event that human remains are encountered, all work in the immediate area of the find will cease; the area will be secured from further activity until burial protocol has been completed. The SHPD Island archaeologist and SHPD Culture and History Branch will both be immediately notified about the inadvertent discovery of human remains on the property. Notification of the inadvertent discovery will also be made to the Maui/Lanai Islands Burial Council by either SHPD or by the contracting archaeologist. A determination of minimum number of individuals (MNI), age(s), and ethnicity of the burial(s) will be ascertained in the field, following standard osteological procedures (*e.g.*, White 2000). Rules outlined in Chapter 6E, Section 43 shall be followed. Profiles, plan view maps,

and illustrative documentation of skeletal parts will be recorded to document the burial(s). The burial location will be identified and marked. If a burial is disturbed, materials excavated from the vicinity of the burial(s) will be manually screened through 1/8-inch wire mesh screens in order to recover any displaced skeletal material. If the remains are to be removed, the work will be in compliance with HRS 6.E-43.6, Procedures Relating to Inadvertent Discoveries after approval from all parties (SHPD, Burial Council). All remains recovered from the site will be temporarily stored in a secure, on-site location until final disposition is determined and completed.

5. To ensure that contractors and the construction crew are aware of this AMP and possible site types to be encountered on the parcel, a brief coordination meeting will be held between the construction personnel and monitoring archaeologist prior to initiation of the project. The construction crew will also be informed as to the possibility that human burials could be encountered and how they should proceed if they observe such remains.
6. The archaeologist will provide all coordination with the contractor, SHPD, and any other group involved in the project. The archaeologist will coordinate all monitoring and sampling activities with the safety officers for the contractors to ensure that proper safety regulations and protective measures meet compliance. Close coordination will also be maintained with construction representatives in order to adequately inform personnel of the possibility that open archaeological units or trenches may occur in the project area.
7. As necessary, verbal reports will be made to SHPD and any other agencies as requested.
8. This Archaeological Monitoring Plan shall be reviewed and approved prior to the commencement of any construction related ground alterations associated with the proposed project, unless otherwise agreed to by SHPD.

LABORATORY ANALYSIS

All samples collected during the project, except human remains, will undergo analysis at the SCS laboratory in Honolulu. In the event that human remains are identified and the SHPD authorizes their removal, these remains and all associated cultural materials will be curated at an appropriate location on Maui. Photographs, illustrations, and all notes accumulated during the project will be curated at the Honolulu laboratory of SCS. All retrieved artifact and midden samples will be sent to the SCS laboratory in Honolulu to be cleaned, sorted, and analyzed. Significant artifacts will be photographed, sketched, and classified (qualitative analysis). All metric measurements and weights will be recorded (quantitative analysis). This data will be presented in

tabular form within the final monitoring report. Midden samples will be minimally identified to major 'class' (e.g., bivalve, gastropod mollusk, echinoderm, fish, bird, and mammal). All data will be clearly recorded on standard laboratory forms which also include number and weight (as appropriate) of each constituent category. These counts will also be included in the final report.

Should any samples amenable to dating be collected from a significant cultural deposit, they will be prepared in the SCS laboratory and submitted for specialized radiocarbon analysis. While primary emphasis for dating is placed on charcoal samples, we do not preclude the use of other materials such as marine shell or nonhuman bone materials. SCS will consult with SHPD and the client if radiocarbon dates are deemed necessary.

All stratigraphic profiles will be drafted for presentation in the final report. Representative plan view sketches showing the location and morphology of identified sites/features/deposits will be compiled and illustrated.

CURATION

If requested by the landowner, SCS will curate all recovered materials in Honolulu (except human remains, which would remain on-island) until a permanent, more suitable curation locale is identified. The land owner(s) may request to curate all recovered materials once analysis has been completed.

REPORTING

An Archaeological Monitoring report documenting the project findings and interpretation, following SHPD guidelines for Archaeological Monitoring reports, will be submitted within 180 days of the completion of fieldwork. This time line is requested to account for any radiocarbon age determinations (typically 60 days), if necessary.

If cultural features or deposits are identified during fieldwork, the sites will be evaluated for historical significance and assessed under State and Federal Significance Criteria. The Archaeological Monitoring report will be submitted to both SHPD and to the client.

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APPENDIX D-2.

**Letter from the State Historic
Preservation Division,
February 11, 2009**

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

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

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

February 11, 2009

Michael F. Dega, Ph.D.
Scientific Consultant Services, Inc.
711 Kapiolani Boulevard, Suite 975
Honolulu, Hawai'i 96813

LOG NO: 2009.0228
DOC NO: 0902PC13
Archaeology

Dear Dr. Dega:

SUBJECT: Chapter 6E-42 Historic Preservation Review – REVISED Archaeological Monitoring Plan for the 8.5 Acre Waiehu Mauka (Heights) Subdivision Waiehu Ahupua'a, Wailuku District, Island of Maui, Hawai'i
TMK: (2) 3-3-001:016 por; (2) 3-3-001:102

Thank you for the opportunity to review this revised plan, which our staff received this afternoon (Dagher and Dega 2008): *An Archaeological Monitoring Plan for Approximately 8.5 Acres for the Proposed Waiehu Heights Subdivision...* Scientific Consultant Services, Inc.

The plan was first reviewed by SHPD staff on August 27 of 2008 (SHPD LOG NO: 2008.2361; DOC NO: 0808PC43), which resulted in a single requested revision. The most recent version of the plan was reviewed in PDF format to confirm completion of that revision.

Precautionary archaeological monitoring was recommended by your firm for all future ground altering disturbance within the subject parcel after completion of an inventory survey during which no culturally significant sites were identified, therefore turning into an assessment. However, the location of the project area in a coastal environmental zone and the assumed presence of Pu'uone sand deposits beneath existing fill layers increases the potential for finding unmarked human remains and/or other culturally significant deposits from the traditional (pre-Contact) and/or early historic (post-Contact) periods.

As specified in the monitoring plan, there will be one archaeologist on site per piece of earth-moving equipment, a coordination meeting with the construction crew and all other pertinent parties to explain monitoring procedures and that the monitoring archaeologist has the authority to halt work in the vicinity of a culturally significant find will be undertaken, and should anything of cultural significance be identified, the SHPD will be consulted for mitigation recommendations. The plan further states that in the event human remains are inadvertently exposed, both the SHPD and Maui/Lana'i Islands Burial Council (MLIBC) will be notified and appropriate burial protocol followed. A report detailing the findings of the monitoring will be prepared and submitted to our office for review within 180 days after the completion of the project.

The plan now contains the required information as specified in HAR §13-279-4 (a) regarding the contents of monitoring plans in general and is acceptable.

Michael F. Dega, Ph.D.
Page 2

Now that the monitoring plan has been accepted pursuant to HAR §13-279, please send one hardcopy of the current version, clearly marked **FINAL**, along with a copy of this review letter and a text-searchable PDF file on CD to the attention of "SHPD Library" at the Kapolei SHPD office.

Should you have any questions or comments regarding this letter, please contact Patty Conte (Patty.J.Conte@hawaii.gov).

Aloha,

A handwritten signature in cursive script that reads "Nancy A. McMahon".

Nancy McMahon, Deputy SHPO/State Archaeologist
State Historic Preservation Division

c: Jeff Hunt, Director, Dept. of Planning, 250 S. High Street, Wailuku, Hawai'i 96793
Maui CRC, Dept. of Planning, 250 S. High Street, Wailuku, Hawai'i 96793

APPENDIX E.

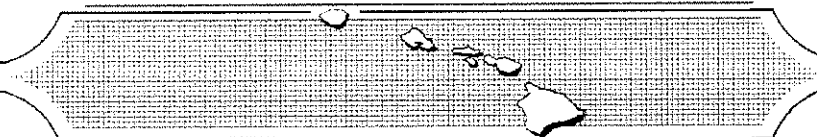
Cultural Impact Assessment Report

**A CULTURAL IMPACT ASSESSMENT
OF APPROXIMATELY 8.5 ACRES LOCATED IN
WAI'EHU AHUPUA'A, WAILUKU DISTRICT,
MAUI ISLAND, HAWAII
[TMK 3-3-001: por. 016 and 102]**

Prepared By:
Leann McGerty, B.A.
and
Robert L. Spear, Ph.D.
December 2008

Prepared For:
Maui Architectural Group
2331 West Main Street
Wailuku, HI 96793

SCIENTIFIC CONSULTANT SERVICES Inc.



711 Kapiolani Blvd. Suite 975 Honolulu, Hawai'i 96813

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INTRODUCTION

At the request of Maui Architectural Group, Scientific Consultant Services, Inc. (SCS) conducted a Cultural Impact Assessment on approximately 8.5 acres of land located in Wai'ehu Ahupua`a, Wailuku District, Maui Island [TMK: 3-3-001: por. 016 and 102] (Figures 1 and 2). Per the documents and exhibits submitted by Maui Architectural Group, the project proposes the development of a residential subdivision.

The Constitution of the State of Hawai`i clearly states that the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of native Hawaiians. Article XII, Section 7 requires the State to “protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by *ahupua`a* tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778” (2000). In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to native Hawaiian *ahupua`a* tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawai`i Supreme Court, reaffirmed HRS 7-1 and expanded it to include, “native Hawaiian rights...may extend beyond the *ahupua`a* in which a native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner” (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

Act 50, enacted by the Legislature of the State of Hawaii (2000) with House Bill 2895, relating to Environmental Impact Statements, proposes that:

...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights... [H.B. NO. 2895].

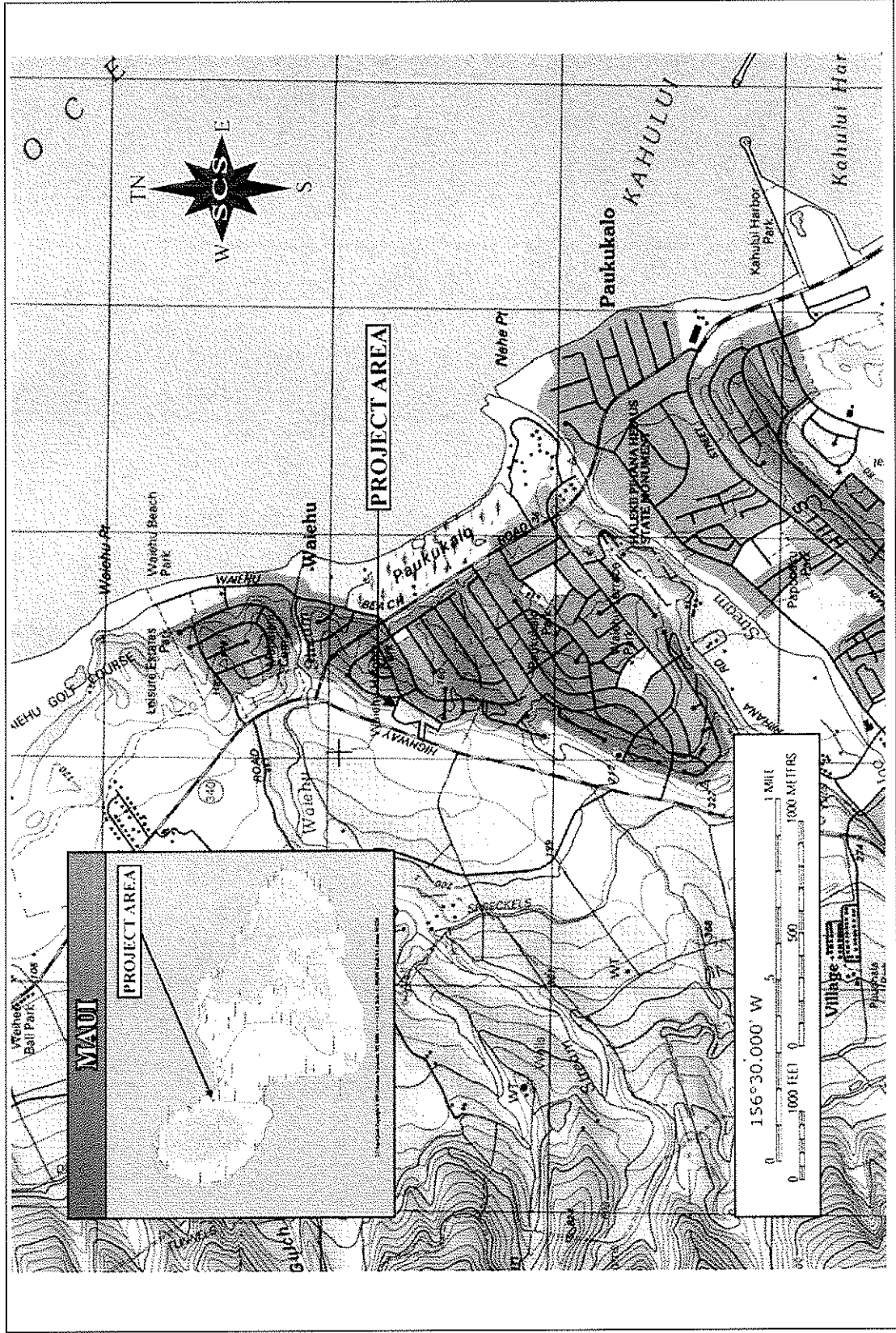


Figure 1: USGS Quadrangle Map Showing Project Area Location.

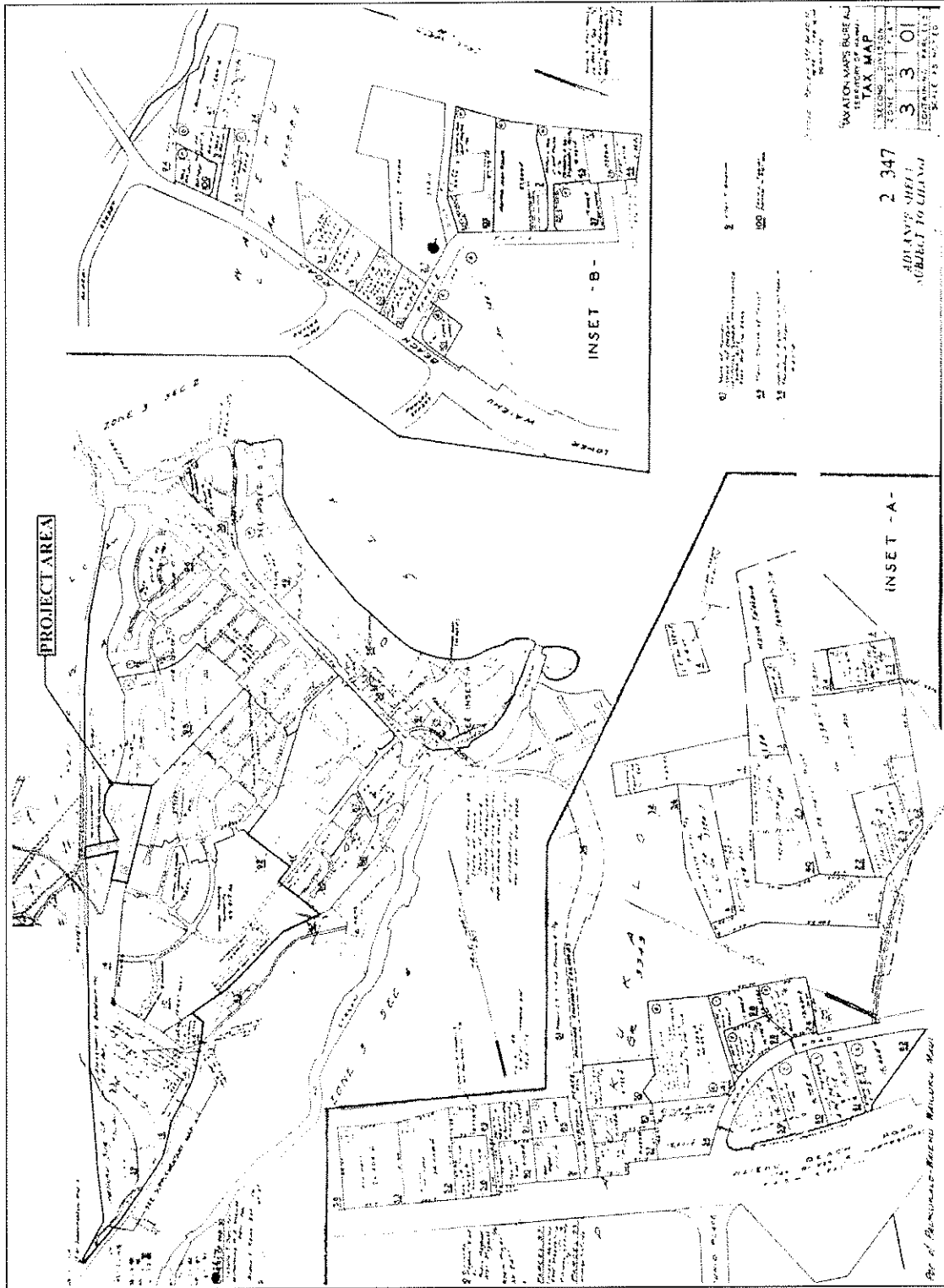


Figure 2: Map Showing Project Area.

Act 50 requires state agencies and other developers to assess the effects of proposed land use or shore line developments on the “cultural practices of the community and State” as part of the HRS Chapter 343 environmental review process (2001). Its purpose has broadened, “to promote and protect cultural beliefs, practices and resources of native Hawaiians [and] other ethnic groups, and it also amends the definition of ‘significant effect’ to be re-defined as “the sum of effects on the quality of the environment including actions that are...contrary to the State’s environmental policies...or adversely affect the economic welfare, social welfare, or cultural practices of the community and State” (H.B. 2895, Act 50, 2000).

Thus, Act 50 requires an assessment of cultural practices to be included in the Environmental Assessments and the Environmental Impact Statements, and to be taken into consideration during the planning process. The concept of geographical expansion is recognized by using, as an example, “the broad geographical area, e.g. district or *ahupua`a*” (OEQC 1997). It was decided that the process should identify ‘anthropological’ cultural practices, rather than ‘social’ cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

The purpose of a Cultural Impact Assessment is to identify the possibility of any cultural resources associated with different ethnic groups within a project area, and then assessing the potential for impacts on these resources from the proposed project. The CIA is not a document of in depth archival-historical land research or a record of oral family histories, unless they contain information about cultural resources that might be impacted by a proposed project. Cultural resources cover a broad range of categories and may include values, rights, beliefs, objects, records, properties, and stories associated with the project area (H.B. 2895, Act 50, 2000).

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of “traditional” was explained in *National Register Bulletin*:

“Traditional” in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations’, usually orally or through practice. The traditional cultural significance of a historic property, then is significance derived from the role the property plays in a community’s historically rooted beliefs, customs, and practices. . . . [Parker and King 1990:1]

This Cultural Impact Assessment involves evaluating the probability of impacts on identified cultural resources, including values, rights, beliefs, objects, records, properties, and stories occurring within the project area and its vicinity cultural values and rights within the project area and its vicinity (H.B. 2895, Act 50, 2000).

METHODOLOGY

This Cultural Impact Assessment was prepared in accordance with the methodology and content protocol suggested in the Guidelines for Assessing Cultural Impacts (OEQC 1997). In outlining the “Cultural Impact Assessment Methodology”, the OEQC state:

...information may be obtained through scoping, community meetings, ethnographic interviews and oral histories... (1997).

The report contains archival and documentary research, as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. This Cultural Impact Assessment was prepared in accordance with the methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 1997). The assessment concerning cultural impacts should address, but not be limited to, the following matters:

- (1) a discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations with might have affected the quality of the information obtained;
- (2) a description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken;
- (3) ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained;

- (4) biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area;
- (5) a discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken, as well as the particular perspective of the authors, if appropriate, any opposing views, and any other relevant constraints, limitations or biases;
- (6) a discussion concerning the cultural resources, practices and beliefs identified, and for the resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site;
- (7) a discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project;
- (8) an explanation of confidential information that has been withheld from public disclosure in the assessment;
- (9) a discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs;
- (10) an analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place, and;
- (11) the inclusion of bibliography of references, and attached records of interviews, which were allowed to be disclosed.

Based on the inclusion of the above information, assessments of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps and land records such as Land Commission

Awards, Royal Patent Grants, and Boundary Commission records; historic accounts, and previous archaeological project reports.

INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws and guidelines. Individuals and/or groups who have knowledge of traditional practices and beliefs associated with a project area or who know of historical properties within a project area are sought for consultation. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs, historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input, and suggest further avenues of inquiry, as well as specific individuals to interview. No interviews were conducted for the present project as a result of no responses received from any of the contacted organizations and individuals.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the information available for this study. When telephone interviews occur, a summary of the information is often sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

In this case, letters briefly outlining the development plans along with maps of the project area were sent to individuals and organizations whose jurisdiction includes knowledge of the area with an invitation for consultation. Consultation was sought from Kai Markell, the Director of Native Rights, Land and Culture, Office of Hawaiian Affairs on O'ahu; Thelma Shimaoka, Coordinator of the Maui branch of the Office of Hawaiian Affairs; the Central Maui Hawaiian Civic Club; Hinano Rodrigues, Cultural Historian with State Historic Preservation Division; Kamika Kepa`a of the Native Hawaiian Preservation Council, and the Cultural Resources Commission of the Maui Planning Department (Appendix A). If cultural resources are identified based on the information received from these organizations and/or additional informants, an assessment of the potential effects on the identified cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

As none of these organizations or individuals responded to the letters of inquiry, an attempt to contact several of them by phone was done in November 2008. Thelma Shimaoka, the Coordinator of the Maui branch of the Office of Hawaiian Affairs responded with the names of four individuals she thought were qualified because of their residence, either past or present, near the project area and might be able to provide some information. Gordon Apo, a past resident of Wai`ehu near the project area, said he wasn't aware of any cultural activities taking place anywhere in the vicinity of the project area. Jan Buen had been raised in the *makai* portion and remembered when grading of the sand dunes for Wai`ehu Heights uncovered several unmarked coffin burials. She was unaware of any ongoing cultural activities, but was concerned that more burials might be found during this project. Ms. Shimaoka also suggested Fern La`i, who said her Aunt, Diana Goo, would be familiar with the area. Ms. Goo presently has property in Wai`ehu near the project area, and although knew where the project was to be, could not identify any cultural activities or endangered resources in the area. The last individual Ms. Shimaoka suggested, Kalai Kahalehau, was unable to be contacted, as her phone was not working.

Hinano Rodrigues suggested we contact Scott Fisher of the Waihe`e Coastal Land Trust for additional information. Mr. Fisher also knew where the project area was and confirmed that as far as he knew, there were no cultural activities on going in the project area or the vicinity.

PROJECT AREA AND VICINITY

The project area is located in Wai`ehu Ahupua`a, occupies approximately 8.5 acres and is located at the border of Wai`ehu Heights Subdivision and was Lot 2 of the Paukukalo Large-Lot Subdivision. The site has been cleared, as it was used for storage of excess material during the building of the Wai`ehu Hights Subdivision.

CULTURAL HISTORICAL CONTEXT

The island of Maui ranks second in size of the eight main islands in the Hawaiian Archipelago. Pu`u Kukui, forming the west end of the island (1,215 m above mean sea level), is composed of large, heavily eroded amphitheater valleys that contain well-developed permanent stream systems that watered fertile agricultural lands extending to the coast. The deep valleys of West Maui and their associated coastal regions have been witness to many battles in ancient times and were coveted productive landscapes.

PAST POLITICAL BOUNDARIES

Traditionally, the division of Maui's lands into districts (*moku*) and sub-districts was performed by a *kahuna* (priest, expert) named Kalaiha`ōhia, during the time of the *ali`i* Kaka`alaneo (Beckwith 1940:383; Fornander places Kaka`alaneo at the end of the fifteenth century or the beginning of the sixteenth century [Fornander 1919-20, Vol. 6:248]). Land was considered the property of the king or *ali`i`ai moku* (the *ali`i* who eats the island/district), which he held in trust for the gods. The title of *ali`i`ai moku* ensured rights and responsibilities pertaining to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka`āinana* (commoners) worked the individual plots of land.

In general, several terms, such as *moku*, *ahupua`a*, *`ili* or *`ili`āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua`a*) which customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua`a* were therefore, able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua`a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *`ili`āina* or *`ili* were smaller land divisions next in importance to the *ahupua`a* and were administered by the chief who controlled the *ahupua`a* in which it was located (*ibid*:33; Lucas 1995:40). The *mo`o`āina* were narrow strips of land within an *`ili*. The land holding of a tenant or *hoa`āina* residing in a *ahupua`a* was called a *kuleana* (Lucas 1995:61). The project area is located in the district of Wailuku, which translated literally means "waters of destruction" (Pukui *et al.* 1974:225).

TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua`a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinarum*) and *mai`a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *`uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Between A.D. 600 and 1100, sometimes referred to as the Developmental Period, the major focus of permanent settlement continued to be the fertile

and well-watered windward valleys, such as those in the West Maui mountains in close proximity to Kahului (Kirch 1985).

WAHI PANA (LEGENDARY PLACES)

Scattered amongst the agricultural and habitation sites were other places of cultural significance to the *kama`āina* of the district. Līlīlehua was the name of the wind and rain that fell in the valley of Wai`ehu (Puku`i and Elbert 1981).

One of the recorded *mo`olelo* (myth, stories), spoke of the supernatural stones of Wai`ehu. Konole, who was a fisherman, would light his torch and on certain nights, would proceed to the ocean. He always brought a fish as an offering to the god Pehu when he returned. His wife mistreated the children while he was gone, and one night he returned to find the children dead. Konole had special powers and so he turned the children, his wife and himself into stones. Due to the evil found in the wife, the parent rocks were separated from the children rocks. The parent rocks lay in a bad place and those of the children where in a good place. A wind was named Maahaaha after one of the places and it means “the wind that distorts the features of the land’s growing things. . . “ and, therefore giving a strange appearance to natural images (Sterling 1998: 71-72).

There was a *heiau* named “Pu`ukuma” on the ridge between Waihe`e and Wai`ehu. This religious feature was dedicated to Kane and Lono and had been constructed by Kalanikupule, son of Kahekili, and the Ali`i Nui, or Chief of Maui. As it had been built “for the welfare of the people and the land”, it was called a *Heiau ho`o uluulu`ai*, a “Shrine to cause increased growth in food” (*ibid.*:496). One unnamed *heiau* was obliterated by the placing of a historic cemetery in its place during the plantation days. A *pu`uhonua* (place of refuge) named Poaiwa was situated on a ridge in the middle of the valley. Stokes refers to it as a *pu`uhonua* and a *heiau* (*ibid.*: 72). During Walker’s archaeological survey in the 1930s, a man named Kawailana, 88 years old, took him to a grove of *kukui* trees at the head of south Wai`ehu valley. Kawailana identified the rocks in the grove as Malumalukua Heiau and said that all the *heiau* near Wai`ehu were all built by Kahekili and were dedicated to Kāne. Offerings of pigs and men were placed on the *lele*, or altar. Kaua`i seems unique in human sacrifice offered to the god Kāne (and sometimes Kanaloa), as this was reserved for Kū on most of the islands (Valeri 1985:185). Kukuikomo Heiau was located on a ridge between north and south Wai`ehu valleys and Puukoa Heiau was situated near a pond on the ridge before it was destroyed (Walker 1931).

Ka Lae O Kehoni was known traditionally as a site for wrestling matches between Kahekili and his son (Sterling 1998). It was also reputedly the birthplace of Namahana, Kahekili's full sister (*ibid.*)

Wailuku District was a center of political power often at war with its rival in Hana. By the end of the 18th century, Kahekili resided with his entourage in Wailuku and it was on its sand dunes that Kahekili and his warriors engaged those of Kalani`ōpu`ū, Chief from Hawai`i Island.

In his bid to conquer Kahekili and obtain Maui, Kalani`ōpu`ū brought his famous and fearless `Ālapa warriors who were slaughtered by Kahekili's men. "The dead lay in heaps strewn like *kukui* branches; corpses lay heaped in death; they were slain like fish enclosed in a net..." (Kamakau 1961:85-89).

Kahekili sailed with his brother, Kaeokulani, the *ali`i nui* on Kaua`i, from O`ahu down the Island chain. After a brief stop on Moloka`i, the fleet continued to Maui and stopped for a while at Waihe`e and Wai`ehu. Apparently, Kahekili had bestowed on Kaeo some form of sovereign authority over Maui. Kaeo proceeded to divide the Lands of Maui between various Kaua`i chiefs and warriors. This led to an altercation between the Maui chiefs and sons of Kahekili and the Kaua`i chiefs at Paukukalo near Wai`ehu which almost destroyed the expedition of the two kings. Koalaulani, one of the sons of Kahekili, showed much courage against the many Kaua`i warriors (Fornander 1969)

A later encounter (1776) between Kahekili and Kalani`ōpu`ū resulted in a temporary truce which was broken in 1790 by the battle of Kepaniwai in `Īao valley, when Kamehameha I consolidated his control over Maui Island. There were so many warriors and canoes invading from Hawai`i Island that it was called the Great Fleet.

WAI`EHU SETTLEMENT PATTERNS

Wai`ehu was part of Nā Wai `Eha (The Four Streams), four large valley's that cut deep into the West Maui mountains, capturing vast amounts of water draining from Pu`u Kukui and in the case of Wai`ehu and Waihe`e, eventually emptying into the ocean (Handy and Handy 1972).

Handy and Handy describe the "Four Streams" system below:

The old *`okana* (land division) named Na Wai Eha...comprised four great valleys which cut far back into the slopes of West Maui and drain the eastward watershed of Pu`u Kukui and the ridges

radiating northeastward, eastward, and southeastward from it. Two of the great valleys, Waihe`e and Waiehu, open toward the ocean and their streams empty into it. Wailuku is partly land bound, but its stream flows into Kahului Bay, which has been eroded by the ocean out of what was formerly the stream mouth. Waikapu is land bound. The waters of its great stream, now utilized for irrigating a great acreage of sugar cane, formerly was diverted into *lo`i* and its overflow was dissipated on the dry plains of the broad isthmus between West and East Maui [1972:496].

Traditionally, Wai`ehu was part of the largest continuous area of *lo`i* (taro pond fields) in the islands. Twin streams watered the taro terraces in Wai`ehu and in the upper portion of the valley, taro was still being cultivated in the 1930s.

Given the amount of intensive agricultural development within Nā Wai `Eha, it seems likely that these coastal valleys would have been settled early. Wai`ehu, along with similar valleys, lent support to the increasingly stratified and expanding Hawaiian population, whose centralized ruling class congregated in the coastal region near religious complexes, such as Pihana and Hale Ki`i.

THE GREAT MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I:145). The Great Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *`okipū* (on O`ahu), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame`eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16). Wai`ehu Ahupua`a was awarded to William C. Lunalilo during the Mahele. There were 124 claims for *kuleana* in Wai`ehu Ahupua`a, but none were identified in the project area.

HISTORIC LAND USE

As the sugar industry developed in the mid to late 1800s in Hawai`i, Kahului became a cluster of warehouses, stores, wheel-wright and blacksmith shops close to the harbor. A small landing was constructed in 1879 to serve the sugar company (Clark 1980). The project area was planted with cane when it became part of the Wailuku Sugar Company, which was formed from Waihe`e and Wai`ehu Sugar Company's land and Wailuku Sugar lands in 1862 (Conté and Best 1973).

SUMMARY

The "level of effort undertaken" to identify potential effect by a project to cultural resources, places or beliefs (OEQC 1997) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who may be affected by the project or who know its history, research identifying sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a "good faith effort". However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the present parcel, letters of inquiry were sent to organizations whose expertise would include the project area. Consultation was sought from Kai Markell, the Director of Native Rights, Land and Culture, Office of Hawaiian Affairs on O`ahu; Thelma Shimaoka, Coordinator of the Maui branch of the Office of Hawaiian Affairs; the Central Maui Hawaiian Civic Club; Hinano Rodrigues, Cultural Historian with State Historic Preservation Division; Kamika Kepa`a of the Native Hawaiian Preservation Council, and the Cultural Resources Commission of the Maui Planning Department.

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of the report. Such scholars as I`i, Kamakau, Beckwith, Chinen, Kame`eleihiwa, Fornander, Kuykendall, Kelly, Handy and Handy, Puku`i and Elbert, Thrum, Sterling, and Cordy have contributed, and continue to contribute to our knowledge and understanding of Hawai`i, past and present. The works of these and other authors were consulted and incorporated in the report where appropriate. Land use document research was supplied by the Waihona `Aina 2007 Data base.

CIA INQUIRY RESPONSE

As suggested in the “Guidelines for Accessing Cultural Impacts” (OEQC 1997), CIAs incorporating personal interviews should include ethnographic and oral history interview procedures, circumstances attending the interviews, as well as the results of this consultation. It is also permissible to include organizations with individuals familiar with cultural practices and features associated with the project area.

As stated above, consultation was sought from Kai Markell, the Director of Native Rights, Land and Culture, Office of Hawaiian Affairs on O`ahu; Thelma Shimaoka, Coordinator of the Maui branch of the Office of Hawaiian Affairs; the Central Maui Hawaiian Civic Club; Hinano Rodrigues, Cultural Historian with State Historic Preservation Division; Kamika Kepa`a of the Native Hawaiian Preservation Council, and the Cultural Resources Commission of the Maui Planning Department. None of the organizations responded to our inquiry. Additional telephone calls led to the contacting of five additional individuals, Gordon Apo, Fern La`i, Jan Buen, Diana Goo, and Scott Fisher, all of whom were not aware of any cultural activities or resources on the project area, or that would be impacted by the development.

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a requirement of the OEQC (No. 10, 1997). To our knowledge, the project area has not been used for traditional cultural purposes within recent times. Based on historical research and no response from the above listed organizations, it is reasonable to conclude that Hawaiian rights related to gathering, access or other customary activities within the project area will not be affected and there will be no direct adverse effect upon cultural practices or beliefs. The visual impact of the project from surrounding vantage points, e.g. the highway, mountains, and coast will be added to that of previously developed residential projects and, as such, will fill another of the open spaces that were once so prevalent on Maui.

CULTURAL ASSESSMEMNT

Based on organizational response as well as archival research, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development activities on a

the portions of parcels 16 and 102. Because there were no cultural activities identified within the project area, there are no adverse effects.

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APPENDIX A: CONSULTATION INQUIRIES
(Figures not included)

SCIENTIFIC CONSULTANT SERVICES, Inc.

711 Kapiolani Blvd., Suite 975 Honolulu, Hawaii 96813

Kamika Kepa'a
Native Hawaiian Preservation Council
606 Kalo Place
Lahaina, HI 96761

May 19, 2008

Dear Mr. Kepa'a:

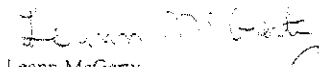
Scientific Consultant Services, Inc. (SCS) has been contracted by Maui Architectural Group, to conduct a Cultural Impact Assessment (CIA) of 8.5 acres in Wai'ehu, Wailuku, Maui [TMK.3-3-001.102 and 106 (por)]. According to documents supplied by Maui Architectural Group, the project proposes the development of a residential subdivision.

SCS has been asked to assess the probability of impacting cultural values and rights within the project area and its vicinity. According to the *Guidelines for Assessing Cultural Impacts* (Office of Environmental Quality Control, Nov. 1997):

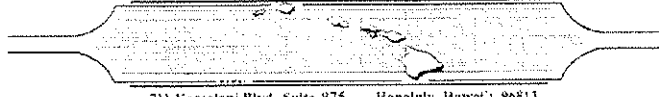
The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs... The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs...

We are asking you for any information that might contribute to the knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The assessment results are dependent on the response and contributions made by individuals and organizations such as yours. Enclosed are maps showing the proposed project area. Please contact me at our SCS Honolulu office at (808) 597-1182; my cell phone, 225-2355; or home, (808) 637-9539, with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,


Leann McGerty,
Senior Archaeologist
Enclosures (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.



711 Kapiolani Blvd., Suite 975 Honolulu, Hawaii 96813

Kai Markell
Director of Native Rights
c/o Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, HI 96813

May 19, 2008

Dear Mr. Markell:

Scientific Consultant Services, Inc. (SCS) has been contracted by Maui Architectural Group, to conduct a Cultural Impact Assessment (CIA) of 8.5 acres in Wai'ehu, Wailuku, Maui [TMK:3-3-001-102 and 106 (port)]. According to documents supplied by Maui Architectural Group, the project proposes the development of a residential subdivision.

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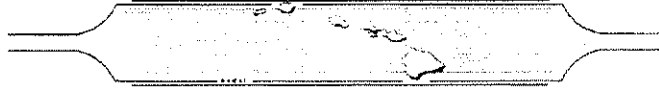
Sincerely yours,

Leann McGerry,
Senior Archaeologist
Enclosures (2)

Ph: 808-597-1182 / SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS / Fax: 808-597-1193

Neighbor Island Offices • Hawaii Island • Maui • Kauai

SCIENTIFIC CONSULTANT SERVICES, Inc



711 Kapiolani Blvd., Suite 975 Honolulu, Hawaii 96813

Helma Shimaoka
c/o Office of Hawaiian Affairs
140 Hoohana St.
Suite 206
Kahului, HI 96732

May 19, 2008

Dear Ms. Shimaoka:

Scientific Consultant Services, Inc. (SCS) has been contracted by Maui Architectural Group, to conduct a Cultural Impact Assessment (CIA) of 8.5 acres in Wai'ehu, Waikuu, Maui [TMK:3-3-001:102 and 106 (por)]. According to documents supplied by Maui Architectural Group, the project proposes the development of a residential subdivision.

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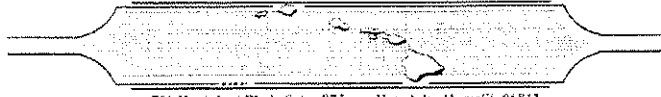
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Sincerely yours,

Leann McGerty,
Senior Archaeologist
Enclosures (2)

SCIENTIFIC CONSULTANT SERVICES, Inc.



711 Kapiolani Blvd., Suite 975 Honolulu, Hawaii 96813

County of Maui
Department of Planning
Cultural Resources Commission
250 S. High Street
Wailuku, HI 96793

May 19, 2008

Dear Sir or Madam:

Scientific Consultant Services, Inc. (SCS) has been contracted by Maui Architectural Group, to conduct a Cultural Impact Assessment (CIA) of 8.5 acres in Wai'ohu, Wailuku, Maui (TMK 3-3-001.102 and 106 (por)). According to documents supplied by Maui Architectural Group, the project proposes the development of a residential subdivision.

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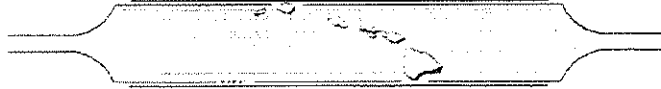
Sincerely yours,

Leann McGerty,
Senior Archaeologist
Enclosures (2)

PH: 808-597-1182 / SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS / FAX: 808-597-1193

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SCIENTIFIC CONSULTANT SERVICES, Inc.



711 Kapiolani Blvd., Suite 975 Honolulu, Hawaii 96813

Hinano Rodrigues, Cultural Historian
DLNR Maui Office
130 Mahalani Street
Wailuku, HI 96791

May 19, 2008

Dear Hinano:

Scientific Consultant Services, Inc. (SCS) has been contracted by Maui Architectural Group, to conduct a Cultural Impact Assessment (CIA) of 8.5 acres in Wai'ehu, Waiuku, Maui [TMK:3-3-001:102 and 106 (por)]. According to documents supplied by Maui Architectural Group, the project proposes the development of a residential subdivision.

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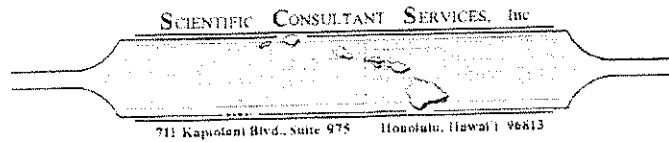
We are asking you for any information that might contribute to the knowledge of traditional activities, or traditional rights that might be impacted by development of the property. The assessment results are dependent on the response and contributions made by individuals and organizations such as yours. Enclosed are maps showing the proposed project area. Please contact me at our SCS Honolulu office at (808) 597-1182; my cell phone, 225-2335; or home, (808) 637-9559, with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Leann McGerty,
Senior Archaeologist
Enclosures (2)

PH: 808-597-1182 / SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS / FAX: 808-597-1193

Neighbor Island Offices • Hawaii Island • Maui • Kauai



Hawaiian Civic Club
Central Maui
310 Ka ahumanu Ave.
Kahului, Maui 96732

May 19, 2008

Dear Members:

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Sincerely yours,

Leann McGerty,
Senior Archaeologist
Enclosures (2)

APPENDIX F.

Traffic Impact Assessment Report

Phillip Rowell and Associates

47-273 'D' Hui Iwa Street

Kaneohe, Hawaii 96744

Phone: (808) 239-8206

FAX: (808) 239-4175

Email: prowell@hawiantel.net

August 7, 2009

Mr. David Lundquist, Principal
Maui Architectural Group, Inc.
2331 W. Main Street
Wailuku, Maui, HI 96793

Re: **Traffic Impact Assessment Report
Waiehu Mauka Rental Housing Project
Wailuku, Maui, Hawaii
TMK: (2)3-3-001:102 and 2(3)-3-001:016(por.)**

Dear David:

Phillip Rowell and Associates have completed the following Traffic Impact Assessment Report (TIAR) for the proposed Waiehu Mauka Rental Housing Project in Wailuku, Maui. The following report is presented in the following format:

- A. Project Location and Description
- B. Purpose and Objective of Study
- C. Methodology
- D. Description of Existing Streets and Intersection Controls
- E. Existing Peak Hour Traffic Volumes
- F. Level-of-Service Concept
- G. Existing Levels-of-Service
- H. Background Traffic Projections
- I. Project Trip Generation
- J. Background Plus Project Traffic Projections
- K. Traffic Impact Analysis with Hale Mua
- L. Traffic Impact Analysis without Hale Mua
- M. Mitigation
- N. Other Traffic Related Issues
- O. Summary and Conclusions

A. Project Location and Description

The proposed project is located adjacent to the Waiehu Heights Subdivision area of Wailuku. See Attachment A. There are two components to the project, a single-family component and a multi-family component. There will be six (6) single-family units located on the north end of the project. Access to and egress from the single-family units will be via Waiehu Beach Road, Wailupe Drive and Haunani Place.

The second will be 100 affordable multi-family housing units. The affordable units will consist of 42 rental (apartment) units and 58 condominium townhomes. Access to and egress from the multi-family units will be via a new roadway connection to Kahekili Highway approximately 4,500 feet, 0.85 mile, south of the Kahekili Highway/Waiehu Beach Road intersection. This new access point appears to align with the south driveway to the proposed Hale Mua project.

A preliminary site plan for the project is provided as Attachment B.

B. Purpose and Objective of Study

1. Quantify and describe the traffic related characteristics of the proposed project.
2. Identify potential deficiencies adjacent to the project that will impact traffic operations in the vicinity of the proposed project.

C. Methodology

1. *Define the Study Area*

The first step in defining the study area was to estimate the number of peak hour trips that the proposed project will generate. Based on a review of studies for other projects in the area, it was determined that the following intersections should be studied:

- a. Waiehu Beach Road at Wailupe Drive
- b. Wailupe Drive at Haunani Place
- c. Kahekili Highway at Waiehu Beach Road
- d. Kahekili Highway at Hale Mua North Driveway & MEO BEST Project Driveway (a future intersection)
- e. Kahekili Highway at Hale Mua South Driveway & Waiehu Mauka Driveway (a future intersection)

2. *Analyze Existing Traffic Conditions*

Existing traffic volumes at the study intersections were estimated from manual traffic counts.

The intersection configuration and right-of-way controls were verified during a field reconnaissance of the study area during June 2008. Existing traffic operating conditions of the study intersection were determined using the methodology described in the 2000 *Highway Capacity Manual* (HCM)¹.

3. *Estimate Horizon Year Background Traffic Projections*

Background traffic conditions are defined as future traffic conditions without the proposed project. The design horizon year does not necessarily represent the project completion date of that phase. It is a date for which future background traffic projections were estimated. For this project, we have used a design, or horizon, year of 2015. Horizon year background traffic conditions were estimated using a background traffic growth factor and traffic from related projects.

¹ *Highway Capacity Manual*, Institute of Transportation Engineers, Washington, D.C., 2000

4. *Estimate Project-Related Traffic Characteristics*

The number of peak-hour trips that the proposed project will generate was estimated using standard trip generation procedures outlined in the *Trip Generation Handbook*² and data provided in *Trip Generation*³. These trips were distributed and assigned based on the available approach and departure routes and trip distribution data from other recently completed traffic studies in the area.

5. *Analyze Project Related Traffic Impacts*

The project-related traffic was then superimposed on background traffic volumes. The traffic impacts of the project were assessed by analyzing the levels-of-service. The purpose of this analysis was to identify potential operational deficiencies in the vicinity of the proposed project.

D. Description of Existing Streets and Intersection Controls

The existing lane configurations and right-of-way controls are summarized in Attachment C.

Waiehu Beach Road connects to Kahekili Highway just east of the project with Lower Main Street. Waiehu Beach Road is a two-lane, two-way roadway. Waiehu Beach Road runs northwest and southeast. However, for this project it was assumed that Waiehu Beach Road has an east-west orientation. There are no traffic signals in the vicinity of the Waiehu Beach Road/Wailupe Drive intersection. The Waiehu Beach Road/Wailupe Drive intersection is unsignalized with STOP signs along the side street approaches. There are separate left turn lanes along the eastbound and westbound approaches. There are no curbs and gutters, but there are paved shoulders. The posted speed limit is 30 miles per hour. The intersection of Waiehu Beach Road with Kahekili Highway is an unsignalized T-intersection with the STOP sign along the Waiehu Beach Road. There are no separate turn lanes along any of the approaches.

Kahekili Highway is a two-lane, two-way highway with a north-south orientation. There are no curbs, gutters or sidewalks but there are paved shoulders. The posted speed limit is 30 miles per hour.

Wailupe Drive and Haunani Place are both local streets designed to urban standards with sidewalks, curbs and gutters. The posted speed limits are 20 miles per hour.

E. Existing Peak Hour Traffic Volumes

The existing morning and afternoon peak hour traffic volumes for the existing intersections are summarized in Attachment D.

Traffic counts for the intersection Waiehu Beach Road at Wailupe Drive were performed during January 2009 and the counts for the intersection of Waiehu Beach Road at Kahekili Highway were performed during February 2009.

² *Trip Generation Handbook*, Institute of Transportation Engineers, Washington, D.C., 1998

³ *Trip Generation*, Institute of Transportation Engineers, Washington, D.C., 2003

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Traffic counts for a previous study at this site were performed at the intersection of Wailupe Drive at Haunani Place during August 2006. As there has been no new development in the Waiehu Terrace or Waiehu Heights subdivisions that would affect the traffic movements of the internal intersections, the 2006 counts were considered still valid and were used for the intersection of Wailupe Drive at Haunani Place.

The traffic counts include mopeds, buses, trucks and other large vehicles. Bicycles are not included.

Pedestrian activity is negligible during the morning peak hours. No pedestrians were noted at the intersection of Kahekili Highway at Waiehu Beach Road. Only one pedestrian was noted at the intersection of Waiehu Beach Road at Wailupe Drive.

During the afternoon peak period, no pedestrians were noted at the intersection of Kahekili Highway at Waiehu Beach Road. However, there were approximately 12 pedestrians crossing Waiehu Beach Road at Wailupe Drive during the afternoon peak period between 3:30 pm and 5:30 pm.

Pedestrians were not counted at the intersection of Wailupe Drive at Haunani Place. Because the intersection is the intersection to two local streets and the surrounding area is residential, it was assumed that pedestrian activity would be insignificant.

F. Level-of-Service Concept

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LOS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, A through F, which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 1. In general, LOS A represents free-flow conditions with no congestion. LOS F, on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service D is typically considered acceptable for peak hour conditions in urban areas.

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics, such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Table 1 Level-of-Service Definitions for Signalized Intersections⁽¹⁾

Level of Service	Interpretation	Volume-to-Capacity Ratio ⁽²⁾	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<20.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	20.1-35.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	35.1-55.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	55.1-80.0
F	Total breakdown with stop-and-go operation	>1.001	>80.0

Notes:
 (1) Source: *Highway Capacity Manual, 2000.*
 (2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from A to F. However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is therefore based on delay of each turning movement. Table 2 summarizes the definitions for level-of-service and the corresponding delay.

Table 2 Level-of-Service Definitions for Unsignalized Intersections⁽¹⁾

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<10.0
B	Short traffic delays	10.1 to 15.0
C	Average traffic delays	15.1 to 25.0
D	Long traffic delays	25.1 to 35.0
E	Very long traffic delays	35.1 to 50.0
F	See note (2) below	>50.1

Notes:
 (1) Source: *Highway Capacity Manual, 2000.*
 (2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congest on affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

G. Existing Levels-of-Service

The existing levels-of-service of the intersections are summarized in Table 3. Since all the study intersections are unsignalized, only the delays and levels-of-service of the controlled movements at the study intersections are noted. The HCM methodology does not calculate volume-to-capacity ratios for unsignalized intersections.

Table 3 Existing Levels-of-Service

Intersection, Approach and Movement	AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS
Waiehu Beach Road at Waiupe Drive & Lower Waiehu Beach Road				
Eastbound Left	7.8	A	8.3	A
Westbound Left	8.4	A	8.5	A
Northbound Left & Thru	24.3	C	34.2	D
Northbound Right	13.4	B	10.6	B
Southbound Left & Thru	67.1	F	166.0	F
Southbound Right	9.7	A	10.5	B
Waiupe Drive at Haunani Place				
Northbound Left & Thru	7.3	A	7.3	A
Eastbound Left & Right	8.9	A	8.8	A
Waiehu Beach Road at Kahekili Highway				
Southbound Left & Thru	8.9	A	8.6	A
Westbound Left & Right	52.5	F	18.3	C

NOTES:

1. V/C ratio is not calculated for unsignalized intersections.
2. Delay is in seconds per vehicle.
3. LOS denotes level-of-service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
4. See Attachment Q for level-of-service worksheets.

H. Background Traffic Projections

Background traffic projections are defined as future background traffic conditions without the proposed project. Future traffic growth consists of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project.

Background Growth

Based on other traffic studies for other projects in the vicinity of the project, the historical average background growth rate is 2% per year^{4 5}. This growth rate was used to estimate the background growth between 2009 and 2015. The growth factor was calculated using the following formula:

$$F = (1 + i)^n$$

where F = Growth Factor
 i = Average annual growth rate, or 0.02
 n = Growth period in years

The background traffic projections for 2015 are shown in Attachment E.

⁴ Julian Ng, Inc., *Traffic Impact Analysis Report Hale Mua Subdivision*, November 2004, p 5

⁵ Julian Ng, Inc., *Revised Traffic Impact Analysis Report Hale Mua Subdivision*, November 2007, p 12

Related Projects

The second component in estimating future background traffic volumes is traffic resulting from other proposed projects in the vicinity. Related projects are defined as those projects that are likely to be constructed within or adjacent to the study project and would significantly impact traffic in the study area. Related projects may be development projects or roadway improvements.

The following two projects that were identified as related projects:

Hale Mua

Hale Mua is located along the west side of Kahekili Highway. The project's traffic assignments were obtained from the traffic studies for the project^{6, 7}. The project will have two driveways along the west side of Kahekili Highway. As described in the project's traffic report, both driveways will be unsignalized and will have separate turn lanes for traffic turning from northbound Kahekili Highway into the project and will have separate left and right turn lanes along the approaches to Kahekili Highway. The south driveway aligns with the proposed connection to Kahekili Highway from the multi-family component of Waiehu Mauka. The traffic report also concluded that traffic signals are warranted for the intersection of Waiehu Beach Road at Kahekili Highway for existing conditions. The report also assessed the viability of a roundabout, but recommended that the intersection should be signalized.

The timetable for the Hale Mua project is uncertain and the project may not be constructed within the study period of the Waiehu Mauka project. Based on discussions with Maui County Public Works, it was decided that background traffic projections would be developed with and without Hale Mua traffic.

MEO BEST Project

The MEO BEST project is located in the narrow, undeveloped parcel in the southeast quadrant of the Kahekili Highway/Waiehu Beach Road intersection between Kahekili Highway and Waiehu Heights. The project is an agricultural project with approximately 20 workers living in two dormitory type buildings. Access to and egress from the project will be via a driveway across from the north driveway to Hale Mua. The project's traffic assignments were obtained from the project's traffic impact assessment report.

The trip assignments for the related projects including Hale Mua are presented as Attachment F. Trip assignments without Hale Mua are presented as Attachment G.

2015 background traffic projections were calculated by expanding existing traffic volumes by the appropriate growth rates and then superimposing traffic generated by related projects. The resulting 2015 background peak hour traffic projections with Hale Mua are shown as Attachment H and 2015 background peak hour traffic projections without Hale Mua are shown as Attachment I.

⁶ Julian Ng, Inc., *Traffic Impact Analysis Report Hale Mua Subdivision*, November, 2004

⁷ Julian Ng, Inc., *Revised Traffic Impact Analysis Report Hale Mua Subdivision*, November, 2007

I. Project Trip Generation

Future traffic volumes generated by a project are typically estimated using the methodology described in the *Trip Generation Handbook*⁸ and data provided in *Trip Generation*⁹. This method uses trip generation rates to estimate the number of trips that the project will generate during the peak hours of the project and along the adjacent street.

The proposed project will consist of six (6) single-family units, 42 apartments and 58 condominiums. *Trip Generation* contains trip generation rates for each of these land uses. The trip generation rates and trip generation calculations are summarized in Table 4. The proposed project will generate 13 inbound and 41 outbound trips during the morning peak hour. During the afternoon peak hour, the project will generate 40 inbound and 24 outbound trips.

Table 4 Trip Generation Calculations for Proposed Project

Time Period	Direction	Single-Family			Apartments			Condominiums			Totals
		Rate or % ⁽¹⁾	Units	Trips	Rate or % ⁽¹⁾	Units	Trips	Rate or % ⁽¹⁾	Units	Trips	
AM Peak Hour	Total	0.77	6	5	0.55	42	23	0.44	58	26	54
	In	26%		1	29%		7	18%		5	13
	Out	74%		4	71%		16	82%		21	41
PM Peak Hour	Total	1.01		6	0.67		28	0.52		30	64
	In	64%		4	61%		17	64%		19	40
	Out	36%		2	39%		11	36%		11	24

NOTES:
 (1) Institute of Transportation Engineers, *Trip Generation*, Seventh Edition, 2003.

The project generated traffic was distributed and assigned based on the following assumptions:

1. There is no connection between the single-family and multi-family components of the project. Refer to the project's site plan (Attachment B).
2. Access to and egress from the single-family component will be via Waiehu Beach Road, Wailupe Drive and Haunani Place. It was assumed that traffic from the single-family units would have approach and departure patterns comparable to Waiehu Heights as estimated from the traffic counts performed at the intersection of Waiehu Beach Road at Wailupe Drive.
3. Access to and egress from the multi-family component will be via a new driveway along the east side of Kahekili Highway. This driveway aligns with the south driveway to and from Hale Mua. Since Hale Mua and Waiehu Mauka are both primarily residential developments, the Waiehu Mauka project will have comparable trip distributions. As described in the Hale Mua traffic study, it is estimated that 80% of the project approach from and depart toward the south. The same distribution was used for the Waiehu Mauka multi-family housing.

The project trip assignments are shown in Attachment J.

⁸ Institute of Transportation Engineers, *Trip Generation Handbook*, Washington, D.C., 1998, p. 7-12

⁹ Institute of Transportation Engineers, *Trip Generation, 7th Edition*, Washington, D.C., 2003

J. Background Plus Project Projections

Background plus project traffic projections were estimated by superimposing the peak hourly traffic generated by the proposed project on the background (without project) peak hour traffic projections. This assumes that the peak hourly trips generated by the project coincide with the peak hour of the adjacent street. This represents a worse-case condition, as it assumes that the peak hours of all the intersection approaches, the peak hours of the related projects and the peak hour of the study project all coincide and that the related projects and the study project are 100% occupied. The resulting background plus project peak hour traffic projections are shown in Attachments K and L. The traffic projection worksheets are shown as Attachments M and N.

K. Traffic Impact Analysis with Hale Mua

The impact of the project was assessed by analyzing the changes in traffic volumes and levels-of-service at the study intersections.

Changes in Total Intersection Volumes

An analysis of the project's share of 2015 background plus project intersection approach volumes at the existing study intersections is summarized in Table 5. The table summarizes the project's share of total 2015 peak hour approach volumes at each intersection. Also shown are the percentages of 2015 background plus project traffic that is the result of background growth and traffic generated by related projects.

Table 5 Project's Share of Total Intersection Approach Volumes with Hale Mua ⁽¹⁾

Intersection	Period	Existing	2015 Background	2015 Background Plus Project	Background Growth		Project Traffic	
					Trips	Percent of Total Traffic ⁽²⁾	Trips	Percent of Total Traffic ⁽³⁾
Waiehu Bch Rd at Wailupe Dr	AM	1175	1371	1382	196	14.2%	11	0.8%
	PM	1230	1437	1449	207	14.3%	12	0.8%
Wailupe Rd at Haunani Pl	AM	70	75	80	5	6.3%	5	6.3%
	PM	65	70	76	5	6.6%	6	7.9%
Kahekili Hwy at Waiehu Bch Rd	AM	1210	1466	1476	256	17.3%	10	0.7%
	PM	1030	1257	1270	227	17.9%	13	1.0%

Notes:

(1) Volumes shown are total intersection approach volumes or projections.

(2) Percentage of total 2015 background plus project traffic.

An analysis of the project's pro rata share of the increase of traffic volumes between 2009 and 2015 is summarized in Table 6. This table summarizes the growth between 2009 and 2015 and indicates the percentage of growth resulting from background growth and related projects and the percentage growth resulting from project generated traffic.

Table 6 Project's Share of Total Intersection Approach Volumes Growth with Hale Mua ⁽¹⁾

Intersection	Period	Existing	2015 Background	Background Plus Project	Background Growth ⁽²⁾		Project Trips ⁽³⁾	
					Volume	% of 2005 to 2015 Growth	Volume ⁽⁴⁾	% of 2005 to 2015 Growth
Waiehu Bch Rd at Wailupe Dr	AM	1175	1371	1382	196	94.7%	11	5.3%
	PM	1230	1437	1449	207	94.5%	12	5.5%
Wailupe Rd at Haunani Pl	AM	70	75	80	5	50.0%	5	50.0%
	PM	65	70	76	5	45.5%	6	54.5%
Kahekili Hwy at Waiehu Bch Rd	AM	1210	1466	1476	256	96.2%	10	3.8%
	PM	1030	1257	1270	227	94.6%	13	5.4%

Notes:

- (1) Volumes shown are total intersection approach volumes or projections.
- (2) Background versus existing.
- (3) Background plus project versus background.
- (4) Project generated traffic.

Level-of-Service Analysis

1. The *Highway Capacity Software* (HCS) package was used to perform level-of-service analyses. This package uses the *Highway Capacity Manual* methodology.
2. As the *Highway Capacity Manual* defines level-of-service by delay, we have used the same definitions.
3. The anticipated roadway network, lane configurations and right-of-way controls are summarized graphically as Attachment O.

The results of the level-of-service analysis are summarized in Table 7. Shown are the average vehicle delays and the levels-of-service of all lane groups. Existing delays and levels-of-service are also shown for comparison.

Table 7 Level-of-Service Analysis for 2015 Conditions with Hale Mua

Approach and Movement	AM Peak Hour ⁽¹⁾						PM Peak Hour					
	Existing (2009)		2015 Without Project		2015 With Project		Existing (2009)		2015 Without Project		2015 With Project	
	Delay ⁽²⁾	LOS ⁽³⁾	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Waiehu Beach Road at Wailupe Drive & Lower Waiehu Beach Road												
Eastbound Left	7.8	A	7.9	A	7.9	A	8.3	A	8.6	A	8.6	A
Westbound Left	8.4	A	8.7	A	8.7	A	8.5	A	8.8	A	8.8	A
Northbound Left & Thru	24.3	C	35.6	E	36.6	E	34.2	D	52.9	F	54.8	F
Northbound Right	13.4	B	15.9	C	16.1	C	10.6	B	11.3	B	11.4	B
Southbound Left & Thru	67.1	F	213.5	F	228.8	F	166.0	F	477.6	F	500.5	F
Southbound Right	9.7	A	10.0	B	10.0	B	10.5	B	11.1	B	11.1	B
Wailupe Drive at Haunani Place												
Northbound Left & Thru	7.3	A	7.3	A	7.3	A	7.3	A	7.3	A	7.4	A
Eastbound Left & Right	8.9	A	8.9	A	8.9	A	8.8	A	8.8	A	8.8	A
Waiehu Beach Road at Kahekili Highway												
Southbound Left & Thru	8.9	A	9.6	A	9.7	A	8.6	A	9.1	A	9.1	A
Westbound Left & Right	52.5	F	306.0	F	323.9	F	18.3	C	66.5	F	79.4	F
Kahekili Highway at Hale Mua North Driveway & MEO BEST Driveway												
Northbound Left			8.6	A	8.7	A			8.2	A	8.2	A
Southbound Left			7.9	A	8.0	A			7.9	A	7.9	A
Westbound Left, Thru & Right	See Note (4)		24.0	C	24.5	C	See Note (4)		18.6	C	19.0	C
Eastbound Left & Thru			24.5	C	25.0	C			21.7	C	22.2	C
Eastbound Right			13.2	B	13.3	B			10.2	B	10.2	B
Kahekili Highway at Hale Mua South Driveway & Waiehu Mauka Driveway												
Northbound Left			9.1	A	9.1	A			8.2	A	8.2	A
Southbound Left			See Note (5)		8.1	A			See Note (5)		8.4	A
Westbound Left, Thru & Right	See Note (4)		See Note (5)		40.4	E	See Note (4)		See Note (5)		27.5	D
Eastbound Left & Thru			23.2	C	28.4	D			20.7	C	25.0	C
Eastbound Right			14.6	B	14.6	B			10.6	B	10.6	B

NOTES:
 1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the project.
 2. Delay is in seconds per vehicle.
 3. LOS denotes level-of-service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
 4. These movements are not provided until the related projects are constructed.
 5. These movements are not provided until the proposed project is constructed.
 6. See Attachment Q for level-of-service worksheets.

The results of the level-of-service analysis are:

Waiehu Beach Road at Wailupe Drive and Lower Waiehu Beach Road

1. During the morning peak hour, the northbound left and through movements from lower Waiehu Beach Road will operate at Level-of-Service E, without and with project generated traffic. The change in delay as a result of project generated traffic is 1.0 second per vehicle, implying that project generated traffic has minimal impact.
2. Also during the morning peak hour, the southbound left and through movements will operate at Level-of-Service F, without and with project generated traffic. These movements currently operate at Level-of-Service F. The change in delay is 15.3 seconds per vehicle, or 7%.
3. During the afternoon peak hour, the northbound left and through movements will operate at Level-of-Service F, without and with project generated traffic. The delay increases 1.9 seconds, or 4%, as a result of project generated traffic.

4. Also during the afternoon peak hour, the southbound left and through movements will operate at Level-of-Service F, without and with project generated traffic. These movements currently operate at Level-of-Service F. The change in delay is 22.9 seconds per vehicle, or 5%.
5. It should be noted that traffic flow along Waiehu Beach Road through this intersection is constrained during the morning peak hour. This back up is from the intersection of Waiehu Beach Road at Lower Main Street.

Wailupe Drive at Haunani Place

6. The intersection of Wailupe Drive at Haunani Place will operate at Level-of-Service A without and with project generated traffic. All controlled movements will operate at Level-of-Service A.

Waiehu Beach Road at Kahekili Highway

7. At the intersection of Waiehu Beach Road at Kahekili Highway, the left and right turns from Waiehu Beach Road to Kahekili Highway will operate at Level-of-Service F during both peak periods, without and with project generated traffic. As previously noted, the traffic study for Hale Mua recommended that this intersection be signalized. With traffic signals, the intersection will operate at Level-of-Service B during both peak periods.

Kahekili Highway at Hale Mua North Driveway and MEO BEST Driveway

8. At Kahekili Highway at Hale Mua North Driveway and MEO BEST Driveway, all movements will operate a Level-of-Service C, or better, without and with project generated traffic.

Kahekili Highway at Hale Mua South Driveway and Waiehu Mauka Driveway

9. At the intersection of Kahekili Highway at Hale Mua South Driveway, the movements along Kahekili Highway will operate at Level-of-Service A. The westbound approach from Waiehu Mauka to Kahekili Highway will operate at Level-of-Service E during the morning peak hour and Level-of-Service D during the afternoon peak hour. The eastbound approach from Hale Mua to Kahekili Highway will operate at Level-of-Service D during the morning peak hour and Level-of-Service C during the afternoon peak hour.

L. Traffic Impact Analysis without Hale Mua

Changes in Total Intersection Volumes

An analysis of the project's share of 2015 background plus project intersection approach volumes at the existing study intersections is summarized in Table 8. The table summarizes the project's share of total 2015 peak hour approach volumes at each intersection. Also shown are the percentages of 2015 background plus project traffic that is the result of background growth and traffic generated by related projects.

Table 8 Project's Share of Total Intersection Approach Volumes without Hale Mua ⁽¹⁾

Intersection	Period	Existing	2015 Background	2015 Background Plus Project	Background Growth		Project Traffic	
					Trips	Percent of Total Traffic ⁽²⁾	Trips	Percent of Total Traffic ⁽³⁾
Waiehu Bch Rd at Wailupe Dr	AM	1175	1326	1337	151	11.3%	11	0.8%
	PM	1230	1387	1399	157	11.2%	12	0.9%
Wailupe Rd at Haunani Pl	AM	70	75	80	5	6.3%	5	6.3%
	PM	65	70	76	5	6.6%	6	7.9%
Kahekili Hwy at Waiehu Bch Rd	AM	1210	1366	1376	156	11.3%	10	0.7%
	PM	1030	1137	1170	107	9.1%	33	2.8%

Notes:

- (1) Volumes shown are total intersection approach volumes or projections.
 (2) Percentage of total 2015 background plus project traffic.

An analysis of the project's pro rata share of the increase of traffic volumes between 2009 and 2015 is summarized in Table 9. This table summarizes the growth between 2009 and 2015 and indicates the percentage of growth resulting from background growth and related projects and the percentage growth resulting from project generated traffic.

Table 9 Project's Share of Total Intersection Approach Volumes Growth without Hale Mua ⁽¹⁾

Intersection	Period	Existing	2015 Background	Background Plus Project	Background Growth ⁽²⁾		Project Trips ⁽³⁾	
					Volume	% of 2005 to 2015 Growth	Volume ⁽⁴⁾	% of 2005 to 2015 Growth
Waiehu Bch Rd at Wailupe Dr	AM	1175	1326	1337	151	93.2%	11	6.8%
	PM	1230	1387	1399	157	92.9%	12	7.1%
Wailupe Rd at Haunani Pl	AM	70	75	80	5	50.0%	5	50.0%
	PM	65	70	76	5	45.5%	6	54.5%
Kahekili Hwy at Waiehu Bch Rd	AM	1210	1366	1376	156	94.0%	10	6.0%
	PM	1030	1137	1170	107	76.4%	33	23.6%

Notes:

- (1) Volumes shown are total intersection approach volumes or projections.
 (2) Background versus existing.
 (3) Background plus project versus background.
 (4) Project generated traffic.

Level-of-Service Analysis

1. The anticipated roadway network, lane configurations and right-of-way controls are summarized graphically as Attachment P.

The results of the level-of-service analysis are summarized in Table 10. Shown are the average vehicle delays and the levels-of-service of all lane groups. Existing delays and levels-of-service are also shown for comparison.

Table 10 Level-of-Service Analysis for 2015 Conditions without Hale Mua

Approach and Movement	AM Peak Hour ⁽¹⁾						PM Peak Hour					
	Existing (2009)		2015 Without Project		2015 With Project		Existing (2009)		2015 Without Project		2015 Without Project	
	Delay ⁽²⁾	LOS ⁽³⁾	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Waiehu Beach Road at Wailupe Drive & Lower Waiehu Beach Road												
Eastbound Left	7.8	A	7.9	A	7.9	A	8.3	A	8.5	A	8.5	A
Westbound Left	8.4	A	8.6	A	8.6	A	8.5	A	8.7	A	8.7	A
Northbound Left & Thru	24.3	C	31.8	D	36.8	E	34.2	D	47.4	E	49.4	E
Northbound Right	13.4	B	15.2	C	15.4	C	10.6	B	11.1	B	11.2	B
Southbound Left & Thru	67.1	F	167.0	F	178.3	F	166.0	F	397.7	F	416.1	F
Southbound Right	9.7	A	9.9	A	9.9	A	10.5	B	10.8	B	10.8	B
Wailupe Drive at Haunani Place												
Northbound Left & Thru	7.3	A	7.3	A	7.3	A	7.3	A	7.3	A	7.4	A
Eastbound Left & Right	8.9	A	8.9	A	8.9	A	8.8	A	8.8	A	8.8	A
Waiehu Beach Road at Kahekili Highway												
Southbound Left & Thru	8.9	A	9.3	A	9.3	A	8.6	A	8.9	A	8.9	A
Westbound Left & Right	52.5	F	159.1	F	176.3	F	18.3	C	26.6	D	29.6	D
Kahekili Highway at Hale Mua North Driveway & MEO BEST Driveway												
Southbound Left & Thru	See Note (4)		7.9	A	7.9	A	See Note (4)		7.9	A	7.9	A
Westbound Left & Right	See Note (4)		13.5	B	13.6	B	See Note (4)		11.3	B	11.4	B
Kahekili Highway at Hale Mua South Driveway & Waiehu Mauka Driveway												
Southbound Left & Thru	See Note (4)		See Note (5)		7.9	A	See Note (4)		See Note (5)		8.0	A
Westbound Left & Right	See Note (4)		See Note (5)		14.8	B	See Note (4)		See Note (5)		12.2	B

NOTES:
 1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the project.
 2. Delay is in seconds per vehicle.
 3. LOS denotes level-of-service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
 4. These movements are not provided until the MEO BEST project is constructed.
 5. These movements are not provided until the proposed project is constructed.
 6. See Attachment Q for level-of-service worksheets.

The results of the Level-of-Service analysis are:

Waiehu Beach Road at Wailupe Drive and Lower Waiehu Beach Road

1. During the morning peak hour, the northbound left and through movements from Lower Waiehu Beach Road will operate at Level-of-Service D, without and with project generated traffic. The change in delay as a result of project generated traffic is 1.0 second per vehicle, implying that project generated traffic has minimal impact.
2. Also during the morning peak hour, the southbound left and through movements will operate at Level-of-Service F, without and with project generated traffic. These movements currently operate at Level-of-Service F. The change in delay is 11.3 seconds per vehicle, or 7%.
3. During the afternoon peak hour, the northbound left and through movements will operate at Level-of-Service E, without and with project generated traffic. The delay increases 2.0 seconds, or 4%, as a result of project generated traffic.
4. Also during the afternoon peak hour, the southbound left and through movements will operate at Level-of-Service F, without and with project generated traffic. These movements currently operate at Level-of-Service F. The change in delay is 18.4 seconds per vehicle, or 5%.

5. As already noted, traffic flow along Waiehu Beach Road through this intersection is constrained during the morning peak hour. This back up is from the intersection of Waiehu Beach Road at Lower Main Street.

Wailupe Drive at Haunani Place

6. The intersection of Wailupe Drive at Haunani Place will operate at Level-of-Service A without and with project generated traffic. All controlled movements will operate at Level-of-Service A.

Waiehi Beach Road at Kahekili Highway

7. At the intersection of Waiehu Beach Road at Kahekili Highway, the left and right turns from Waiehu Beach Road to Kahekili Highway will operate at Level-of-Service F during the morning peak hour and Level-of-Service D during the afternoon peak hour, without and with project generated traffic. As previously noted, the traffic study for Hale Mua recommended that this intersection be signalized. With traffic signals, the intersection will operate at Level-of-Service B during both peak periods.

Kahekili Highway at MEO BEST Driveway

8. At the intersection of Kahekili Highway at MEO BEST Driveway, all movements will operate a Level-of-Service B, or better, without and with project generated traffic.

Kahekili Highway at Hale Mua South Driveway and Waiehi Mauka Driveway

9. At the intersection of Kahekili Highway at Waiehu Mauka, the movements along Kahekili Highway will operate at Level-of-Service A and the driveway approaching Kahekili Highway will operate at Level-of-Service B.

M. Mitigation

We have used the Institute of Transportation Engineers standard that a Level-of-Service D is the minimum acceptable level-of-service and that the criteria is applicable to the overall intersection. If project generated traffic causes the level-of-service to drop below Level-of-Service D, then mitigation should be provided to improve the level-of-service to Level-of-Service C or better. Minor movements, such as left turns and side street approaches may operate at Level-of-Service E for short periods. "Level-of-Service E is sometimes tolerated for minor movements such as left turns when there are no feasible mitigating measures or if it helps maintain the main through movements at acceptable levels-of-service."

Level-of-Service D is generally considered to be the minimum acceptable peak hour level-of-service for urban intersections ¹⁰. It is generally accepted that side street approaches and minor movements, such as left turn lanes may operate at Level-of-Service E or F for short periods, especially if the volume-to-capacity ratio indicates a higher level-of-service, as this implies that the long delay and therefore the low level-of-service is a result of the traffic signal cycle length rather than a lane deficiency ¹¹.

¹⁰ Institute of Traffic Engineers *Transportation Impact Analyses for Site Development, A Recommended Practice*, Washington, D.C., 2006, p 60.

¹¹ Transportation Research Board, *Highway Capacity Manual*, Washington, D.C., 2000, p 16-35.

Mr. David Lundquist
August 7, 2009
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Based on this criteria, no mitigation is required at the intersections of Wailupe Drive at Haunani Place, Kahekili Highway at Hale Mua North and MEO BEST driveways and Kahekili Highway at Hale Mua South and Waiehu Mauka driveways.

Waiehu Beach Road at Wailupe Drive and Lower Waiehu Beach Road

Existing and future conditions at the intersection of Waiehu Beach Road at Wailupe Drive are below acceptable conditions. The southbound approach to the intersection will operate at Level-of-Service F during both peak periods, without and with project generated traffic. The northbound left and through movement will operate at Level-of-Service E during the afternoon peak hour without and with project generated traffic. Mitigation will improve the background level-of-service to an acceptable level-of-service, which should be Level-of-Service D, or better. The poor levels-of-service are the result of long delays to traffic along the side street approaches (Wailupe Drive and Lower Waiehu Beach Road). A level-of-service analysis for signalized conditions determined that the intersection would operate at Level-of-Service B during both peak periods, without and with project generated traffic. However, a traffic signal warrant analysis determined that traffic signals are not warranted for existing 100%, or urban, conditions. See Attachment S.

Waiehu Beach Road at Kahekili Highway

The traffic study for Hale Mua recommended that this intersection be signalized because the **warrant for a traffic signal is satisfied by existing traffic conditions**. Since the warrant for a traffic signal is satisfied for existing conditions, the proposed project should not be responsible for installation of the signals. With traffic signals, the intersection will operate at an acceptable level-of-service and no additional mitigation is required.

N. Other Traffic Related Issues

Regional Traffic Impact

It is understood that residents of the proposed project will have travel destinations over a wide area of Maui and will use major regional roadways (Kahekili Highway and Waiehu Beach Road) to get to those destinations. Considering the heavy traffic volumes on these roadways and relatively small number of trips that the project will generate, the proposed project will have a minimal impact on the regional transportation system, especially at locations beyond the immediate vicinity of the project.

Public Transportation

The Maui Bus has a bus route along Waiehu Beach Road and the lower area of Waiehu Heights. See Attachment R. The nearest bus stop is at the intersection of Wailupe Drive at Analo Street, which is one block south of Waiehu Beach Road. This bus stop is approximately 0.4 mile from the Waiehu Mauka project.

The Maui Bus also operates along Kahekili Highway between Wailuku and Makaaka Drive, and the bus stop is approximately 0.5 mile south of the project's multi-family units.

Police Department Comments

No comments have been received from the Maui Police Department

O. Summary and Conclusions

The conclusions of the traffic impact assessment are:

1. The proposed project will consist of six (6) single-family units, 48 apartments and 52 condominium townhome units.
2. The proposed project will generate 13 inbound and 41 outbound trips during the morning peak hour. During the afternoon peak hour, the project will generate 40 inbound and 24 outbound trips.
3. No mitigation is required at the intersections of Wailupe Drive at Haunani Place, Kahekili Highway at Hale Mua North and MEO BEST driveways, and Kahekili Highway at Hale Mua South and Waiehu Mauka driveways.
4. Existing and future conditions at the intersection of Waiehu Beach Road at Wailupe Drive are below acceptable conditions. Mitigation measures should be identified and assessed, even though the unacceptable operating conditions are a result of existing conditions and will continue whether or not the Waiehu Mauka project is constructed. The Waiehu Mauka project should be responsible for no more than its pro rata share of the increase in traffic growth between 2009 and 2015, which would be a maximum of 7.1%.
5. The traffic study for Hale Mua recommended that the intersection of Waiehu Beach Road at Kahekili Highway be signalized because the warrant for a traffic signal is satisfied by existing traffic conditions. With traffic signals, the intersection will operate at an acceptable level-of-service and no additional mitigation is required.
6. The Maui Bus should be contacted regarding the feasibility of providing bus service to and from the project, especially the multi-family units.

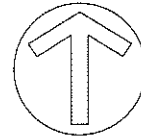
Respectfully submitted,
PHILLIP ROWELL AND ASSOCIATES



Phillip J. Rowell, P.E.
Principal

List of Attachments

- A. Project Location Map
- B. Project Site Plan
- C. Existing Lane Configurations and Right-of-Way Controls
- D. Existing AM and PM Peak Hour Traffic Volumes
- E. Background Traffic Growth (2009 to 2015)
- F. Related Projects' Peak Hour Traffic Assignments with Hale Mua
- G. Related Project's Peak Hour Traffic Assignments without Hale Mua
- H. 2015 Background Peak Hour Traffic Projections with Hale Mua
- I. 2015 Background Peak Hour Traffic Projections without Hale Mua
- J. Project Trip Assignments
- K. Background Plus Project Peak Hour Traffic Projections with Hale Mua
- L. Background Plus Project Peak Hour Traffic Projections without Hale Mua
- M. Traffic Projection Worksheets with Hale Mua
- N. Traffic Projection Worksheets without Hale Mua
- O. 2015 Lane Configurations and Right-of-Way Controls with Hale Mua
- P. 2015 Lane Configurations and Right-of-Way Controls without Hale Mua
- Q. Level-of-Service Worksheets
- R. The Maui Bus Service in Waiehu Heights Area
- S. Traffic Signal Warrant Analysis Warrant 2 - Four Hour Vehicular Warrant

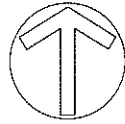


NOT TO SCALE



LEGEND
● PROJECT LOCATION

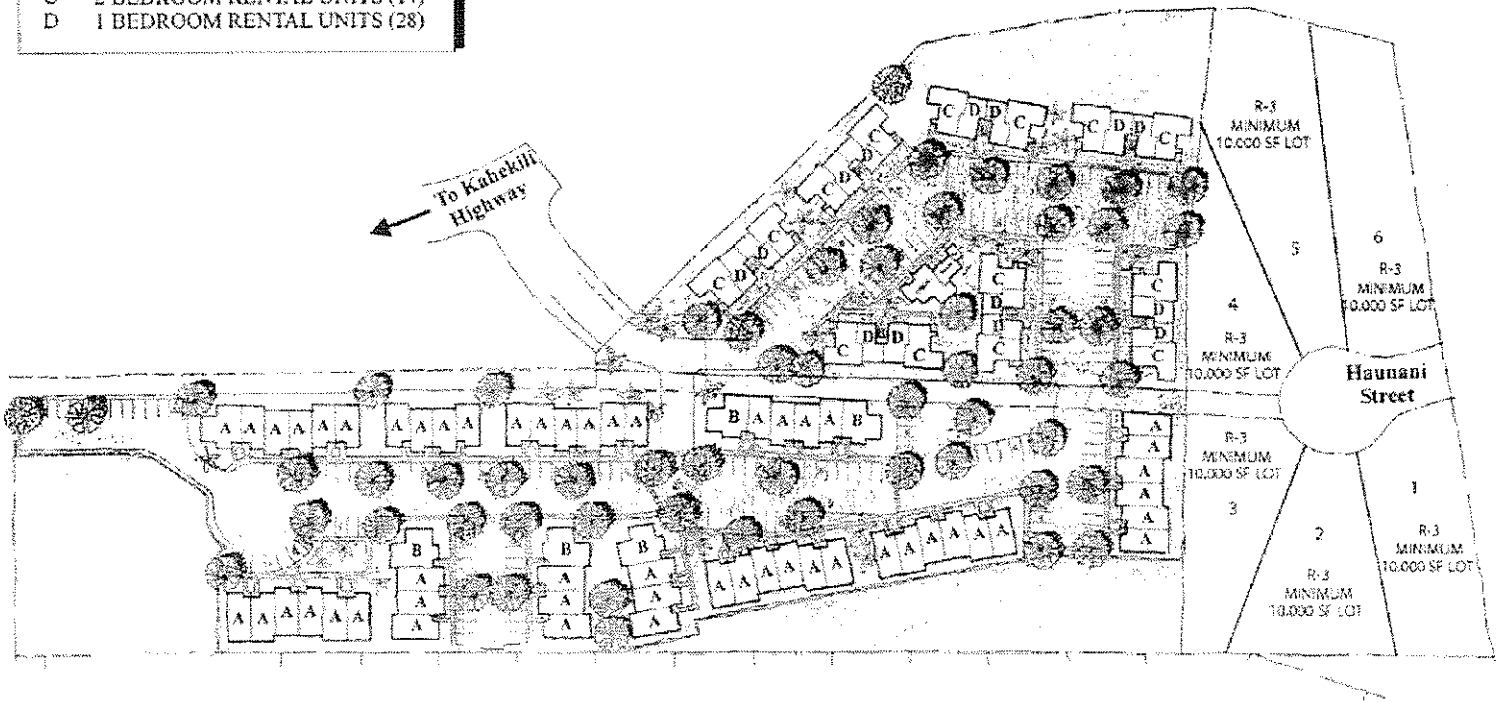
Attachment A PROJECT LOCATION MAP



APPROXIMATE
NORTH

KEY

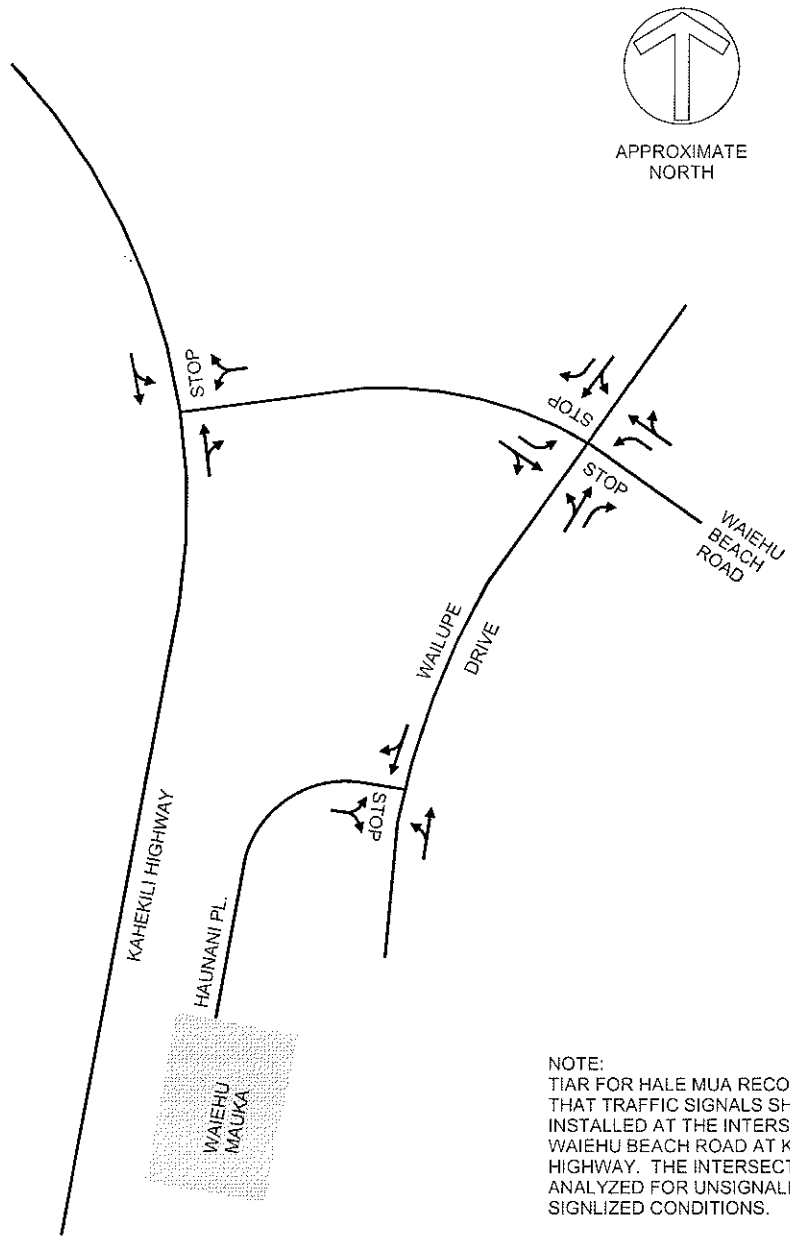
- A 3 BEDROOM TOWNHOUSES (52)
- B 4 BEDROOM TOWNHOUSES (6)
- C 2 BEDROOM RENTAL UNITS (14)
- D 1 BEDROOM RENTAL UNITS (28)



Source: Hans Riecke

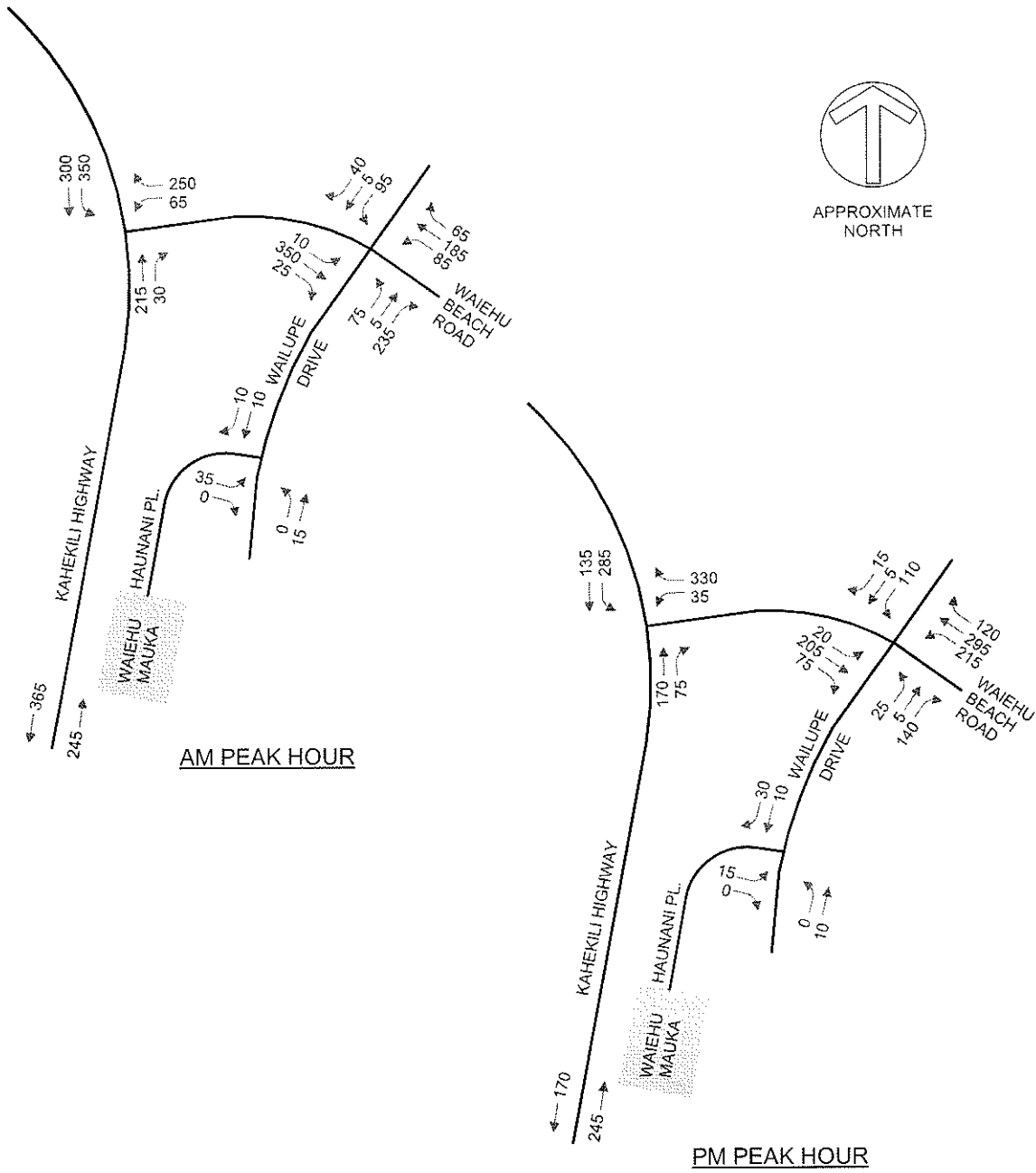
SOURCE: MUNEKIYO & HIRAGA, INC.

**Attachment B
PROJECT SITE PLAN**



NOTE:
 TIAR FOR HALE MUA RECOMMENDED
 THAT TRAFFIC SIGNALS SHOULD BE
 INSTALLED AT THE INTERSECTION OF
 WAIIEHU BEACH ROAD AT KAHEKILI
 HIGHWAY. THE INTERSECTION WAS
 ANALYZED FOR UNSIGNALIZED AND
 SIGNALIZED CONDITIONS.

Attachment C
EXISTING LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS



Attachment D
EXISTING AM AND PM PEAK HOUR VOLUMES

TRAFFIC COUNT SUMMARY WORKSHEET

PROJECT: Waiehu Mauka
 INTERSECTION: 1. Waiehu Beach Road at Wailupe Drive
 DAY & DATE: Friday, January 30, 2009
 START TIME: 6:30 am
 END TIME: 8:30 am

15-Minute Volumes Beginning at:

Interval	Start Time	North Approach			East Approach			South Approach			West Approach			Totals
		1	2	3	4	5	6	7	8	9	10	11	12	
1	6:30 am	4	1	15	10	33	13	53	0	10	3	90	2	234
2	6:45 am	6	0	23	12	50	19	60	1	15	7	97	2	292
3	7:00 am	9	0	37	12	47	19	78	1	29	5	92	3	332
4	7:15 am	9	0	21	16	55	16	46	0	14	6	71	0	254
5	7:30 am	13	1	14	14	34	25	50	0	17	6	72	4	250
6	7:45 am	7	0	23	14	39	20	38	0	8	8	57	4	218
7	8:00 am	3	0	17	19	34	21	47	0	6	4	40	0	191
8	8:15 am	3	1	29	20	34	17	42	1	6	2	49	4	208
9	8:30 am													0
10	8:45 am													0
11	9:00 am													0
12	9:15 am													0
13	9:30 am													0
14	9:45 am													0
Maximum:		13	1	37	20	55	25	78	1	29	8	97	4	332

Hourly Volume of Each Movement

6:30 am	7:30 am	28	1	96	50	185	67	237	2	68	21	350	7	1112
6:45 am	7:45 am	37	1	95	54	186	79	234	2	75	24	332	9	1128
7:00 am	8:00 am	38	1	95	56	175	80	212	1	68	25	292	11	1054
7:15 am	8:15 am	32	1	75	63	162	82	181	0	45	24	240	8	913
7:30 am	8:30 am	26	2	83	67	141	83	177	1	37	20	218	12	867
7:45 am	8:45 am	13	1	69	53	107	58	127	1	20	14	146	8	617
8:00 am	9:00 am	6	1	46	39	68	38	89	1	12	6	89	4	399
8:15 am	9:15 am	3	1	29	20	34	17	42	1	6	2	49	4	208
8:30 am	9:30 am	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 am	9:45 am	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 am	10:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Volume		38	2	96	67	186	83	237	2	75	25	350	12	1128
Per Cent of Approach		28%	1%	28%	20%	37%	26%	75%	2%	17%	6%	23%	1%	
Peak Hour Factor:		0.73	0.5	0.65	0.84	0.85	0.83	0.76	0.5	0.65	0.78	0.9	0.75	0.85
Total Arrivals			136			336			314			387		
Total Departures			81			683			110			299		
Total			217			1019			424			686		

TRAFFIC COUNT SUMMARY WORKSHEET

PROJECT: Waiehu Mauka
 INTERSECTION: 1. Waiehu Beach Road at Wailupe Drive
 DAY & DATE: Friday, January 30, 2009
 START TIME: 3:30 pm
 END TIME: 5:30 pm

15-Minute Volumes Beginning at:

Interval	Start Time	North Approach			East Approach			South Approach			West Approach			Totals
		1	2	3	4	5	6	7	8	9	10	11	12	
1	3:30 pm	4	1	20	41	69	39	28	0	3	12	50	2	269
2	3:45 pm	2	0	13	32	67	39	21	1	6	10	41	5	237
3	4:00 pm	4	1	25	17	63	46	26	1	12	6	45	2	248
4	4:15 pm	5	1	23	31	72	47	27	0	2	20	51	3	282
5	4:30 pm	4	1	25	21	64	65	31	0	3	10	50	5	279
6	4:45 pm	1	0	24	28	87	55	27	1	7	25	50	5	310
7	5:00 pm	3	1	32	30	62	37	39	0	3	18	48	5	278
8	5:15 pm	2	1	29	32	80	58	42	1	5	15	58	6	329
9	5:30 pm													0
10	5:45 pm													0
11	6:00 pm													0
12	6:15 pm													0
13	6:30 pm													0
14	6:45 pm													0
Maximum:		5	1	32	41	87	65	42	1	12	25	58	6	329

Hourly Volume of Each Movement

3:30 pm	4:30 pm	15	3	81	121	271	171	102	2	23	48	187	12	1036
3:45 pm	4:45 pm	15	3	86	101	266	197	105	2	23	46	187	15	1046
4:00 pm	5:00 pm	14	3	97	97	286	213	111	2	24	61	196	15	1119
4:15 pm	5:15 pm	13	3	104	110	285	204	124	1	15	73	199	18	1149
4:30 pm	5:30 pm	10	3	110	111	293	215	139	2	18	68	206	21	1196
4:45 pm	5:45 pm	6	2	85	90	229	150	108	2	15	58	156	16	917
5:00 pm	6:00 pm	5	2	61	62	142	95	81	1	8	33	106	11	607
5:15 pm	6:15 pm	2	1	29	32	80	58	42	1	5	15	58	6	329
5:30 pm	6:30 pm	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 pm	6:45 pm	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 pm	7:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Volume		15	3	110	121	293	215	139	2	24	73	206	21	1196
Per Cent of Approach		12%	1%	21%	19%	45%	60%	84%	2%	8%	24%	14%	2%	
Peak Hour Factor:		0.75	0.75	0.86	0.74	0.84	0.83	0.83	0.5	0.5	0.73	0.89	0.88	0.91
Total Arrivals			128			629		165			300			
Total Departures			144			455		291			332			
Total			272			1084		456			632			

TRAFFIC COUNT SUMMARY WORKSHEET

PROJECT: Waiehu Mauka
 INTERSECTION: 2. Wailupe Drive at Haunani Place
 DAY & DATE: Thursday, August 31, 2006
 START TIME: 6:30 am
 END TIME: 9:00 am

15-Minute Volumes Beginning at:

Interval	Start Time	North Approach			East Approach			South Approach			West Approach			Totals
		1	2	3	4	5	6	7	8	9	10	11	12	
1	6:30 am	0	0	0	0	0	0	0	2	0	1	0	2	5
2	6:45 am	1	0	0	0	0	0	0	2	1	0	0	7	11
3	7:00 am	2	0	0	0	0	0	0	3	0	0	0	7	12
4	7:15 am	4	2	0	0	0	0	0	4	0	0	0	9	19
5	7:30 am	2	1	0	0	0	0	0	5	0	0	0	11	19
6	7:45 am	4	1	0	0	0	0	0	2	0	1	0	7	15
7	8:00 am	1	2	0	0	0	0	0	0	0	0	0	3	6
8	8:15 am	1	4	0	0	0	0	0	4	1	0	0	4	14
9	8:30 am	2	0	0	0	0	0	0	1	0	0	0	4	7
10	8:45 am	2	1	0	0	0	0	0	3	0	1	0	3	10
11	9:00 am													0
12	9:15 am													0
13	9:30 am													0
14	9:45 am													0
Maximum:		4	4	0	0	0	0	0	5	1	1	0	11	19

Hourly Volume of Each Movement

6:30 am	7:30 am	7	2	0	0	0	0	0	11	1	1	0	25	47
6:45 am	7:45 am	9	3	0	0	0	0	0	14	1	0	0	34	61
7:00 am	8:00 am	12	4	0	0	0	0	0	14	0	1	0	34	65
7:15 am	8:15 am	11	6	0	0	0	0	0	11	0	1	0	30	59
7:30 am	8:30 am	8	8	0	0	0	0	0	11	1	1	0	25	54
7:45 am	8:45 am	8	7	0	0	0	0	0	7	1	1	0	18	42
8:00 am	9:00 am	6	7	0	0	0	0	0	8	1	1	0	14	37
8:15 am	9:15 am	5	5	0	0	0	0	0	8	1	1	0	11	31
8:30 am	9:30 am	4	1	0	0	0	0	0	4	0	1	0	7	17
8:45 am	9:45 am	2	1	0	0	0	0	0	3	0	1	0	3	10
9:00 am	10:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0

Maximum Volume 12 8 0 0 0 0 0 0 14 1 1 0 34 65

Per Cent of Approach 60% 100% 0% 0% 0% 0% 0% 0% 88% 50% 3% 0% 34%

Peak Hour Factor: 0.75 0.5 0 0 0 0 0 0 0.7 0.25 0.25 0 0.77 0.86

Total Arrivals 20 0 15 35
 Total Departures 48 0 9 13
 Total 68 0 24 48

TRAFFIC COUNT SUMMARY WORKSHEET

PROJECT: Waiehu Mauka
 INTERSECTION: 2. Waiupe Drive at Haunani Place
 DAY & DATE: Thursday, August 31, 2006
 START TIME: 3:30 pm
 END TIME: 6:00 pm

15-Minute Volumes Beginning at:

Interval	Start Time	North Approach			East Approach			South Approach			West Approach			Totals
		1	2	3	4	5	6	7	8	9	10	11	12	
1	3:30 pm	3	2	0	0	0	0	0	3	0	0	0	3	11
2	3:45 pm	4	2	0	0	0	0	0	2	0	0	0	2	10
3	4:00 pm	6	2	0	0	0	0	0	3	0	0	0	0	11
4	4:15 pm	2	1	0	0	0	0	0	2	0	1	0	3	9
5	4:30 pm	9	4	0	0	0	0	0	1	1	0	0	4	19
6	4:45 pm	4	4	0	0	0	0	0	2	1	0	0	6	17
7	5:00 pm	8	2	0	0	0	0	0	4	0	0	0	1	15
8	5:15 pm	11	1	0	0	0	0	0	4	0	1	0	4	21
9	5:30 pm	8	4	0	0	0	0	0	1	0	0	0	1	14
10	5:45 pm	3	2	0	0	0	0	0	1	0	0	0	3	9
11	6:00 pm													0
12	6:15 pm													0
13	6:30 pm													0
14	6:45 pm													0
Maximum:		11	4	0	0	0	0	0	4	1	1	0	6	21

Hourly Volume of Each Movement

3:30 pm	4:30 pm	15	7	0	0	0	0	0	10	0	1	0	8	41
3:45 pm	4:45 pm	21	9	0	0	0	0	0	8	1	1	0	9	49
4:00 pm	5:00 pm	21	11	0	0	0	0	0	8	2	1	0	13	56
4:15 pm	5:15 pm	23	11	0	0	0	0	0	9	2	1	0	14	60
4:30 pm	5:30 pm	32	11	0	0	0	0	0	11	2	1	0	15	72
4:45 pm	5:45 pm	31	11	0	0	0	0	0	11	1	1	0	12	67
5:00 pm	6:00 pm	30	9	0	0	0	0	0	10	0	1	0	9	59
5:15 pm	6:15 pm	22	7	0	0	0	0	0	6	0	1	0	8	44
5:30 pm	6:30 pm	11	6	0	0	0	0	0	2	0	0	0	4	23
5:45 pm	6:45 pm	3	2	0	0	0	0	0	1	0	0	0	3	9
6:00 pm	7:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Volume		32	11	0	0	0	0	0	11	2	1	0	15	72
Per Cent of Approach		74%	100%	0%	0%	0%	0%	0%	79%	67%	6%	0%	17%	
Peak Hour Factor:		0.73	0.69	0	0	0	0	0	0.69	0.5	0.25	0	0.63	0.86
Total Arrivals		43			0			13			16			
Total Departures		26			0			12			34			
Total		69			0			25			50			

TRAFFIC COUNT SUMMARY WORKSHEET

PROJECT: Waiehu Mauka
 INTERSECTION: 3. Kahekili Highway at Waiehu Beach Road
 DAY & DATE: Thursday, February 19, 2009
 START TIME: 6:30 am
 END TIME: 9:00 am

15-Minute Volumes Beginning at:

Interval	Start Time	North Approach			East Approach			South Approach			West Approach			Totals
		1	2	3	4	5	6	7	8	9	10	11	12	
1	6:30 am		42	74	54		11	3	27					211
2	6:45 am		44	110	69		3	3	45					274
3	7:00 am		77	97	70		26	5	66					341
4	7:15 am		108	56	59		20	4	61					308
5	7:30 am		72	85	43		11	10	42					263
6	7:45 am		31	65	39		6	9	27					177
7	8:00 am		16	50	36		8	6	18					134
8	8:15 am		15	45	30		4	5	19					118
9	8:30 am													0
10	8:45 am													0
11	9:00 am													0
12	9:15 am													0
13	9:30 am													0
14	9:45 am													0
Maximum:			108	110	70		26	10	66					341

Hourly Volume of Each Movement

6:30 am	7:30 am	0	271	337	252	0	60	15	199	0	0	0	0	1134
6:45 am	7:45 am	0	301	348	241	0	60	22	214	0	0	0	0	1186
7:00 am	8:00 am	0	288	303	211	0	63	28	196	0	0	0	0	1089
7:15 am	8:15 am	0	227	256	177	0	45	29	148	0	0	0	0	882
7:30 am	8:30 am	0	134	245	148	0	29	30	106	0	0	0	0	692
7:45 am	8:45 am	0	62	160	105	0	18	20	64	0	0	0	0	429
8:00 am	9:00 am	0	31	95	66	0	12	11	37	0	0	0	0	252
8:15 am	9:15 am	0	15	45	30	0	4	5	19	0	0	0	0	118
8:30 am	9:30 am	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 am	9:45 am	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00 am	10:00 am	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Volume		0	301	348	252	0	63	30	214	0	0	0	0	1186
Per Cent of Approach		0%	33%	58%	80%	0%	21%	12%	100%	0%	0%	0%	0%	
Peak Hour Factor:		0	0.7	0.79	0.9	0	0.61	0.75	0.81	0	0	0	0	0.87
Total Arrivals			649			315			244				0	
Total Departures			466			378			364				0	
Total			1115			693			608				0	

TRAFFIC COUNT SUMMARY WORKSHEET

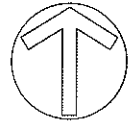
PROJECT: Waiehu Mauka
 INTERSECTION: 3. Kahekili Highway at Waiehu Beach Road
 DAY & DATE: Thursday, February 19, 2009
 START TIME: 3:30 pm
 END TIME: 6:00 pm

15-Minute Volumes Beginning at:

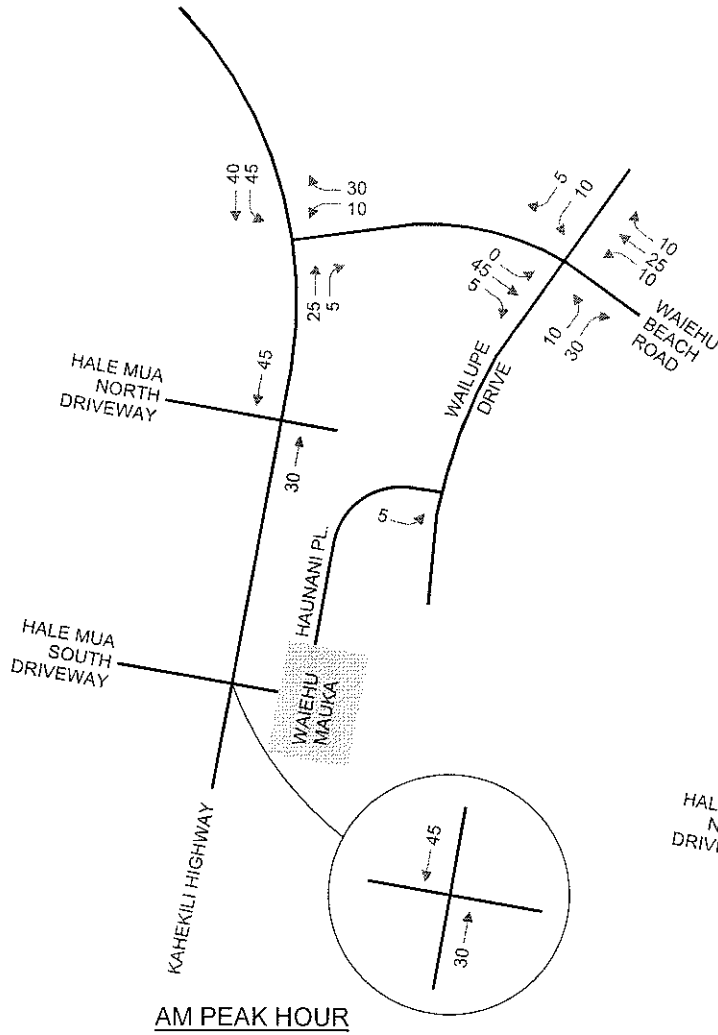
Interval	Start Time	North Approach			East Approach			South Approach			West Approach			Totals
		1	2	3	4	5	6	7	8	9	10	11	12	
1	3:30 pm	30	57	58	58	6	14	34					199	
2	3:45 pm	37	52	78	78	7	10	36					220	
3	4:00 pm	35	61	62	62	15	9	30					212	
4	4:15 pm	31	62	73	73	4	13	29					212	
5	4:30 pm	26	63	95	95	7	21	54					266	
6	4:45 pm	28	78	78	78	10	19	39					252	
7	5:00 pm	29	58	84	84	9	15	37					232	
8	5:15 pm	24	79	74	74	5	20	41					243	
9	5:30 pm	25	72	69	69	5	15	29					215	
10	5:45 pm	26	53	75	75	9	17	30					210	
11	6:00 pm												0	
12	6:15 pm												0	
13	6:30 pm												0	
14	6:45 pm												0	
Maximum:		37	79	95		15	21	54					266	

Hourly Volume of Each Movement

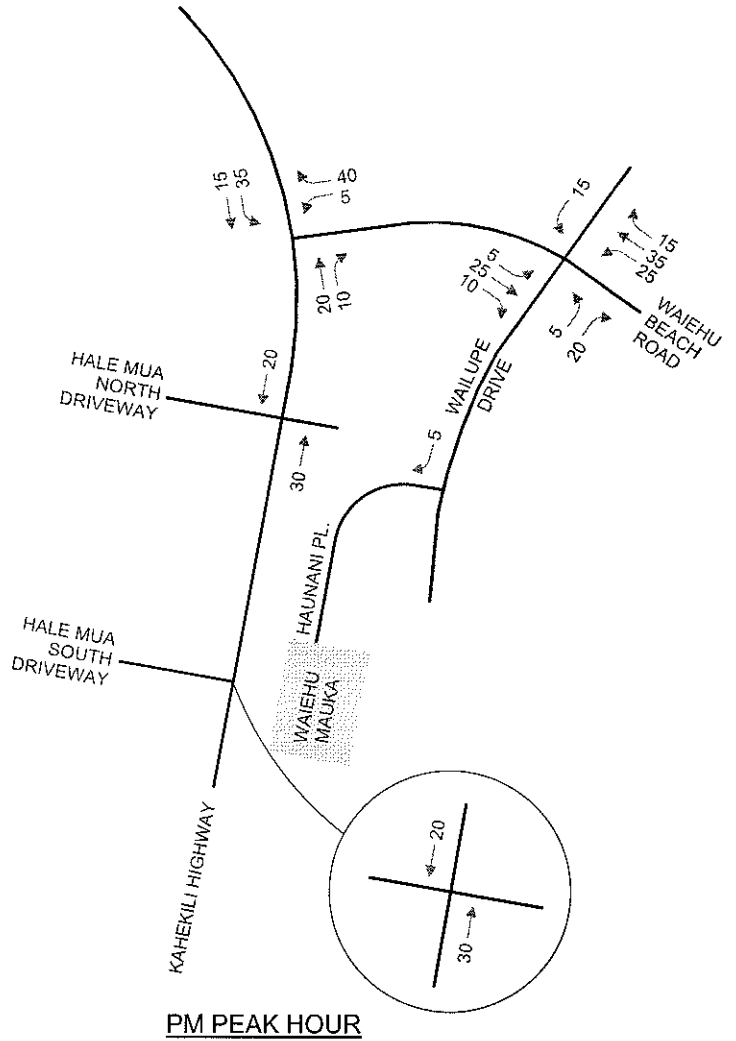
3:30 pm	4:30 pm	0	133	232	271	0	32	46	129	0	0	0	0	843
3:45 pm	4:45 pm	0	129	238	308	0	33	53	149	0	0	0	0	910
4:00 pm	5:00 pm	0	120	264	308	0	36	62	152	0	0	0	0	942
4:15 pm	5:15 pm	0	114	261	330	0	30	68	159	0	0	0	0	962
4:30 pm	5:30 pm	0	107	278	331	0	31	75	171	0	0	0	0	993
4:45 pm	5:45 pm	0	106	287	305	0	29	69	146	0	0	0	0	942
5:00 pm	6:00 pm	0	104	262	302	0	28	67	137	0	0	0	0	900
5:15 pm	6:15 pm	0	75	204	218	0	19	52	100	0	0	0	0	668
5:30 pm	6:30 pm	0	51	125	144	0	14	32	59	0	0	0	0	425
5:45 pm	6:45 pm	0	26	53	75	0	9	17	30	0	0	0	0	210
6:00 pm	7:00 pm	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum Volume		0	133	287	331	0	36	75	171	0	0	0	0	993
Per Cent of Approach		0%	18%	46%	90%	0%	13%	30%	100%	0%	0%	0%	0%	
Peak Hour Factor:		0	0.9	0.91	0.87	0	0.6	0.89	0.79	0	0	0	0	0.93
Total Arrivals			420			367			246				0	
Total Departures			502			362			169				0	
Total			922			729			415				0	



APPROXIMATE
NORTH

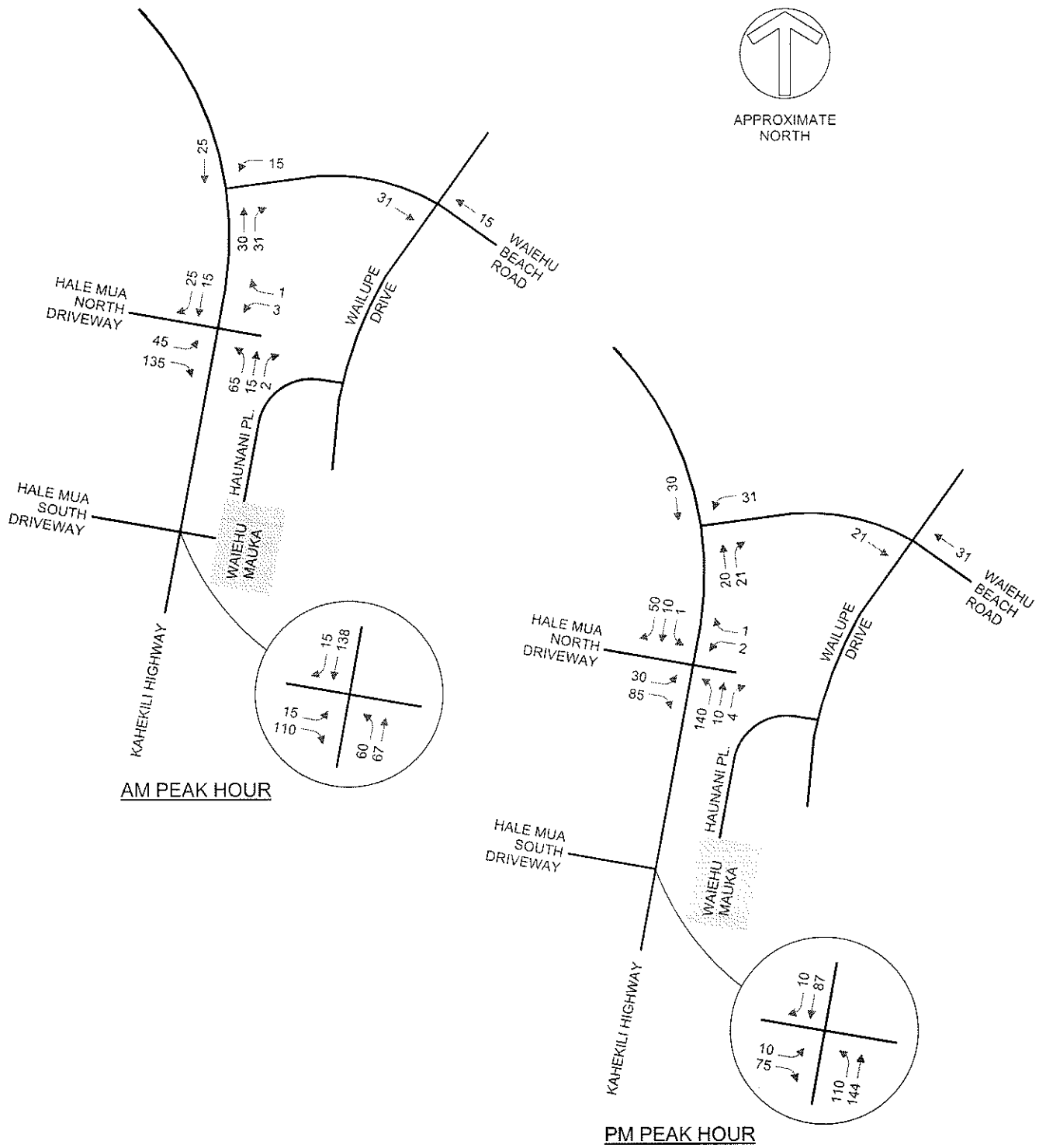


AM PEAK HOUR

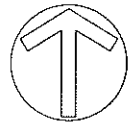


PM PEAK HOUR

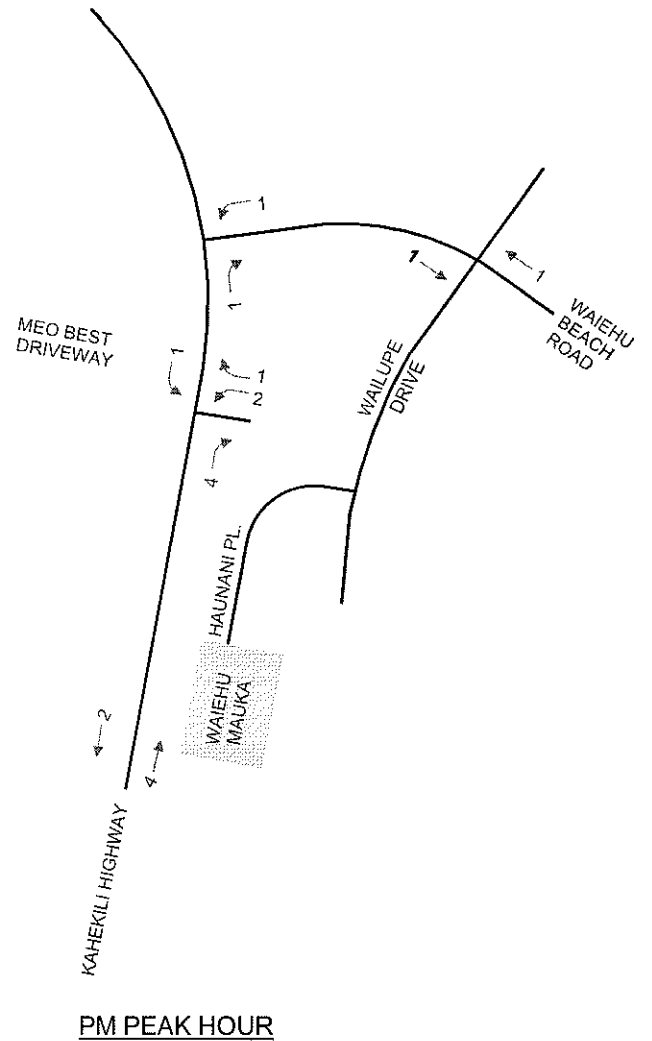
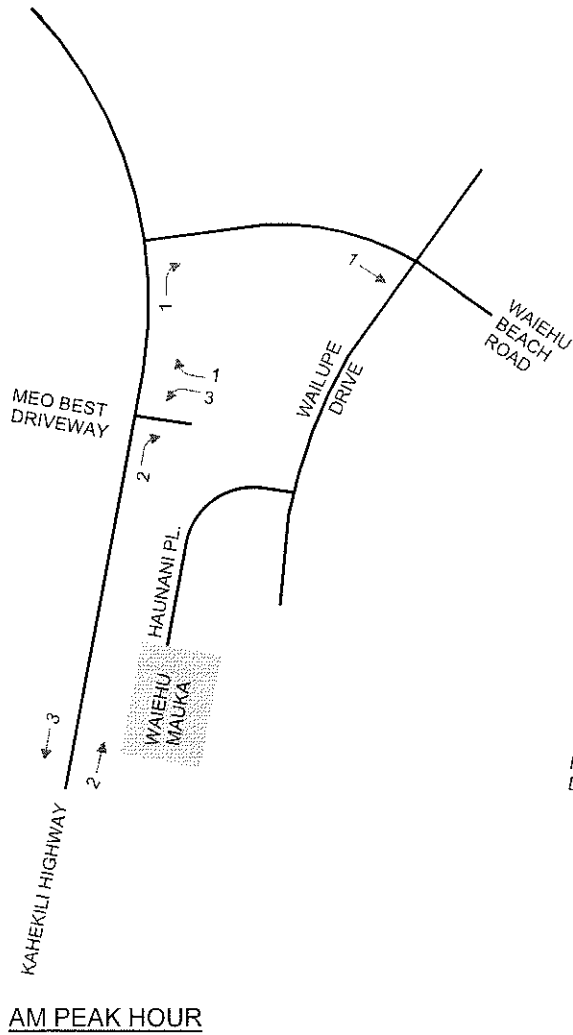
Attachment E
BACKGROUND GROWTH (2009 TO 2015)



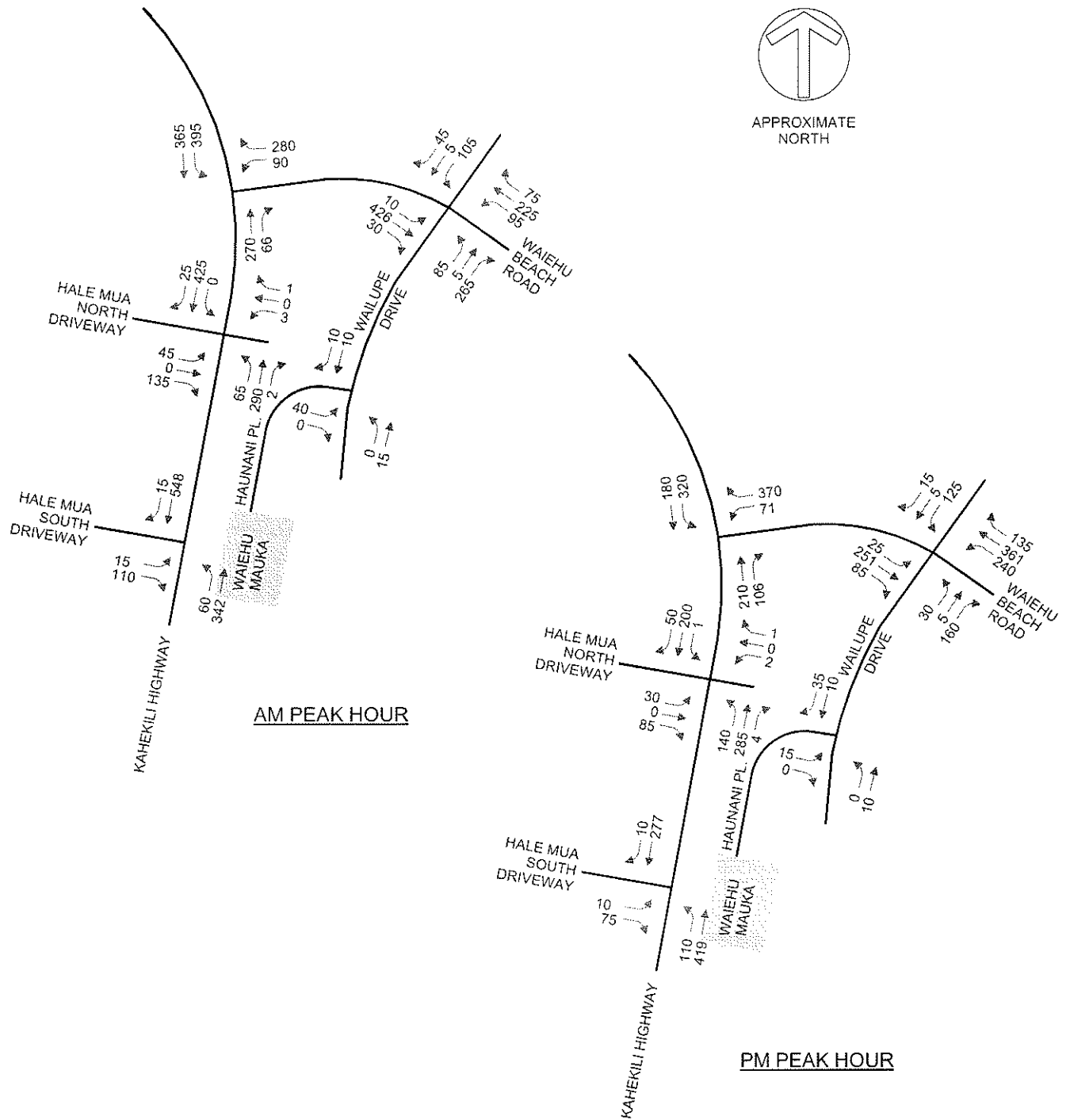
Attachment F
RELATED PROJECTS' PEAK HOUR TRIP ASSIGNMENTS
WITH HALE MUA



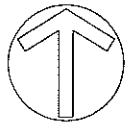
APPROXIMATE
NORTH



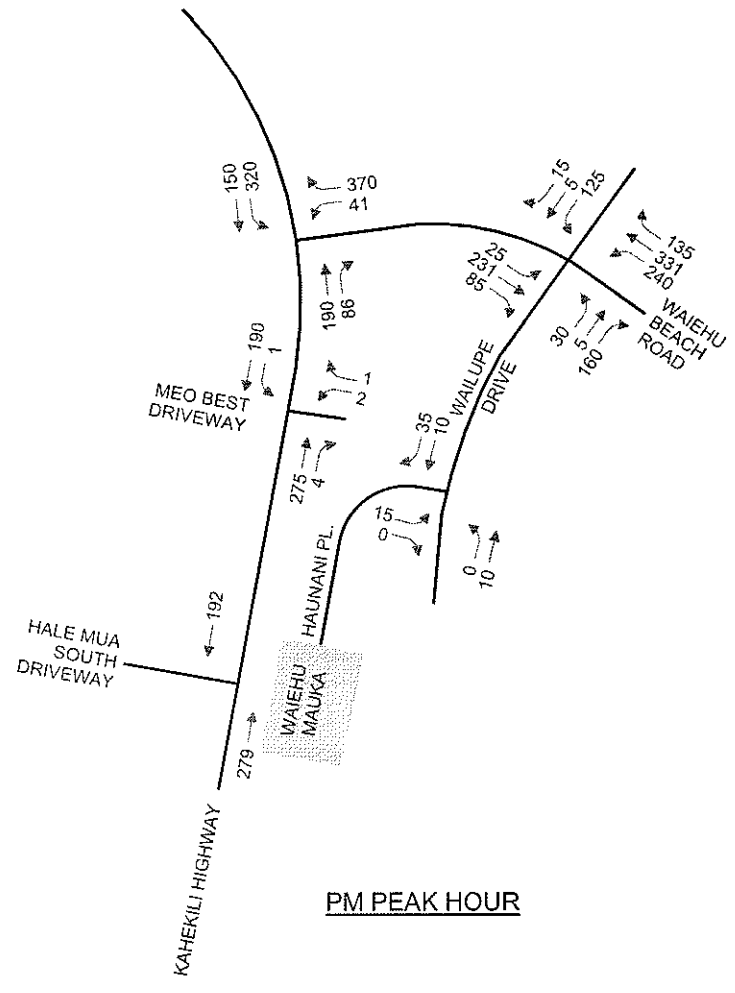
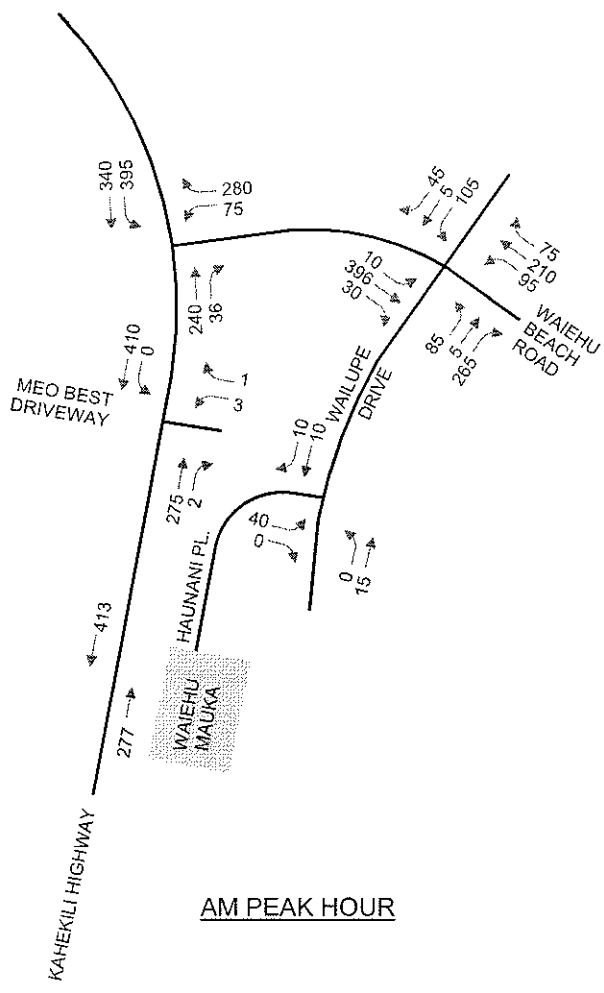
Attachment G
RELATED PROJECTS' PEAK HOUR TRIP ASSIGNMENTS
WITHOUT HALE MUA



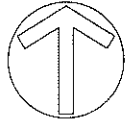
Attachment H
2015 BACKGROUND PEAK HOUR TRAFFIC PROJECTIONS
WITH HALE MUA



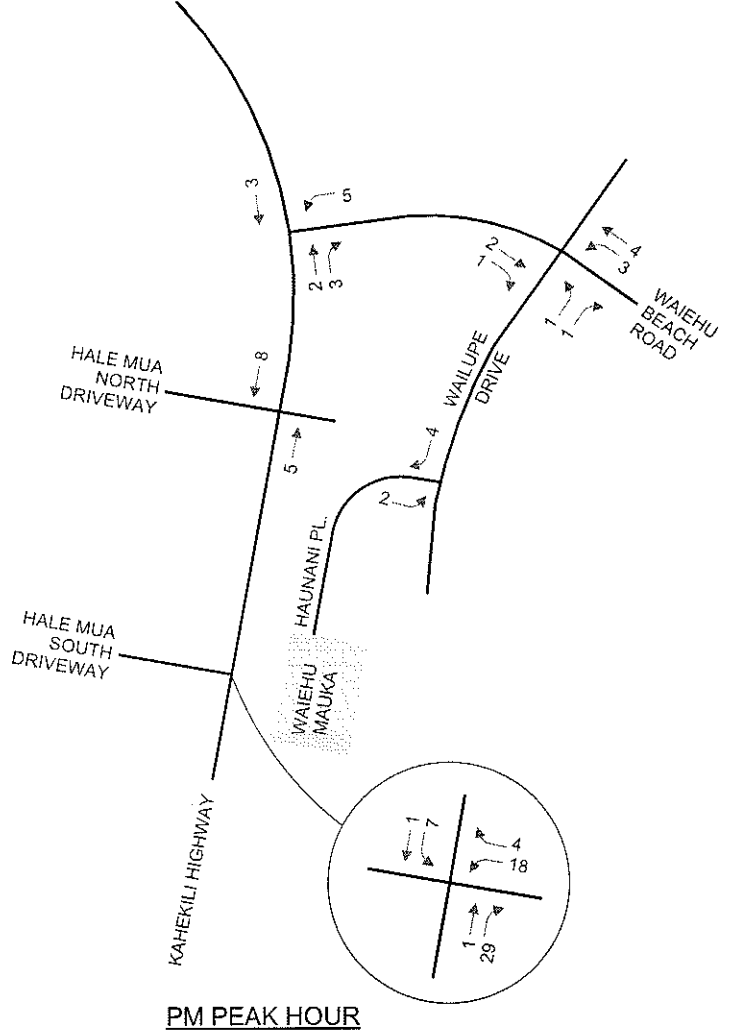
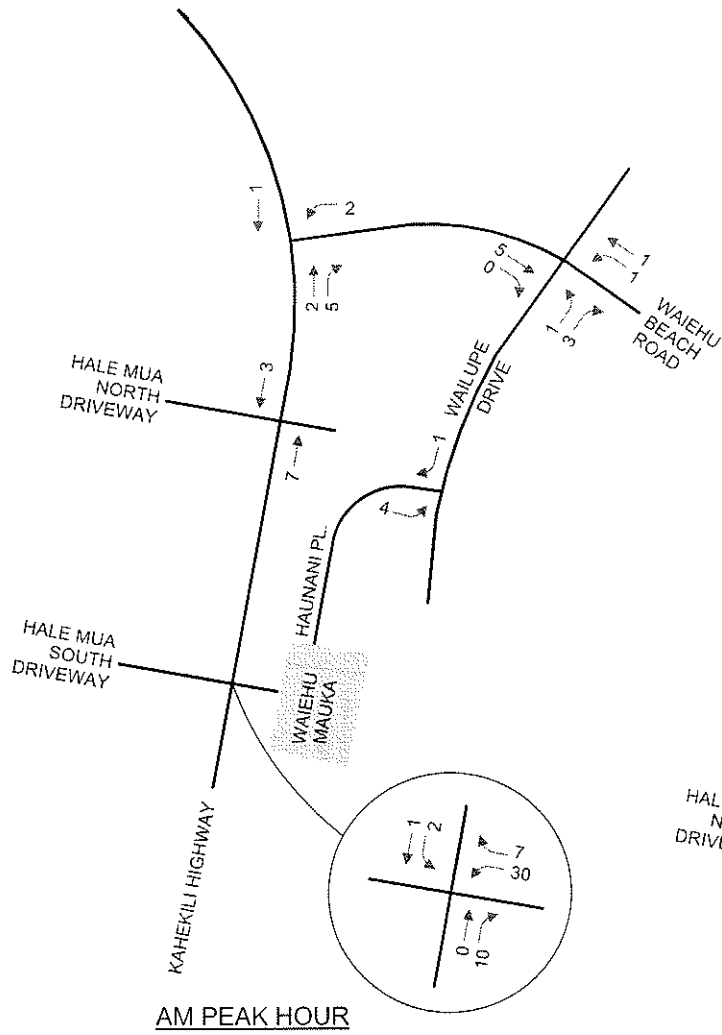
APPROXIMATE NORTH



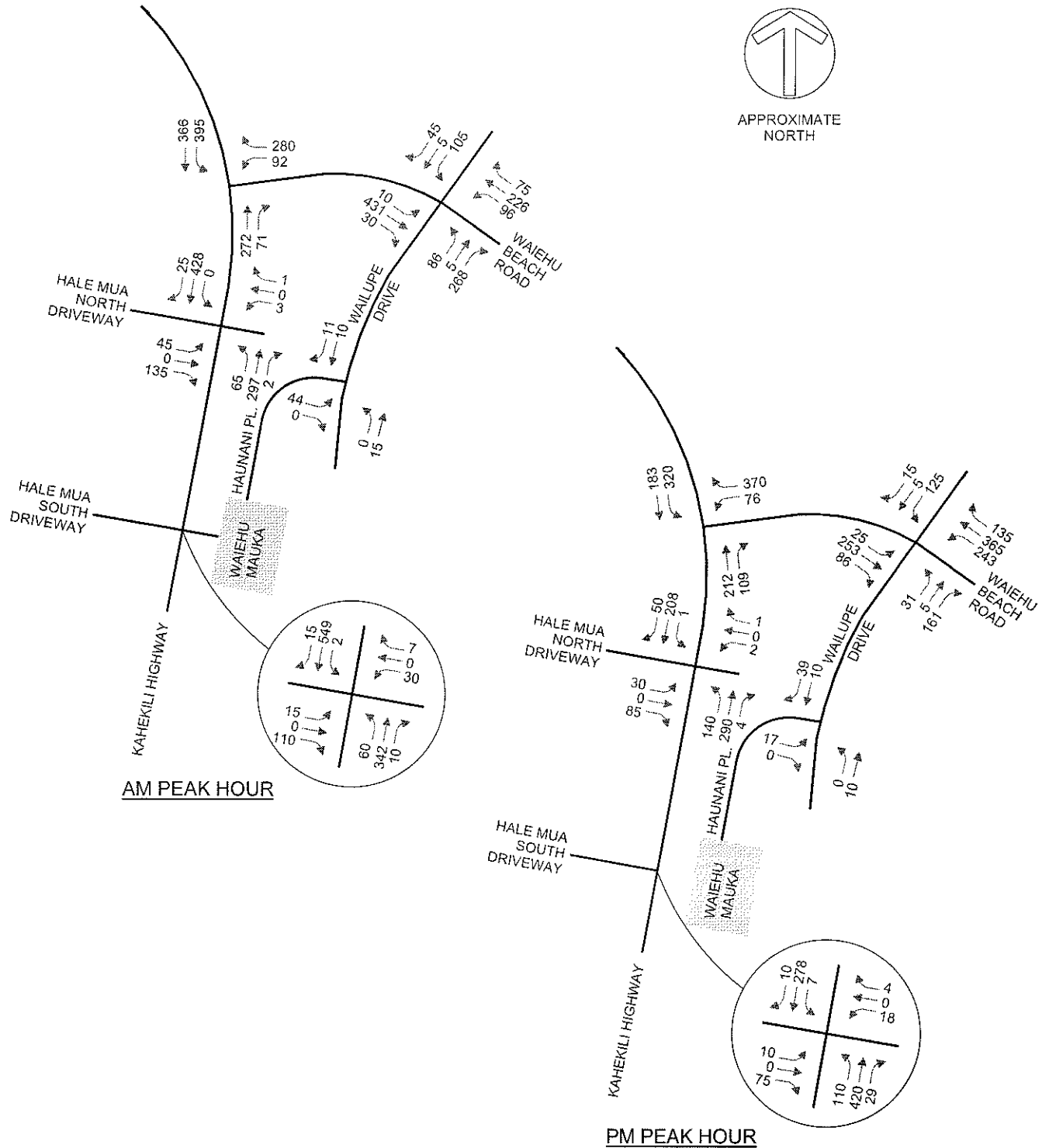
Attachment I
2015 BACKGROUND PEAK HOUR TRAFFIC PROJECTIONS
WITHOUT HALE MUA



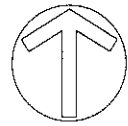
APPROXIMATE NORTH



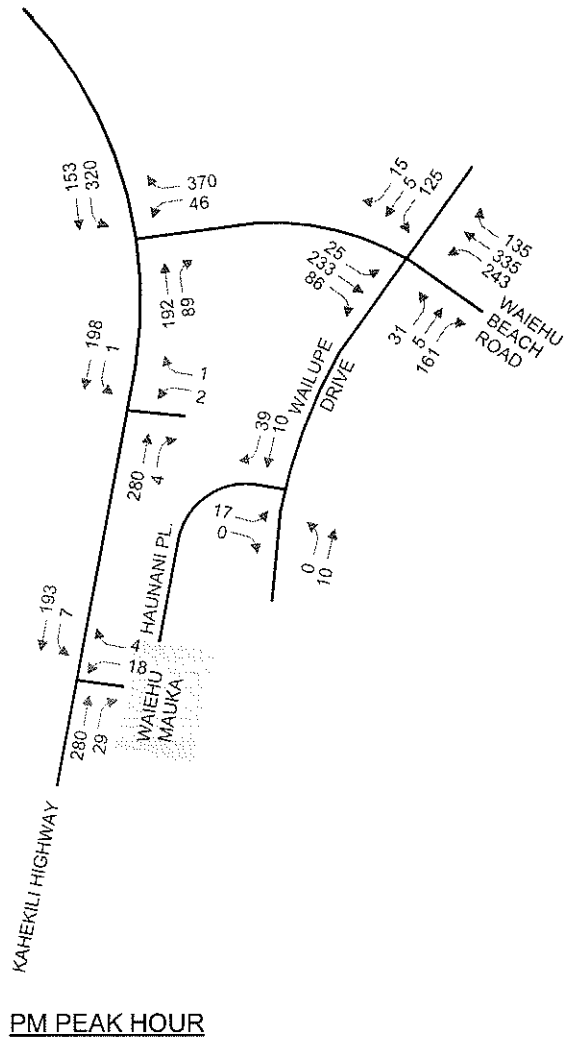
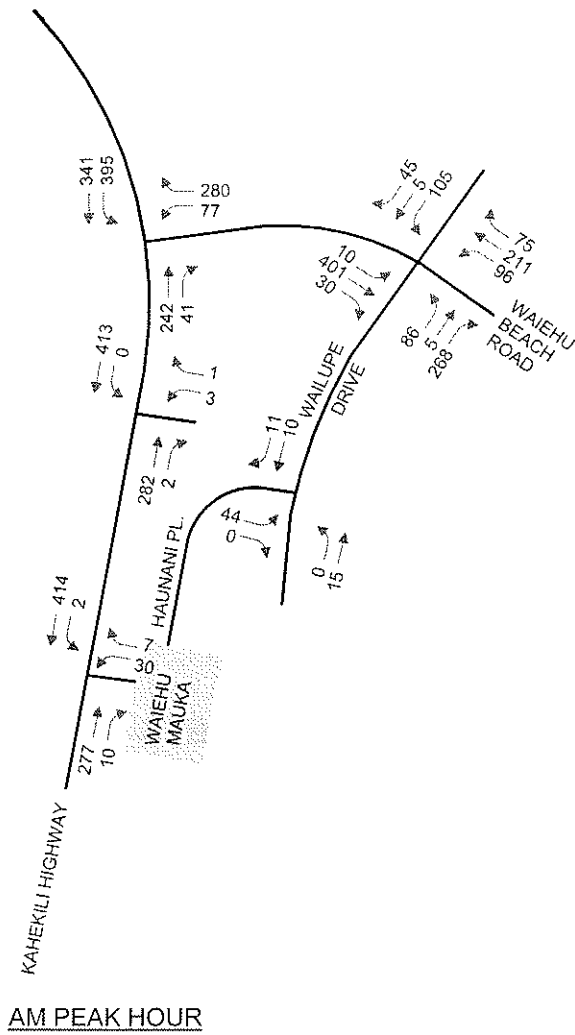
**Attachment J
PROJECT TRIP ASSIGNMENTS**



Attachment K
2015 BACKGROUND PLUS PROJECT PEAK HOUR TRAFFIC PROJECTIONS
WITH HALE MUA



APPROXIMATE
NORTH



Attachment L
2015 BACKGROUND PLUS PROJECT PEAK HOUR TRAFFIC PROJECTIONS
WITHOUT HALE MUA

Attachment M
TRAFFIC PROJECTION WORKSHEETS
WITH HALE MUA

Part 2.1
Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 1
INTERSECTION OF Waiehu Beach Road at Wellups Drive

Approach No	& Mov	Case 1 Existing		Background		Hale Kua Trips		MEO Best Trips		Related Project Traffic		Case 2 2015 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N-	40	15	0	0	0	0	0	0	0	0	45	15	0	0	0	0	0	0	45	15
2	TH	5	0	0	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	5	5
3	LT	95	110	10	15	105	125	0	0	0	0	105	125	0	0	0	0	0	0	105	125
4	E-	65	120	10	15	75	135	0	0	0	0	75	135	0	0	0	0	0	0	75	135
5	TH	185	295	25	35	225	361	1	1	15	31	225	361	1	4	1	4	1	4	226	365
6	LT	85	215	10	25	95	240	0	0	0	0	95	240	0	0	0	0	0	0	96	243
7	S-	235	140	30	20	265	160	0	0	0	0	265	160	3	1	3	1	3	1	268	161
8	TH	5	5	0	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	5	5
9	LT	75	25	10	5	85	30	0	0	0	0	85	30	1	1	1	1	1	1	86	31
10	W-	25	75	5	10	30	85	0	0	0	0	30	85	0	0	0	0	0	0	30	86
11	TH	350	205	45	25	425	251	1	1	31	21	425	251	5	2	5	2	5	2	431	253
12	LT	10	20	0	5	10	25	0	0	0	0	10	25	0	0	0	0	0	0	10	25
TOTAL		1175	1230	150	155	1371	1437	46	52	46	52	1371	1437	11	12	11	12	11	12	1382	1449
Approach Totals																					
From North		140	130	0	15	155	145	0	0	0	0	155	145	0	0	0	0	0	0	155	145
From East		335	630	0	45	75	395	15	31	15	31	385	736	0	0	0	0	0	0	397	743
From South		315	170	0	40	25	355	0	0	0	0	355	195	0	0	0	0	0	0	359	197
From West		365	300	0	50	40	466	31	21	31	21	466	361	46	52	46	52	46	52	471	364
Total		1175	1230	0	150	155	1371	46	52	46	52	1371	1437	11	12	11	12	11	12	1382	1449
Departure Totals																					
To North		80	145	0	10	20	165	0	0	0	0	90	165	0	0	0	0	0	0	90	165
To East		680	455	0	85	60	536	31	21	31	21	786	536	0	0	0	0	0	0	804	539
To South		115	295	0	15	35	330	0	0	0	0	130	330	0	0	0	0	0	0	131	334
To West		300	335	0	40	40	406	15	31	15	31	355	406	46	52	46	52	46	52	357	411
Total		1175	1230	0	150	155	1371	46	52	46	52	1371	1437	11	12	11	12	11	12	1382	1449
Leg Totals																					
North		220	275	0	25	35	310	0	0	0	0	245	310	0	0	0	0	0	0	245	310
East		1015	1085	0	130	135	1272	46	52	46	52	1191	1272	0	0	0	0	0	0	1201	1282
South		430	465	0	55	60	525	0	0	0	0	485	525	0	0	0	0	0	0	490	531
West		585	535	0	50	50	567	46	52	46	52	621	567	46	52	46	52	46	52	628	573
Total		2350	2460	0	300	310	2742	92	104	92	104	2742	2874	11	12	11	12	11	12	2764	2898

Part 2.1
Traffic Projection Worksheet

Waiehu Mauka
 January 2009

INTERSECTION NO 2
 INTERSECTION OF Wallupee Drive at Haunani Place

Approach No & Mt	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 0.15 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1 N- RT	10	30	0	5	0	0	0	0	0	0	10	35	1	4	0	0	11	39	0	0
2 TH	10	10	0	0	0	0	0	0	0	0	10	10	0	0	0	0	10	10	0	0
3 LT			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 E- RT			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 TH			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6 LT			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 S- RT			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 TH	15	10	0	0	0	0	0	0	0	0	15	10	0	0	0	0	15	10	0	0
9 LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 W- RT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 TH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 LT	35	15	0	0	0	0	0	0	0	0	40	15	4	2	0	0	44	17	0	0
TOTAL	70	65	5	5	0	0	0	0	0	0	75	70	4	2	0	0	80	76	0	0
Approach Totals																				
From North	20	40	0	0	0	0	0	0	0	0	20	45	0	0	0	0	21	49	0	0
From East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From South	15	10	0	0	0	0	0	0	0	0	15	10	0	0	0	0	15	10	0	0
From West	35	15	0	0	0	0	0	0	0	0	40	15	0	0	0	0	44	17	0	0
Total	70	65	0	0	0	0	0	0	0	0	75	70	0	0	0	0	80	76	0	0
Departure Totals																				
To North	50	25	0	0	0	0	0	0	0	0	55	25	0	0	0	0	59	27	0	0
To East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South	10	10	0	0	0	0	0	0	0	0	10	10	0	0	0	0	10	10	0	0
To West	10	30	0	0	0	0	0	0	0	0	10	35	0	0	0	0	11	39	0	0
Total	70	65	0	0	0	0	0	0	0	0	75	70	0	0	0	0	80	76	0	0
Leg Totals																				
North	70	65	0	0	0	0	0	0	0	0	75	70	0	0	0	0	80	76	0	0
East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South	25	20	0	0	0	0	0	0	0	0	25	20	0	0	0	0	25	20	0	0
West	45	45	0	0	0	0	0	0	0	0	50	50	0	0	0	0	55	55	0	0
Total	140	130	0	0	0	0	0	0	0	0	150	140	0	0	0	0	160	152	0	0

Part 2.1
Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 3
Waiehu Beach Road at Kahikii Highway

Approach No & Mtd	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 2015 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1 N- RT	300	135	0	0	25	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 TH LT	350	285	45	35	0	0	25	30	0	0	365	180	1	3	0	0	1	3	366	183
3 LT	350	285	45	35	0	0	0	0	0	0	385	320	0	0	0	0	0	0	395	320
4 E- RT	250	330	30	40	0	0	0	0	0	0	280	370	0	0	0	0	0	0	280	370
5 TH	65	35	0	0	15	30	0	0	15	30	90	71	1	4	0	0	0	0	0	0
6 LT	30	75	5	10	30	20	1	1	31	21	66	106	0	1	1	4	2	5	92	76
7 S- RT	215	170	25	20	30	20	1	1	30	20	270	210	0	1	2	2	5	3	71	109
8 TH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	272	212
9 LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 W- RT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 TH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12 LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1210	1030	155	125	101	102	101	102	101	102	1466	1257	1466	1257	10	13	10	13	1476	1270
Approach Totals	650	420	85	50	25	30	25	30	25	30	760	500	761	503	761	503	761	503	372	446
From North	315	365	0	45	15	31	15	31	15	31	370	441	370	441	370	441	370	441	343	321
From East	245	245	0	30	61	41	61	41	61	41	336	316	336	316	336	316	336	316	0	0
From South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1210	1030	85	125	101	102	101	102	101	102	1466	1257	1466	1257	10	13	10	13	1476	1270
Departure Totals	465	500	55	60	30	20	30	20	30	20	580	580	580	580	552	582	552	582	466	429
To North	380	380	0	45	31	21	31	21	31	21	461	426	461	426	466	429	466	429	458	259
To East	365	170	0	50	40	61	40	61	40	61	455	251	455	251	458	259	458	259	0	0
To South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1210	1030	55	125	101	102	101	102	101	102	1466	1257	1466	1257	10	13	10	13	1476	1270
Leg Totals	1115	920	140	110	55	50	55	50	55	50	1310	1080	1313	1085	1313	1085	1313	1085	838	875
North	695	725	0	90	46	52	46	52	46	52	831	867	831	867	831	867	831	867	801	580
East	610	415	0	80	101	102	101	102	101	102	791	567	791	567	791	567	791	567	0	0
South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West	0	0	0	0	202	204	202	204	202	204	2932	2514	2932	2514	2932	2514	2932	2514	2952	2640
Total	2420	2060	310	250	202	204	202	204	202	204	2932	2514	2932	2514	2932	2514	2932	2514	2952	2640

Part 2.1
Traffic Projection Worksheet

Waiehu Mauka
 January 2009

INTERSECTION NO 4
 INTERSECTION OF Kahakuli Highway at Hale Mua North Driveway/MEO Best Driveway

Approach No	Approach & Mov	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 0.15 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N-	RT	0	0	0	25	50	0	1	25	50	0	0	0	0	0	0	0	0	25	50
2	TH	365	170	45	20	15	10	15	10	15	10	425	200	3	8	2	7	3	428	208	
3	LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	E-	RT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5	TH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6	LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7	S-	RT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8	TH	245	245	30	30	15	10	3	2	15	10	290	285	0	1	7	4	7	297	290	
9	LT	0	0	0	0	65	140	0	0	65	140	65	140	0	0	0	0	0	65	140	
10	W-	RT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	TH	0	0	0	0	135	85	0	0	135	85	135	85	0	0	0	0	0	135	85	
12	LT	0	0	0	0	45	30	0	0	45	30	45	30	0	0	0	0	0	45	30	
TOTAL			610	415	75	50	306	333	981	798	306	333	981	798	10	13	1001	811	1001	811	
Approach Totals																					
From North		365	170	0	45	20	40	61	450	251	40	61	450	251	4	3	453	259	453	259	
From East		0	0	0	0	0	4	3	4	3	4	3	4	3	0	0	4	3	4	3	
From South		245	245	0	30	30	82	154	357	429	82	154	357	429	0	0	364	434	364	434	
From West		0	0	0	0	0	180	115	180	115	180	115	180	115	0	0	180	115	180	115	
Total		610	415	0	75	50	306	333	981	798	306	333	981	798	10	13	1001	811	1001	811	
Departure Totals																					
To North		245	245	0	30	30	61	41	336	316	61	41	336	316	0	0	343	321	343	321	
To East		0	0	0	0	0	2	5	2	5	2	5	2	5	0	0	2	5	2	5	
To South		365	170	0	45	20	153	97	563	287	153	97	563	287	0	0	566	295	566	295	
To West		0	0	0	0	0	30	190	30	190	30	190	30	190	0	0	30	190	30	190	
Total		610	415	0	75	50	306	333	981	798	306	333	981	798	10	13	1001	811	1001	811	
Leg Totals																					
North		610	415	0	75	50	101	102	786	567	101	102	786	567	0	0	796	580	796	580	
East		0	0	0	0	0	6	8	6	8	6	8	6	8	0	0	6	8	6	8	
South		610	415	0	75	50	235	251	920	716	235	251	920	716	0	0	930	729	930	729	
West		0	0	0	0	0	270	305	270	305	270	305	270	305	0	0	270	305	270	305	
Total		1220	830	0	150	100	612	666	1582	1596	612	666	1582	1596	10	13	2002	1622	2002	1622	

Part 2.1
Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 5
INTERSECTION OF Kanekili Highway at Hale Mua South Driveway/Waiehu Mauka Driveway

Approach No	Direction	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 2015 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N- RT			0	0	15	10	15	10	15	10	15	10	1	1	0	0	0	0	15	10
2	TH	365	170	45	20	135	85	3	2	138	87	548	277	0	0	1	1	1	1	549	278
3	LT			0	0	0	0			0	0	0	0	2	7	2	7	2	7	2	7
4	E- RT			0	0	0	0			0	0	0	0	7	4	7	4	7	4	7	4
5	TH			0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0
6	LT			0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0
7	S- RT			0	0	0	0			0	0	0	0	30	18	30	18	30	18	30	18
8	TH	245	245	30	30	65	140	2	4	67	144	342	419	0	1	10	29	0	1	342	420
9	LT			0	0	60	110			60	110	60	110	0	0	0	0	0	0	60	110
10	W- RT			0	0	110	75			110	75	110	75	0	0	0	0	0	0	110	75
11	TH			0	0	0	0			0	0	0	0	0	0	0	0	0	0	0	0
12	LT			0	0	15	10			15	10	15	10	0	0	0	0	0	0	15	10
TOTAL		610	415	75	50	405	436	1050	901	405	436	1050	901	50	60	50	60	50	60	1140	961
Approach Totals																					
From North		365	170	0	45	20				153	97	563	287							566	295
From East		0	0	0	0	0				0	0	0	0							37	22
From South		245	245	0	30	30				127	254	402	529							412	559
From West		0	0	0	0	0				125	85	125	85							125	85
Total		610	415	0	75	50				405	436	1050	901							1140	961
Departure Totals																					
To North		245	245	0	30	30				82	154	357	429							364	434
To East		0	0	0	0	0				0	0	0	0							12	36
To South		365	170	0	45	20				248	162	658	352							689	371
To West		0	0	0	0	0				75	120	75	120							75	120
Total		610	415	0	75	50				405	436	1050	901							1140	961
Leg Totals																					
North		610	415	0	75	50				235	251	920	716							930	720
East		0	0	0	0	0				0	0	0	0							49	58
South		610	415	0	75	50				375	416	1050	881							1101	930
West		0	0	0	0	0				200	205	200	205							200	205
Total		1220	830	0	150	100				810	872	2180	1802							2280	1922

Attachment N
TRAFFIC PROJECTION WORKSHEETS
WITHOUT HALE MUA

Part 2.1
Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 1
INTERSECTION OF Waiehu Beach Road at Wallupe Drive

Approach No	Approach & Mov	Case 1 Existing		Background Growth		Hale Maua Trips		MEO Best Trips		Related Project Traffic		Case 2 0.15 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N- RT	40	15	0	0	0	0	0	0	0	0	45	15	0	0	0	0	0	0	45	15
2	TH	5	5	0	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	105	125
3	LT	95	110	10	15	105	125	0	0	0	0	75	135	0	0	0	0	0	0	175	135
4	E- RT	65	120	10	15	0	0	0	0	0	0	210	331	1	4	1	4	1	1	211	335
5	TH	185	295	25	35	0	0	1	1	0	0	95	240	3	1	3	1	3	0	96	243
6	E- LT	85	215	10	25	0	0	0	0	0	0	265	160	3	1	3	1	3	0	268	161
7	S- RT	235	140	30	20	0	0	0	0	0	0	5	5	0	0	0	0	0	0	5	5
8	TH	5	5	0	0	0	0	0	0	0	0	85	30	1	1	1	1	1	0	86	31
9	E- LT	75	25	10	5	0	0	0	0	0	0	30	85	0	1	0	1	0	0	30	86
10	W- RT	25	75	5	10	0	0	0	0	0	0	396	231	0	1	5	2	5	5	401	233
11	TH	350	205	45	25	1	1	1	1	1	1	10	25	0	0	0	0	0	0	10	25
12	LT	10	20	0	5	0	0	0	0	0	0	1326	1387	1	2	11	12	11	12	1337	1399
	TOTAL	1175	1230	150	155																
Approach Totals																					
From North		140	130	0	15	155	145	0	0	0	0	155	145	0	0	0	0	0	0	155	145
From East		335	630	0	45	380	706	0	1	0	0	380	706	0	0	0	0	0	0	382	713
From South		315	170	0	40	25	195	0	0	0	0	355	195	0	0	0	0	0	0	359	197
From West		385	300	0	50	40	341	1	1	1	1	436	341	1	1	1	1	1	1	441	344
Total		1175	1230	0	150	155	1326	1387	1	2	1	1326	1387	1	2	11	12	11	12	1337	1399
Departure Totals																					
To North		60	145	0	10	20	165	0	0	0	0	60	165	0	0	0	0	0	0	90	165
To East		680	485	0	85	60	516	1	1	1	1	766	516	1	1	1	1	1	1	774	519
To South		115	285	0	15	35	330	0	0	0	0	130	330	0	0	0	0	0	0	131	334
To West		300	335	0	40	40	376	0	0	0	0	340	376	0	0	0	0	0	0	342	381
Total		1175	1230	0	150	155	1326	1387	1	2	1	1326	1387	1	2	11	12	11	12	1337	1399
Leg Totals																					
North		220	275	0	25	35	310	0	0	0	0	245	310	0	0	0	0	0	0	245	310
East		1015	1095	0	130	135	1222	1	2	1	2	1146	1222	1	2	1	2	1	2	1156	1232
South		430	465	0	55	60	525	0	0	0	0	485	525	0	0	0	0	0	0	490	531
West		685	635	0	90	80	717	1	2	1	2	726	717	1	2	1	2	1	2	783	726
Total		2350	2460	0	300	310	2652	2	4	2	4	2652	2774	2	4	11	12	11	12	2674	2798

Part 2.1
Traffic Projection Worksheet

Waialehu Mauka
January 2009

INTERSECTION NO 2
INTERSECTION OF Waialehu Drive at Heaunani Place

No	Approach & Mt	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 015 Background		Single Family Trips		Multi Family Trips		Project Trips		Background Plus Project		Case 3 AM	Case 3 PM
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM		
1	N- RT	10	30	0	5	0	0	0	0	0	0	10	35	1	4	1	4	11	39	0	0	11	39
2	TH LT	10	10	0	0	0	0	0	0	0	0	10	10	0	0	0	0	10	10	0	0	10	10
3	LT			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	E- RT			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	TH			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	TH			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	S- RT			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	TH	15	10	0	0	0	0	0	0	0	0	15	10	0	0	0	0	15	10	0	0	15	10
9	LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	W- RT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	TH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	LT	35	15	0	0	0	0	0	0	0	0	40	15	4	2	4	2	44	17	4	2	44	17
	TOTAL	70	65	5	5	0	0	0	0	0	0	75	70	4	2	5	6	80	76	5	6	80	76
Approach Totals																							
	From North	20	40	0	0	0	0	0	0	0	0	20	45	0	0	0	0	21	49	0	0	21	49
	From East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	From South	15	10	0	0	0	0	0	0	0	0	15	10	0	0	0	0	15	10	0	0	15	10
	From West	35	15	0	0	0	0	0	0	0	0	40	15	0	0	0	0	44	17	0	0	44	17
	Total	70	65	0	0	0	0	0	0	0	0	75	70	4	2	5	6	80	76	4	2	80	76
Departure Totals																							
	To North	50	25	0	0	0	0	0	0	0	0	55	25	0	0	0	0	59	27	0	0	59	27
	To East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	To South	10	10	0	0	0	0	0	0	0	0	10	10	0	0	0	0	10	10	0	0	10	10
	To West	10	30	0	0	0	0	0	0	0	0	10	35	0	0	0	0	11	39	0	0	11	39
	Total	70	65	0	0	0	0	0	0	0	0	75	70	4	2	5	6	80	76	4	2	80	76
Leg Totals																							
	North	70	65	0	0	0	0	0	0	0	0	75	70	0	0	0	0	80	76	0	0	80	76
	East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	South	25	20	0	0	0	0	0	0	0	0	25	20	0	0	0	0	25	20	0	0	25	20
	West	45	45	0	0	0	0	0	0	0	0	50	50	0	0	0	0	55	56	0	0	55	56
	Total	140	130	0	0	0	0	0	0	0	0	150	140	4	2	5	6	160	152	4	2	160	152

Part 2.1
Traffic Projection Worksheet

Waiehu Meads
January 2009

INTERSECTION NO 3
INTERSECTION OF Waiehu Beach Road at Kaiheki Highway

Approach No	Approach & Mt	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 101.5 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N-	360	135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	TH	360	135	40	15	340	150	0	0	0	0	340	150	0	0	0	0	0	0	341	153
3	LT	350	285	45	35	395	320	0	0	0	0	395	320	0	0	0	0	0	0	395	320
4	E-	250	330	30	40	280	370	0	0	0	0	280	370	0	0	0	0	0	0	280	370
5	TH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	LT	65	35	10	5	75	41	0	0	0	0	75	41	0	0	0	0	0	0	77	46
7	S-	30	75	5	10	36	86	1	1	1	1	36	86	0	0	0	0	0	0	41	89
8	TH	215	170	25	20	240	190	0	0	0	0	240	190	0	0	0	0	0	0	242	192
9	LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	W-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	TH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	LT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		1210	1030	155	125	1366	1157	1	2	1	2	1366	1157	10	13	10	13	10	13	1376	1170
Approach Totals																					
From North		650	420	0	85	50	0	0	0	0	0	735	470	0	0	0	0	0	0	736	473
From East		315	365	0	40	45	0	0	0	0	0	355	411	0	0	0	0	0	0	357	416
From South		245	245	0	30	30	0	0	0	0	0	276	276	0	0	0	0	0	0	283	281
From West		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		1210	1030	0	155	125	0	0	0	0	0	1366	1157	0	0	0	0	0	0	1376	1170
Departure Totals																					
To North		465	500	0	55	60	0	0	0	0	0	520	560	0	0	0	0	0	0	522	562
To East		380	360	0	50	45	0	0	0	0	0	431	406	0	0	0	0	0	0	436	409
To South		365	170	0	50	20	0	0	0	0	0	415	191	0	0	0	0	0	0	418	199
To West		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		1210	1030	0	155	125	0	0	0	0	0	1366	1157	0	0	0	0	0	0	1375	1170
Leg Totals																					
North		1115	920	0	140	110	0	0	0	0	0	1255	1030	0	0	0	0	0	0	1258	1035
East		695	725	0	90	90	0	0	0	0	0	786	817	0	0	0	0	0	0	793	825
South		610	415	0	80	50	0	0	0	0	0	691	467	0	0	0	0	0	0	701	480
West		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		2420	2060	0	310	250	0	0	0	0	0	2732	2314	0	0	0	0	0	0	2752	2340

Part 2.1
Traffic Projection Worksheet

Waialeale Mauka
 January 2008

INTERSECTION NO 4
 INTERSECTION OF Kahakuli Highway at Hale Mua North Driveway/MEO Best Driveway

Approach No & Mvt	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 2015 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1 N-			0	0																
2 TH	365	170	45	20																
3 LT			0	0																
4 E-			0	0																
5 TH			0	0																
6 LT			0	0																
7 S-			0	0																
8 TH	245	245	30	30																
9 LT			0	0																
10 W-			0	0																
11 TH			0	0																
12 LT			0	0																
TOTAL	610	415	75	50					6	8	691	473					10	13	701	486
Approach Totals																				
From North	365	170	0	45	20				0	1	410	191							413	199
From East	0	0	0	0	0				4	3	4	3							4	3
From South	245	245	0	30	30				2	4	277	279							284	284
From West	0	0	0	0	0				0	0	0	0							0	0
Total	610	415	0	75	50				6	8	691	473							701	486
Departure Totals																				
To North	245	245	0	30	30				1	1	276	276							283	281
To East	0	0	0	0	0				2	5	2	5							2	5
To South	365	170	0	45	20				3	2	413	192							416	200
To West	0	0	0	0	0				0	0	0	0							0	0
Total	610	415	0	75	50				6	8	691	473							701	486
Leg Totals																				
North	610	415	0	75	50				1	2	696	467							696	480
East	0	0	0	0	0				6	8	6	8							6	8
South	610	415	0	75	50				5	6	690	471							700	484
West	0	0	0	0	0				0	0	0	0							0	0
Total	1220	830	0	150	100				12	16	1382	946							1402	972

Part 2.1
Traffic Projection Worksheet

Waiehu Maika
 January 2009

INTERSECTION NO 5
 Kahekili Highway at Hale Mua South Driveway/Waiehu Maika Driveway

Approach No & Mgt	Case 1 Existing		Background Growth		Hale Mua Trips		MEO Best Trips		Related Project Traffic		Case 2 2015 Background		Single Family Trips		Multi Family Trips		Project Trips		Case 3 Background Plus Project	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1 N- RT			0	0					0	0	0	0					0	0	0	0
2 TH	365	170	45	20			3	2	3	2	413	192	1	1	2	7	1	1	414	193
3 LT			0	0			0	0	0	0	0	0					2	7	2	7
4 E- RT			0	0			0	0	0	0	0	0					7	4	7	4
5 TH			0	0			0	0	0	0	0	0					0	0	0	0
6 LT			0	0			0	0	0	0	0	0					0	0	0	0
7 S- RT			0	0			0	0	0	0	0	0					30	18	30	18
8 TH	245	245	30	30			2	4	2	4	277	279	0	1	10	29	0	1	277	280
9 LT			0	0			0	0	0	0	0	0					0	0	0	0
10 W- RT			0	0			0	0	0	0	0	0					0	0	0	0
11 TH			0	0			0	0	0	0	0	0					0	0	0	0
12 LT			0	0			0	0	0	0	0	0					0	0	0	0
TOTAL	610	415	75	50			5	6	5	6	690	471			50	60	50	60	740	531

Approach Totals

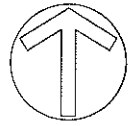
From North	365	170	0	45	20			3	2	3	2	413	192					3	2	3	2
From East	0	0	0	0	0			0	0	0	0	0	0					0	0	0	0
From South	245	245	0	30	30			2	4	2	4	277	279					2	4	2	4
From West	0	0	0	0	0			0	0	0	0	0	0					0	0	0	0
Total	610	415	0	75	50			5	6	5	6	690	471					5	6	5	6

Departure Totals

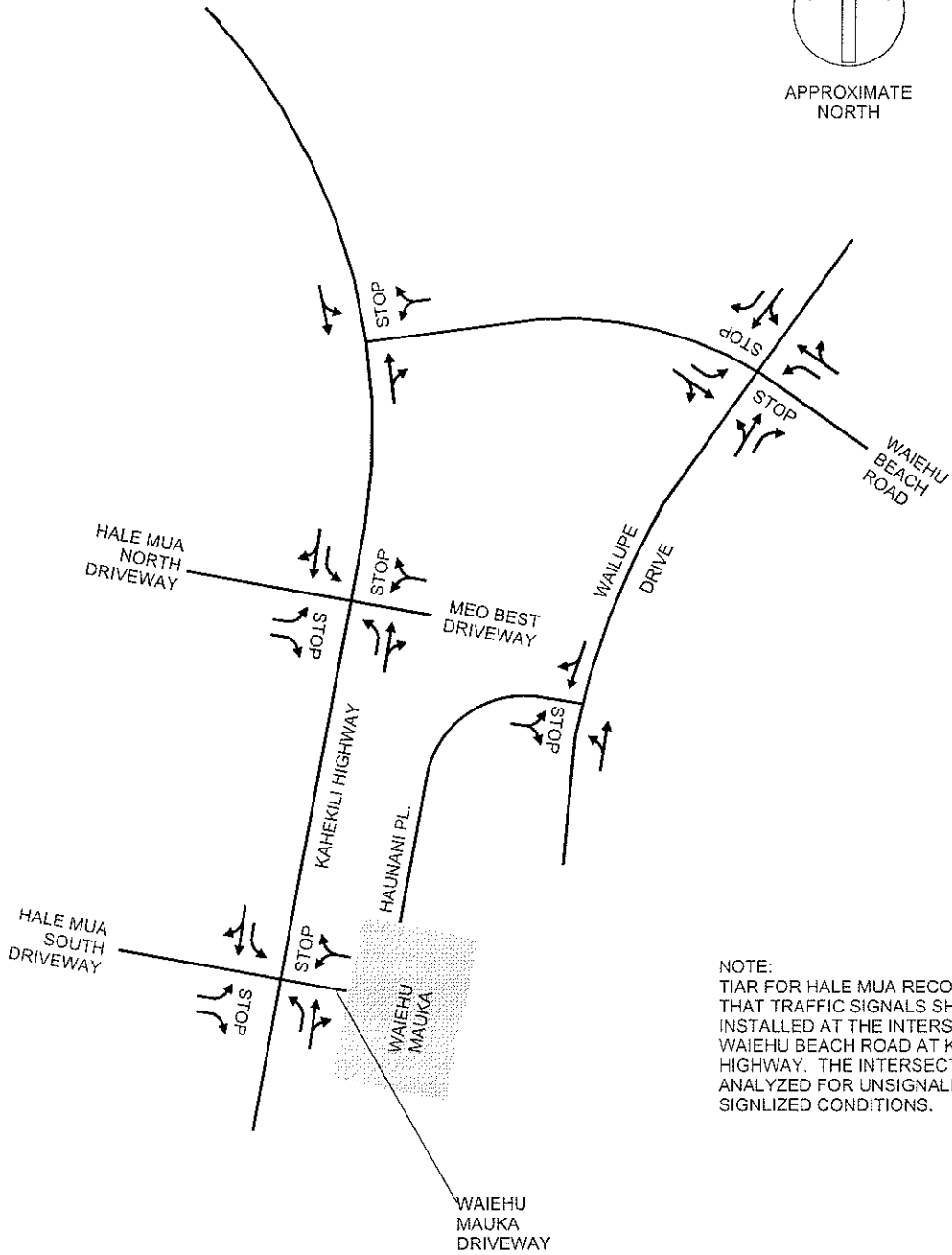
To North	245	245	0	30	30			2	4	2	4	277	279					2	4	2	4
To East	0	0	0	0	0			0	0	0	0	0	0					0	0	0	0
To South	365	170	0	45	20			3	2	3	2	413	192					3	2	3	2
To West	0	0	0	0	0			0	0	0	0	0	0					0	0	0	0
Total	610	415	0	75	50			5	6	5	6	690	471					5	6	5	6

Leg Totals

North	610	415	0	75	50			5	6	5	6	690	471					5	6	5	6
East	0	0	0	0	0			0	0	0	0	0	0					0	0	0	0
South	610	415	0	75	50			5	6	5	6	690	471					5	6	5	6
West	0	0	0	0	0			0	0	0	0	0	0					0	0	0	0
Total	1220	830	0	150	100			10	12	10	12	1380	942					10	12	10	12

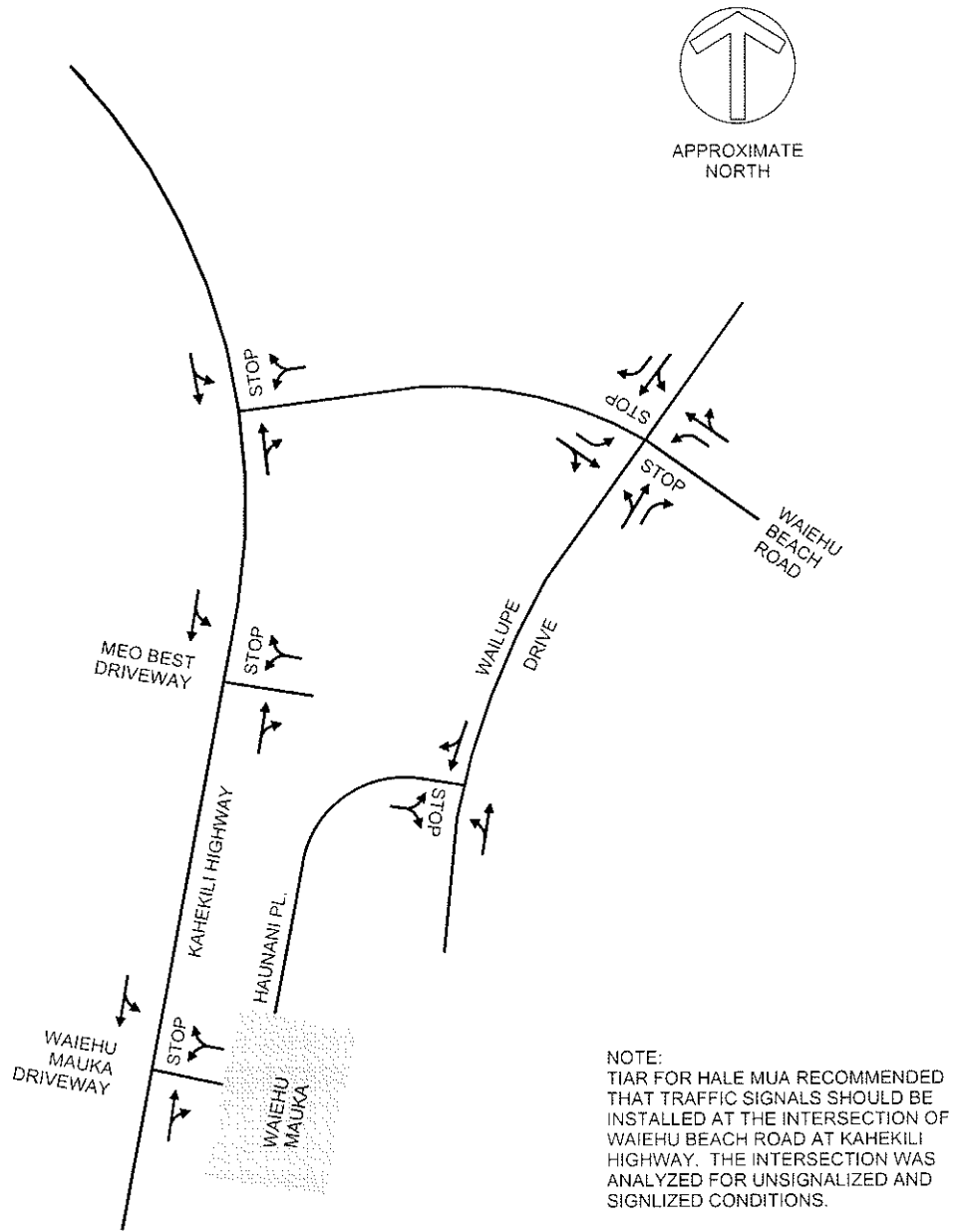


APPROXIMATE
NORTH



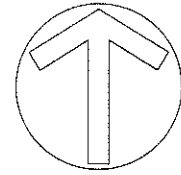
NOTE:
TIAR FOR HALE MUA RECOMMENDED
THAT TRAFFIC SIGNALS SHOULD BE
INSTALLED AT THE INTERSECTION OF
WAIEHU BEACH ROAD AT KAHEKILI
HIGHWAY. THE INTERSECTION WAS
ANALYZED FOR UNSIGNALIZED AND
SIGNALIZED CONDITIONS.

Attachment O
2015 LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS
WITH HALE MUA

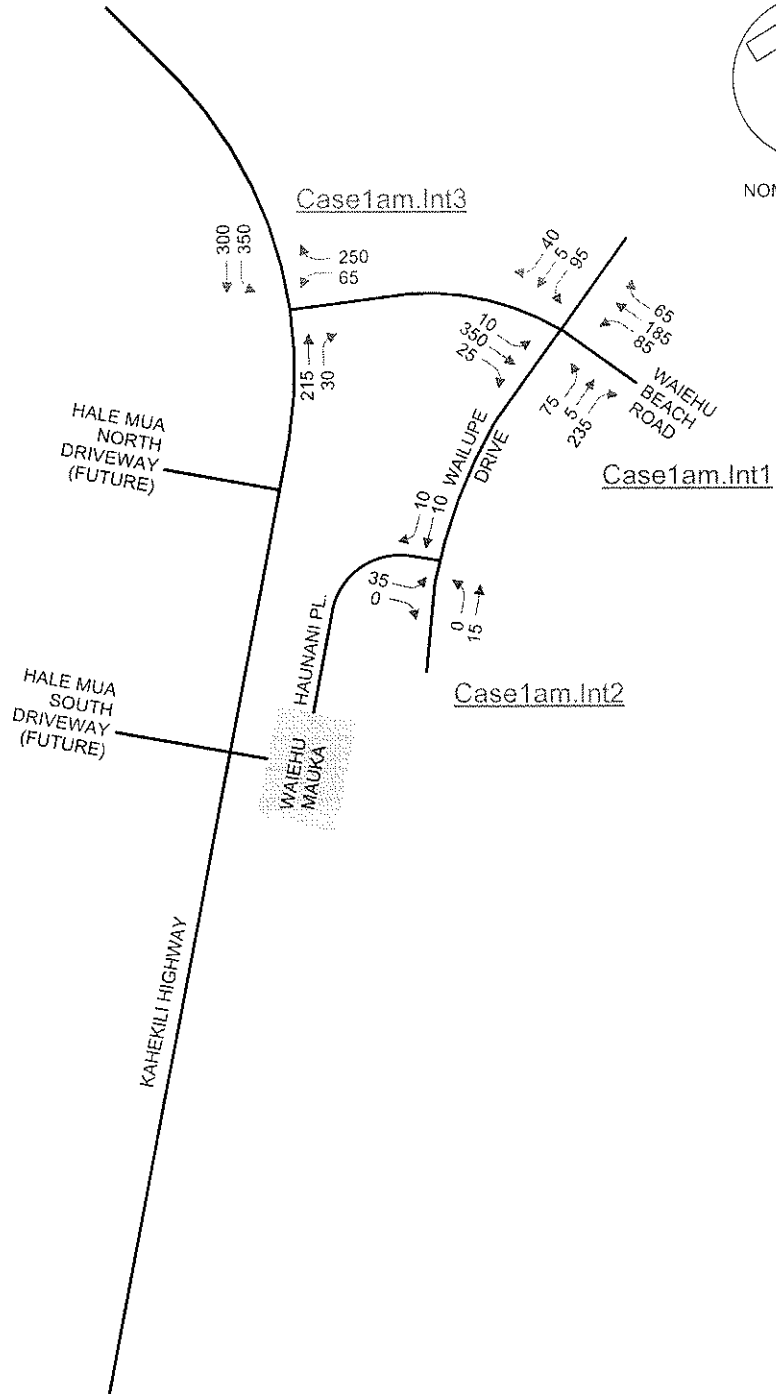


**Attachment P
 2015 LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS
 WITHOUT HALE MUA**

Attachment Q
LEVEL-OF-SERVICE WORKSHEETS



NOMINAL NORTH

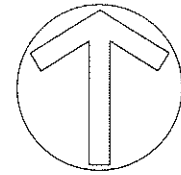


Case 1am
EXISTING AM PEAK HOUR

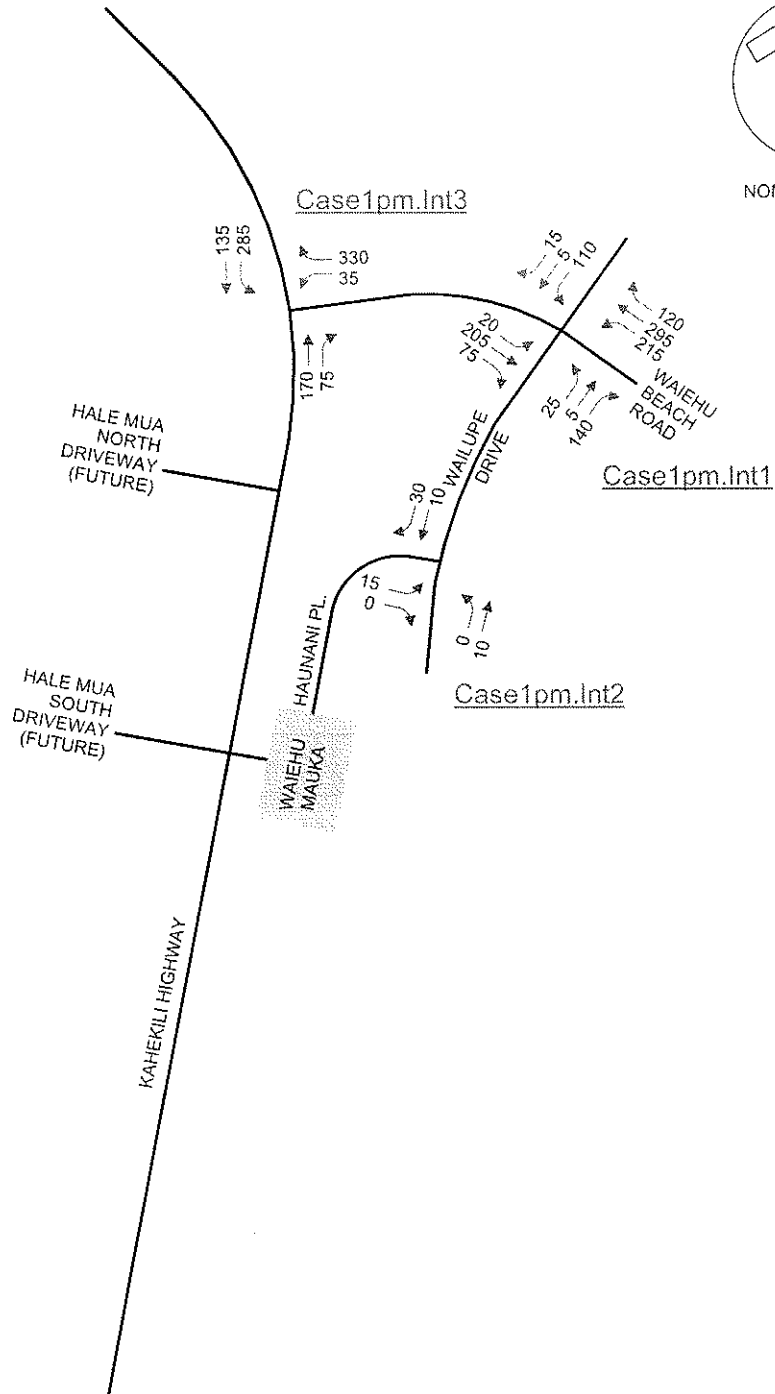
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case1am.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	350	25	85	185	65		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	10	360	25	87	190	67		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	75	5	235	95	5	40		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	77	5	242	97	5	41		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	10	87	82		242	102		41
C (m) (veh/h)	1290	1157	267		667	152		808
v/c	0.01	0.08	0.31		0.36	0.67		0.05
95% queue length	0.02	0.24	1.26		1.66	3.80		0.16
Control Delay (s/veh)	7.8	8.4	24.3		13.4	67.1		9.7
LOS	A	A	C		B	F		A
Approach Delay (s/veh)	--	--	16.2			50.6		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case1am.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	15			10	10		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	40	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1		0	
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	35		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	11	0	17	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0	0	
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						40	
C (m) (veh/h)	1574						973	
v/c	0.00						0.04	
95% queue length	0.00						0.13	
Control Delay (s/veh)	7.3						8.9	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.9	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case1am.Int3			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		215	30	350	300			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	68	0	263		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				65		250		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	368	315	0	0	226	31		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		368		331				
C (m) (veh/h)		1290		381				
v/c		0.29		0.87				
95% queue length		1.19		8.45				
Control Delay (s/veh)		8.9		52.5				
LOS		A		F				
Approach Delay (s/veh)	--	--	52.5					
Approach LOS	--	--	F					



NOMINAL NORTH

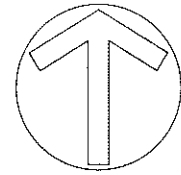


Case 1pm
EXISTING PM PEAK HOUR

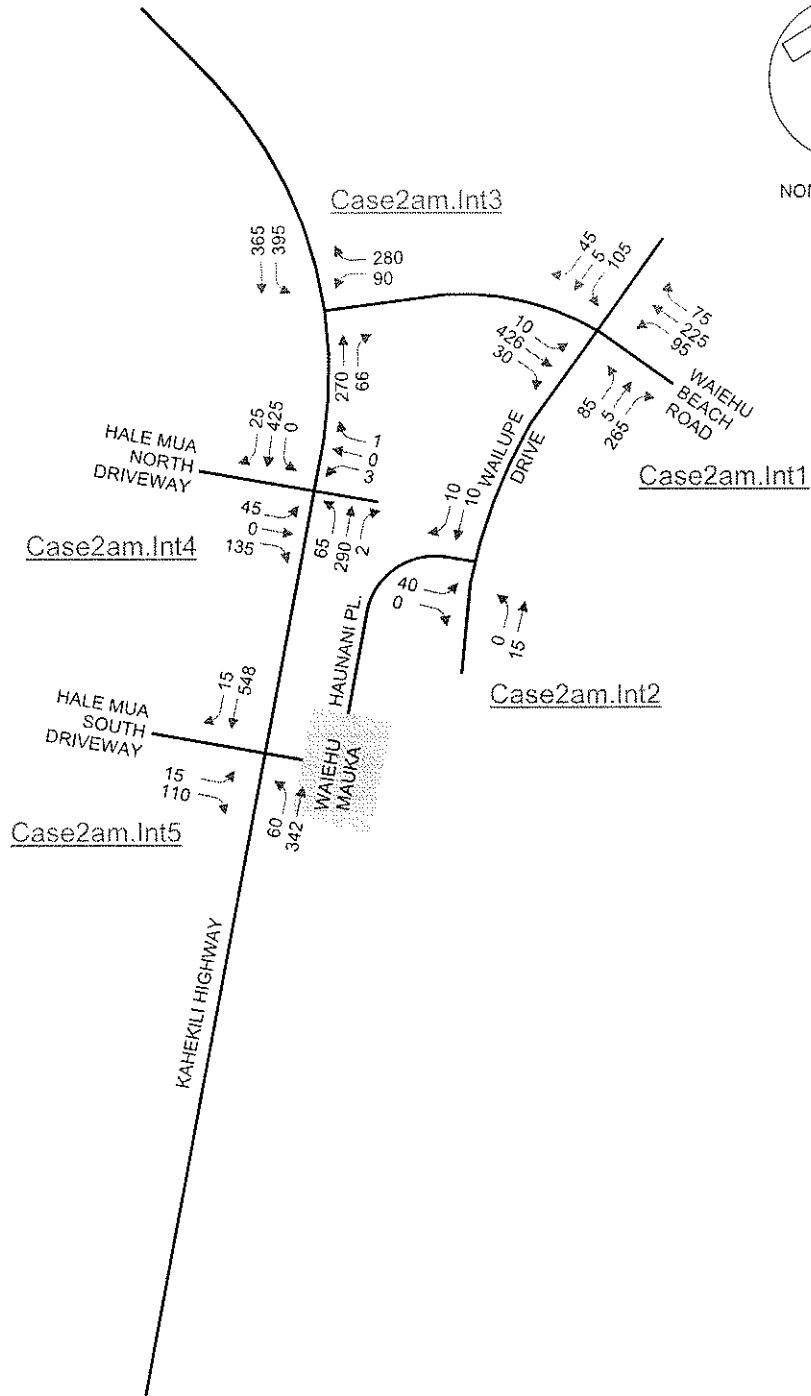
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case1pm.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	20	205	75	215	295	120		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	20	211	77	221	304	123		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	25	5	140	110	5	15		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	25	5	144	113	5	15		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	20	221	30		144	118		15
C (m) (veh/h)	1116	1257	153		781	114		673
v/c	0.02	0.18	0.20		0.18	1.04		0.02
95% queue length	0.05	0.64	0.70		0.67	6.91		0.07
Control Delay (s/veh)	8.3	8.5	34.2		10.6	166.0		10.5
LOS	A	A	D		B	F		B
Approach Delay (s/veh)	--	--	14.7			148.5		
Approach LOS	--	--	B			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case1pm.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	10			10	30		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	17	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	15		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	34	0	11	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						17	
C (m) (veh/h)	1544						965	
v/c	0.00						0.02	
95% queue length	0.00						0.05	
Control Delay (s/veh)	7.3						8.8	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.8	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case1pm.Int3			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		170	75	285	135			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	36	0	347		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				35		330		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	300	142	0	0	178	78		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		300		383				
C (m) (veh/h)		1292		647				
v/c		0.23		0.59				
95% queue length		0.90		3.89				
Control Delay (s/veh)		8.6		18.3				
LOS		A		C				
Approach Delay (s/veh)	--	--	18.3					
Approach LOS	--	--	C					



NOMINAL NORTH



Case 2am
2015 BACKGROUND
WITH HALE MUA

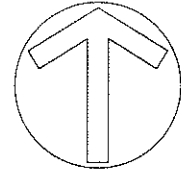
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2am.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	426	30	95	225	75		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	10	439	30	97	231	77		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	85	5	265	105	5	45		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	87	5	273	108	5	46		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	10	97	92		273	113		46
C (m) (veh/h)	1236	1077	207		600	99		761
v/c	0.01	0.09	0.44		0.46	1.14		0.06
95% queue length	0.02	0.30	2.09		2.37	7.44		0.19
Control Delay (s/veh)	7.9	8.7	35.6		15.9	213.5		10.0
LOS	A	A	E		C	F		B
Approach Delay (s/veh)	--	--	20.9			154.6		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2am.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	15			10	10		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	46	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	40		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	11	0	17	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						46	
C (m) (veh/h)	1574						973	
v/c	0.00						0.05	
95% queue length	0.00						0.15	
Control Delay (s/veh)	7.3						8.9	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.9	
Approach LOS	--	--					A	

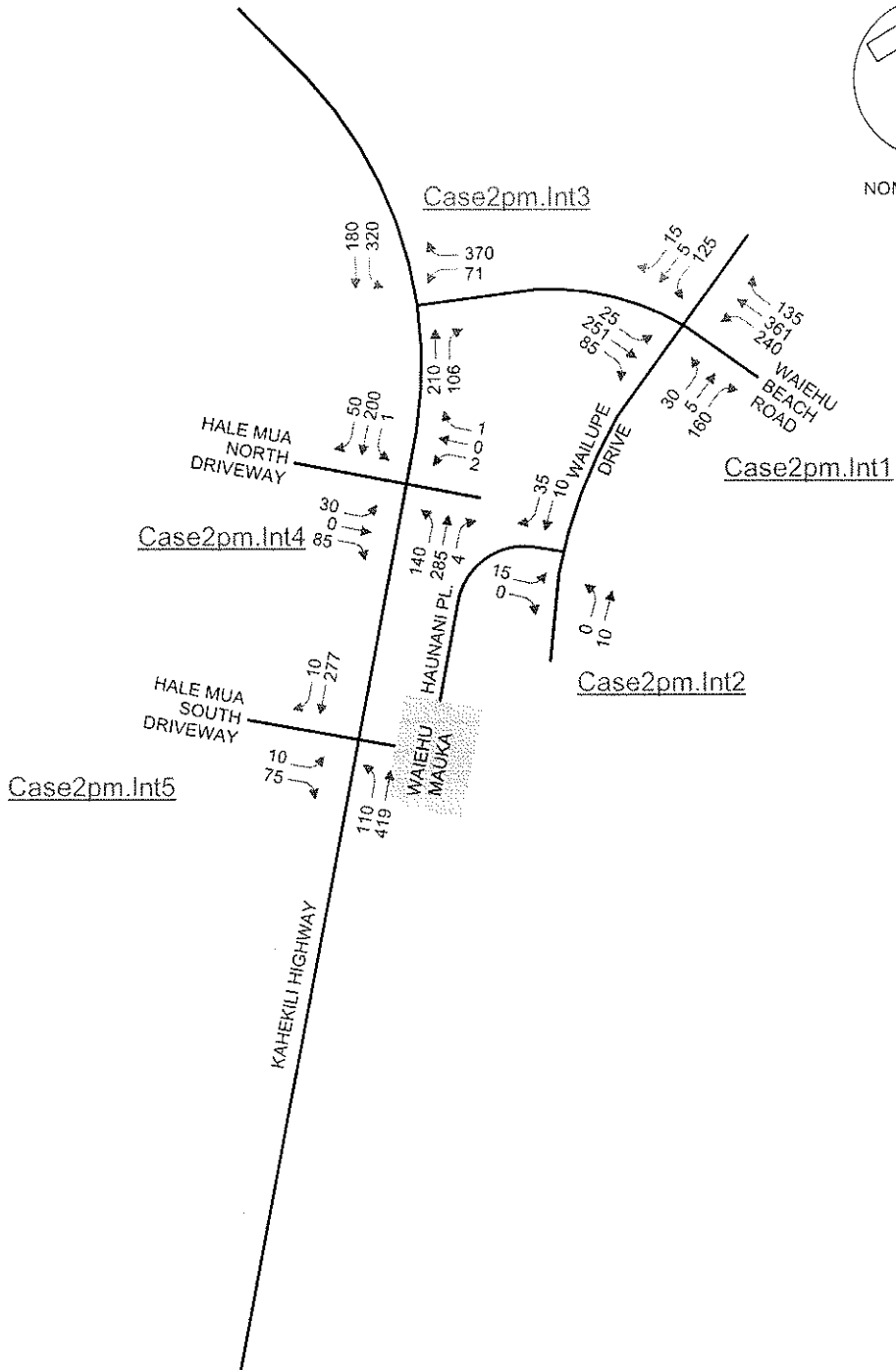
TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case2am.Int3		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>					North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		270	66	395	365			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	94	0	294		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				90		280		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	415	384	0	0	284	69		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		415		388				
C (m) (veh/h)		1189		249				
v/c		0.35		1.56				
95% queue length		1.58		23.55				
Control Delay (s/veh)		9.6		306.0				
LOS		A		F				
Approach Delay (s/veh)	--	--		306.0				
Approach LOS	--	--		F				

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2am.Int4			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hale Mua North/MEO BEST</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	65	290	2	0	425	25		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	48	0	146	3	0	1		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	45	0	135	3	0	1		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	461	27	70	315	2		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	1	0	1	0		
Configuration	LT		R		LTR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR		LT		R
v (veh/h)	70	0		4		48		146
C (m) (veh/h)	1060	1226		193		232		584
v/c	0.07	0.00		0.02		0.21		0.25
95% queue length	0.21	0.00		0.06		0.76		0.98
Control Delay (s/veh)	8.6	7.9		24.0		24.5		13.2
LOS	A	A		C		C		B
Approach Delay (s/veh)	--	--		24.0		16.0		
Approach LOS	--	--		C		C		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2am.Int5			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hael Mua South/Waiehu Mauka</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	60	342			548	15		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	16	0	119	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	15		110					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	595	16	65	371	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	1	0	1	0	0	0		
Configuration	L		R					
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (veh/h)	65					16		119
C (m) (veh/h)	953					214		493
v/c	0.07					0.07		0.24
95% queue length	0.22					0.24		0.94
Control Delay (s/veh)	9.1					23.2		14.6
LOS	A					C		B
Approach Delay (s/veh)	--	--				15.6		
Approach LOS	--	--				C		



NOMINAL NORTH



Case 2pm
2015 BACKGROUND
WITH HALE MUA

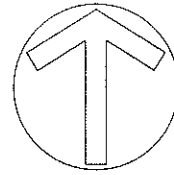
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2pm.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	25	251	85	240	361	135		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	25	258	87	247	372	139		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	30	5	160	125	5	15		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	30	5	164	128	5	15		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	25	247	35		164	133		15
C (m) (veh/h)	1039	1197	109		731	76		609
v/c	0.02	0.21	0.32		0.22	1.75		0.02
95% queue length	0.07	0.77	1.25		0.86	11.47		0.08
Control Delay (s/veh)	8.6	8.8	52.9		11.3	477.6		11.1
LOS	A	A	F		B	F		B
Approach Delay (s/veh)	--	--	18.7			430.3		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2pm.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	10			10	35		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	17	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	<i>Undivided</i>							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	<i>LT</i>						<i>TR</i>	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	15		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	40	0	11	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		<i>N</i>			<i>N</i>			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration	<i>LR</i>							
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	<i>LT</i>					<i>LR</i>		
v (veh/h)	0						17	
C (m) (veh/h)	1536						962	
v/c	0.00						0.02	
95% queue length	0.00						0.05	
Control Delay (s/veh)	7.3						8.8	
LOS	A						A	
Approach Delay (s/veh)	--	--				8.8		
Approach LOS	--	--				A		

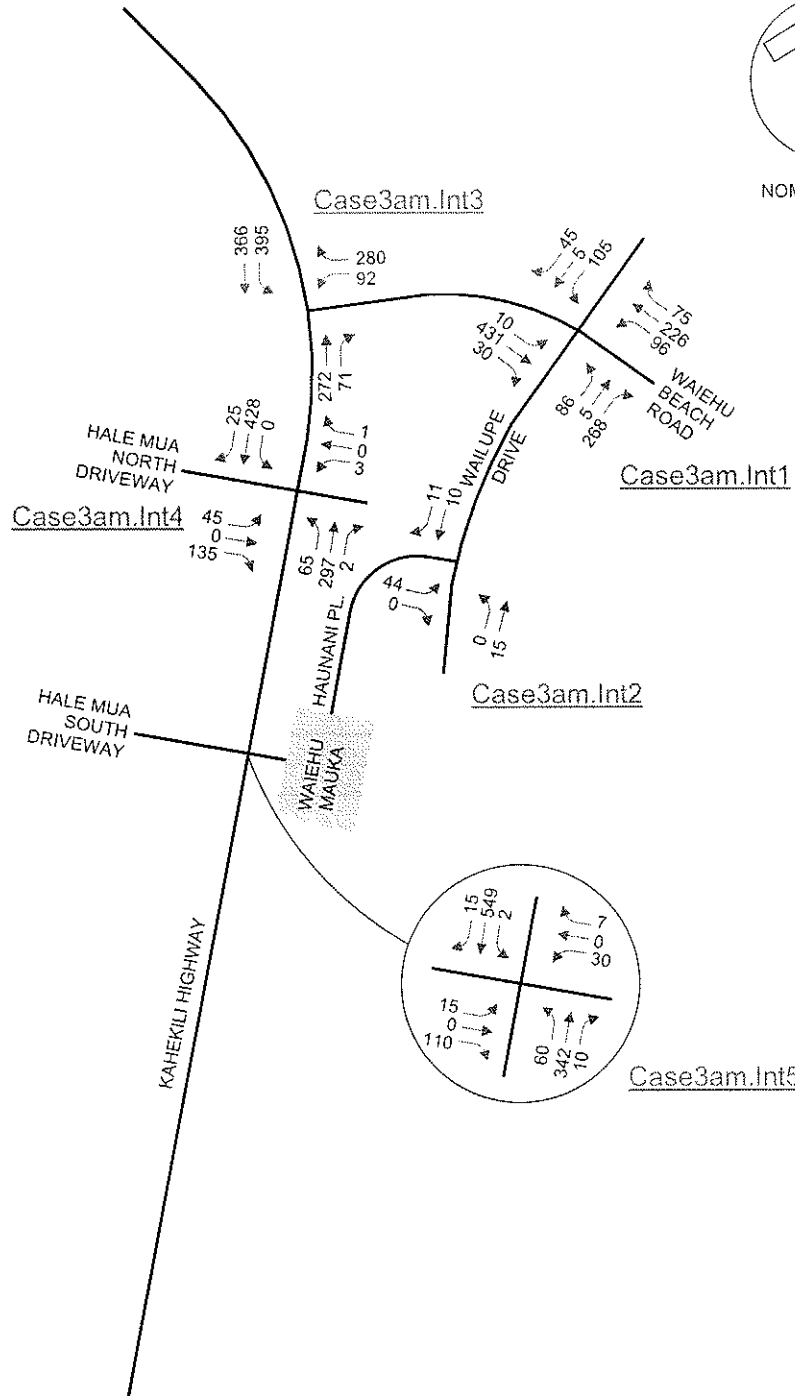
TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case2pm.Int3		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>					North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		210	106	320	180			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	74	0	389		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				71		370		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	336	189	0	0	221	111		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		336		463				
C (m) (veh/h)		1211		472				
v/c		0.28		0.98				
95% queue length		1.14		12.63				
Control Delay (s/veh)		9.1		66.5				
LOS		A		F				
Approach Delay (s/veh)	--	--	66.5					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2pm.Int4			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hale Mua North/MEO BEST</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	140	285	4	1	200	50		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	32	0	92	2	0	1		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	30	0	85	2	0	1		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	1	217	54	152	309	4		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	1	0	1	0		
Configuration	LT		R		LTR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LT		R
v (veh/h)	152	1		3		32		92
C (m) (veh/h)	1275	1230		267		247		787
v/c	0.12	0.00		0.01		0.13		0.12
95% queue length	0.40	0.00		0.03		0.44		0.40
Control Delay (s/veh)	8.2	7.9		18.6		21.7		10.2
LOS	A	A		C		C		B
Approach Delay (s/veh)	--	--	18.6			13.2		
Approach LOS	--	--	C			B		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case2pm.Int5			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hael Mua South/Waiehu Mauka</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	110	419			277	10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	0	81	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	0	1	0		
Configuration	L	T				TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10		75					
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	301	10	119	455	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	1	0	1	0	0	0		
Configuration	L		R					
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (veh/h)	119					10		81
C (m) (veh/h)	1233					240		727
v/c	0.10					0.04		0.11
95% queue length	0.32					0.13		0.37
Control Delay (s/veh)	8.2					20.7		10.6
LOS	A					C		B
Approach Delay (s/veh)	--	--				11.7		
Approach LOS	--	--				B		



NOMINAL NORTH



Case 3am
BACKGROUND PLUS PROJECT
WITH HALE MUA

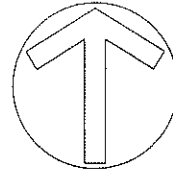
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3am.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	431	30	96	226	75		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	10	444	30	98	232	77		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	86	5	268	105	5	45		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	88	5	276	108	5	46		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	10	98	93		276	113		46
C (m) (veh/h)	1235	1072	204		596	96		761
v/c	0.01	0.09	0.46		0.46	1.18		0.06
95% queue length	0.02	0.30	2.17		2.44	7.66		0.19
Control Delay (s/veh)	7.9	8.7	36.6		16.1	228.8		10.0
LOS	A	A	E		C	F		B
Approach Delay (s/veh)	--	--	21.3			165.5		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3am.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	15			10	11		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	51	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	44		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	12	0	17	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						51	
C (m) (veh/h)	1573						972	
v/c	0.00						0.05	
95% queue length	0.00						0.17	
Control Delay (s/veh)	7.3						8.9	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.9	
Approach LOS	--	--					A	

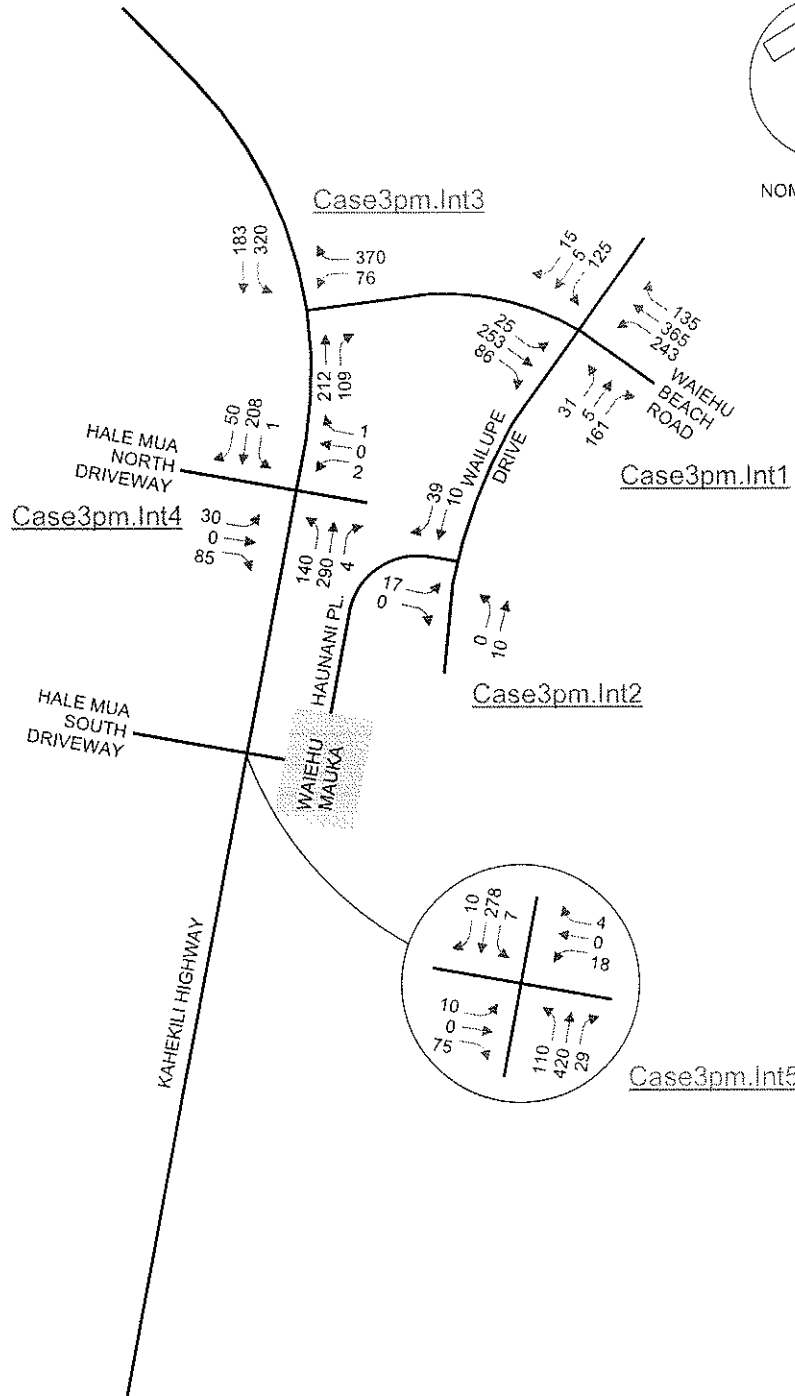
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3am.Int3			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		272	71	395	366			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	96	0	294		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				92		280		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	415	385	0	0	286	74		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		415		390				
C (m) (veh/h)		1182		244				
v/c		0.35		1.60				
95% queue length		1.60		24.27				
Control Delay (s/veh)		9.7		323.9				
LOS		A		F				
Approach Delay (s/veh)	--	--		323.9				
Approach LOS	--	--		F				

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3am.Int4			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hale Mua North/MEO BEST</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	65	297	2	0	428	25		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	48	0	146	3	0	1		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	45	0	135	3	0	1		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	465	27	70	322	2		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	1	0	1	0		
Configuration	LT		R		LTR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LT		R
v (veh/h)	70	0	4			48		146
C (m) (veh/h)	1056	1219	189			228		581
v/c	0.07	0.00	0.02			0.21		0.25
95% queue length	0.21	0.00	0.06			0.77		0.99
Control Delay (s/veh)	8.7	8.0	24.5			25.0		13.3
LOS	A	A	C			C		B
Approach Delay (s/veh)	--	--	24.5			16.2		
Approach LOS	--	--	C			C		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3am.Int5			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hael Mua South/Waiehu Mauka</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	60	342	10	2	549	15		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	16	0	119	32	0	7		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	15	0	110	30	0	7		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	2	596	16	65	371	10		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	1	0	1	0		
Configuration	LT		R		LTR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR		LT		R
v (veh/h)	65	2		39		16		119
C (m) (veh/h)	953	1161		140		170		493
v/c	0.07	0.00		0.28		0.09		0.24
95% queue length	0.22	0.01		1.07		0.31		0.94
Control Delay (s/veh)	9.1	8.1		40.4		28.4		14.6
LOS	A	A		E		D		B
Approach Delay (s/veh)	--	--	40.4			16.2		
Approach LOS	--	--	E			C		



NOMINAL NORTH



Case 3pm
BACKGROUND PLUS PROJECT
WITH HALE MUA

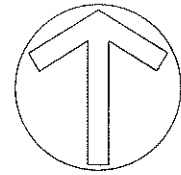
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3pm.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	25	253	86	243	365	135		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	25	260	88	250	376	139		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	31	5	161	125	5	15		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	31	5	165	128	5	15		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	25	250	36		165	133		15
C (m) (veh/h)	1035	1194	107		729	74		606
v/c	0.02	0.21	0.34		0.23	1.80		0.02
95% queue length	0.07	0.79	1.32		0.87	11.65		0.08
Control Delay (s/veh)	8.6	8.8	54.8		11.4	500.5		11.1
LOS	A	A	F		B	F		B
Approach Delay (s/veh)	--	--	19.2			450.9		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3pm.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	10			10	39		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	19	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LT					TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	17		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	45	0	11	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						19	
C (m) (veh/h)	1530						958	
v/c	0.00						0.02	
95% queue length	0.00						0.06	
Control Delay (s/veh)	7.4						8.8	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.8	
Approach LOS	--	--					A	

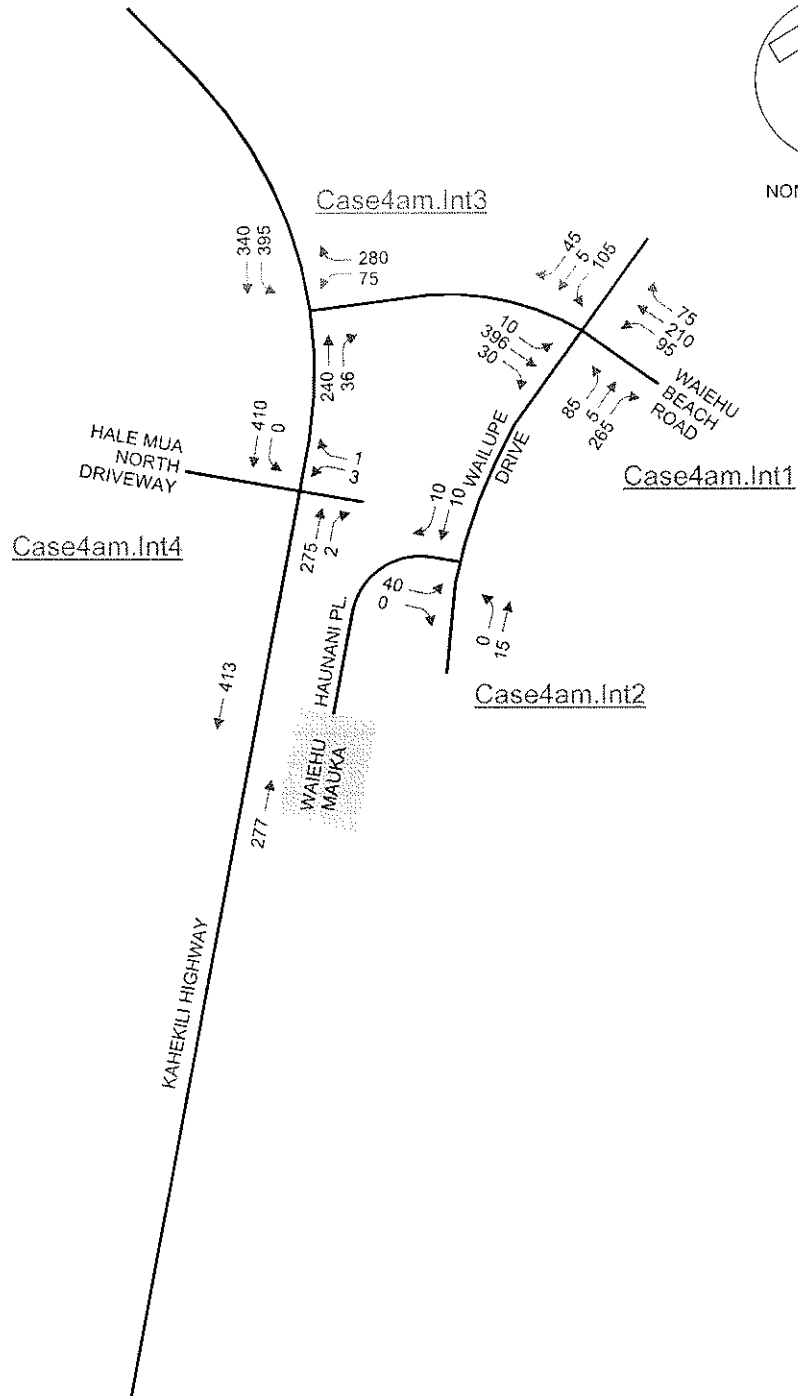
TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case3pm.Int3		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>					North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		212	109	320	183			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	80	0	389		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				76		370		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	336	192	0	0	223	114		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		336		469				
C (m) (veh/h)		1206		457				
v/c		0.28		1.03				
95% queue length		1.15		14.03				
Control Delay (s/veh)		9.1		79.4				
LOS		A		F				
Approach Delay (s/veh)	--	--	79.4					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case3pm.Int4		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hale Mua North/MEO BEST</i>					North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	140	290	4	1	208	50		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	32	0	92	2	0	1		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	30	0	85	2	0	1		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	1	226	54	152	315	4		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	1	0	1	0		
Configuration	LT		R		LTR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LT		R
v (veh/h)	152	1		3		32		92
C (m) (veh/h)	1266	1224		261		241		778
v/c	0.12	0.00		0.01		0.13		0.12
95% queue length	0.41	0.00		0.03		0.45		0.40
Control Delay (s/veh)	8.2	7.9		19.0		22.2		10.2
LOS	A	A		C		C		B
Approach Delay (s/veh)	--	--	19.0			13.3		
Approach LOS	--	--	C			B		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case3pm.Int5			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hael Mua South/Waiehu Mauka</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	110	420	29	7	278	10		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	10	0	81	19	0	4		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	10	0	75	18	0	4		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	7	302	10	119	456	31		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	1	0	1	0		
Configuration	LT		R		LTR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR		LT		R
v (veh/h)	119	7		23		10		81
C (m) (veh/h)	1232	1061		183		190		726
v/c	0.10	0.01		0.13		0.05		0.11
95% queue length	0.32	0.02		0.42		0.17		0.38
Control Delay (s/veh)	8.2	8.4		27.5		25.0		10.6
LOS	A	A		D		C		B
Approach Delay (s/veh)	--	--	27.5			12.2		
Approach LOS	--	--	D			B		



NOMINAL NORTH



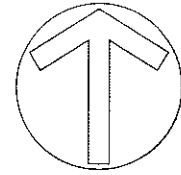
Case 4am
2015 BACKGROUND
WITHOUT HALE MUA

TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case4am.Int1		
Agency/Co.	PRA				Jurisdiction			
Date Performed	1/28/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>					North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>			
Intersection Orientation: <i>East-West</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	396	30	95	210	75		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	10	408	30	97	216	77		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	85	5	265	105	5	45		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	87	5	273	108	5	46		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				1	
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	10	97	92		273	113		46
C (m) (veh/h)	1252	1106	224		624	110		777
v/c	0.01	0.09	0.41		0.44	1.03		0.06
95% queue length	0.02	0.29	1.88		2.22	6.70		0.19
Control Delay (s/veh)	7.9	8.6	31.8		15.2	167.0		9.9
LOS	A	A	D		C	F		A
Approach Delay (s/veh)	--	--	19.4			121.6		
Approach LOS	--	--	C			F		

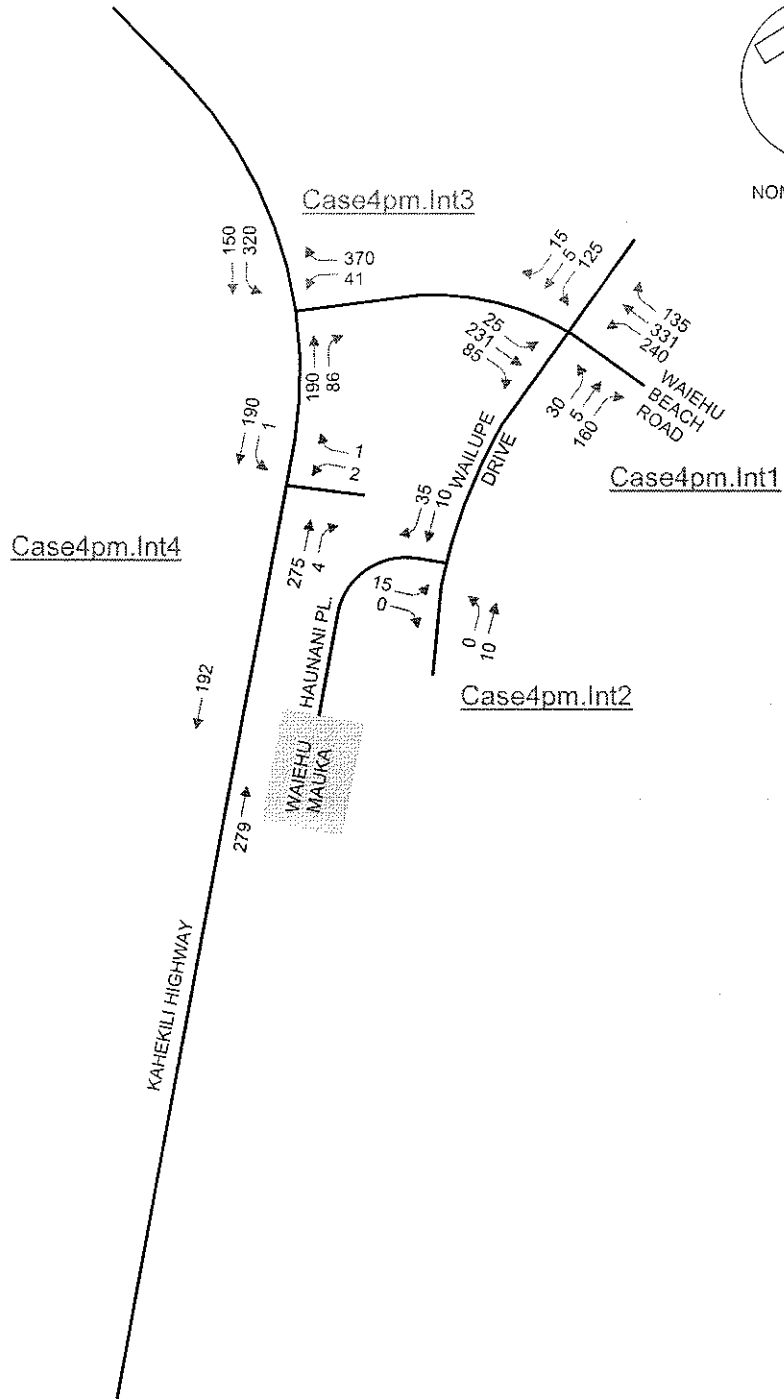
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case4am.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	15			10	10		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	46	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	40		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	11	0	17	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						46	
C (m) (veh/h)	1574						973	
v/c	0.00						0.05	
95% queue length	0.00						0.15	
Control Delay (s/veh)	7.3						8.9	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.9	
Approach LOS	--	--					A	

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	PJR			Intersection	Case4am.Int3		
Agency/Co.	PRA			Jurisdiction			
Date Performed	2/2/2009			Analysis Year			
Analysis Time Period							
Project Description <i>Waiehu Mauka Subdivision</i>							
East/West Street: <i>Wiehu Bch Rd</i>				North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Northbound			Southbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		240	36	395	340		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly Flow Rate, HFR (veh/h)	0	0	0	78	0	294	
Percent Heavy Vehicles	0	--	--	5	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
Minor Street	Eastbound			Westbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				75		280	
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	
Hourly Flow Rate, HFR (veh/h)	415	357	0	0	252	37	
Percent Heavy Vehicles	0	0	0	5	0	5	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Northbound	Southbound	Westbound			Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (veh/h)		415		372			
C (m) (veh/h)		1256		306			
v/c		0.33		1.22			
95% queue length		1.46		16.64			
Control Delay (s/veh)		9.3		159.1			
LOS		A		F			
Approach Delay (s/veh)	--	--	159.1				
Approach LOS	--	--	F				

TWO-WAY STOP CONTROL SUMMARY							
General Information				Site Information			
Analyst	PJR			Intersection	Case4am.Int4		
Agency/Co.	PRA			Jurisdiction			
Date Performed	2/2/2009			Analysis Year			
Analysis Time Period							
Project Description <i>Waiehu Mauka Subdivision</i>							
East/West Street: <i>Hale Mua North/MEO BEST</i>				North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments							
Major Street	Northbound			Southbound			
Movement	1	2	3	4	5	6	
	L	T	R	L	T	R	
Volume (veh/h)		275	2	0	410		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	0	0	0	3	0	1	
Percent Heavy Vehicles	5	--	--	5	--	--	
Median Type	Undivided						
RT Channelized			0				0
Lanes	0	1	0	0	1	0	
Configuration			TR	LT			
Upstream Signal		0			0		
Minor Street	Eastbound			Westbound			
Movement	7	8	9	10	11	12	
	L	T	R	L	T	R	
Volume (veh/h)				3		1	
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR (veh/h)	0	445	0	0	298	2	
Percent Heavy Vehicles	5	5	5	5	5	5	
Percent Grade (%)	0			0			
Flared Approach		N			N		
Storage		0			0		
RT Channelized			0			0	
Lanes	0	0	0	0	0	0	
Configuration					LR		
Delay, Queue Length, and Level of Service							
Approach	Northbound	Southbound	Westbound			Eastbound	
Movement	1	4	7	8	9	10	11
Lane Configuration		LT		LR			
v (veh/h)		0		4			
C (m) (veh/h)		1244		430			
v/c		0.00		0.01			
95% queue length		0.00		0.03			
Control Delay (s/veh)		7.9		13.5			
LOS		A		B			
Approach Delay (s/veh)	--	--		13.5			
Approach LOS	--	--		B			



NOMINAL NORTH



Case 4pm
2015 BACKGROUND
WITHOUT HALE MUA

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case4pm.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	25	231	85	240	331	135		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	25	238	87	247	341	139		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	30	5	160	125	5	15		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	30	5	164	128	5	15		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	25	247	35		164	133		15
C (m) (veh/h)	1067	1218	119		750	84		635
v/c	0.02	0.20	0.29		0.22	1.58		0.02
95% queue length	0.07	0.76	1.13		0.83	10.76		0.07
Control Delay (s/veh)	8.5	8.7	47.4		11.1	397.7		10.8
LOS	A	A	E		B	F		B
Approach Delay (s/veh)	--	--	17.5			358.4		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case4pm.Int2		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>					North/South Street: <i>Wailupe Drive</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	10			10	35		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	17	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	15		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	40	0	11	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						17	
C (m) (veh/h)	1536						962	
v/c	0.00						0.02	
95% queue length	0.00						0.05	
Control Delay (s/veh)	7.3						8.8	
LOS	A						A	
Approach Delay (s/veh)	--	--				8.8		
Approach LOS	--	--				A		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case4pm.Int3			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		190	86	320	150			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	43	0	389		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				41		370		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	336	157	0	0	200	90		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		336		432				
C (m) (veh/h)		1255		584				
v/c		0.27		0.74				
95% queue length		1.09		6.38				
Control Delay (s/veh)		8.9		26.6				
LOS		A		D				
Approach Delay (s/veh)	--	--	26.6					
Approach LOS	--	--	D					

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case4pm.Int4			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hale Mua North/MEO BEST</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		275	4	1	190			
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	2	0	1		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				2		1		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	1	206	0	0	298	4		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		1		3				
C (m) (veh/h)		1242		575				
v/c		0.00		0.01				
95% queue length		0.00		0.02				
Control Delay (s/veh)		7.9		11.3				
LOS		A		B				
Approach Delay (s/veh)	--	--	11.3					
Approach LOS	--	--	B					

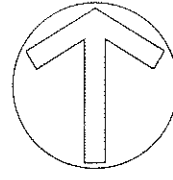
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case5am.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	10	401	30	96	211	75		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	10	413	30	98	217	77		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	86	5	268	105	5	45		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	88	5	276	108	5	46		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				1	
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	10	98	93		276	113		46
C (m) (veh/h)	1251	1101	220		620	107		775
v/c	0.01	0.09	0.42		0.45	1.06		0.06
95% queue length	0.02	0.29	1.96		2.29	6.90		0.19
Control Delay (s/veh)	7.9	8.6	32.8		15.4	178.3		9.9
LOS	A	A	D		C	F		A
Approach Delay (s/veh)	--	--	19.8			129.6		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case5am.Int2			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Haunani Place</i>				North/South Street: <i>Wailupe Drive</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	15			10	11		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	51	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	44		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	12	0	17	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						51	
C (m) (veh/h)	1573						972	
v/c	0.00						0.05	
95% queue length	0.00						0.17	
Control Delay (s/veh)	7.3						8.9	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.9	
Approach LOS	--	--					A	

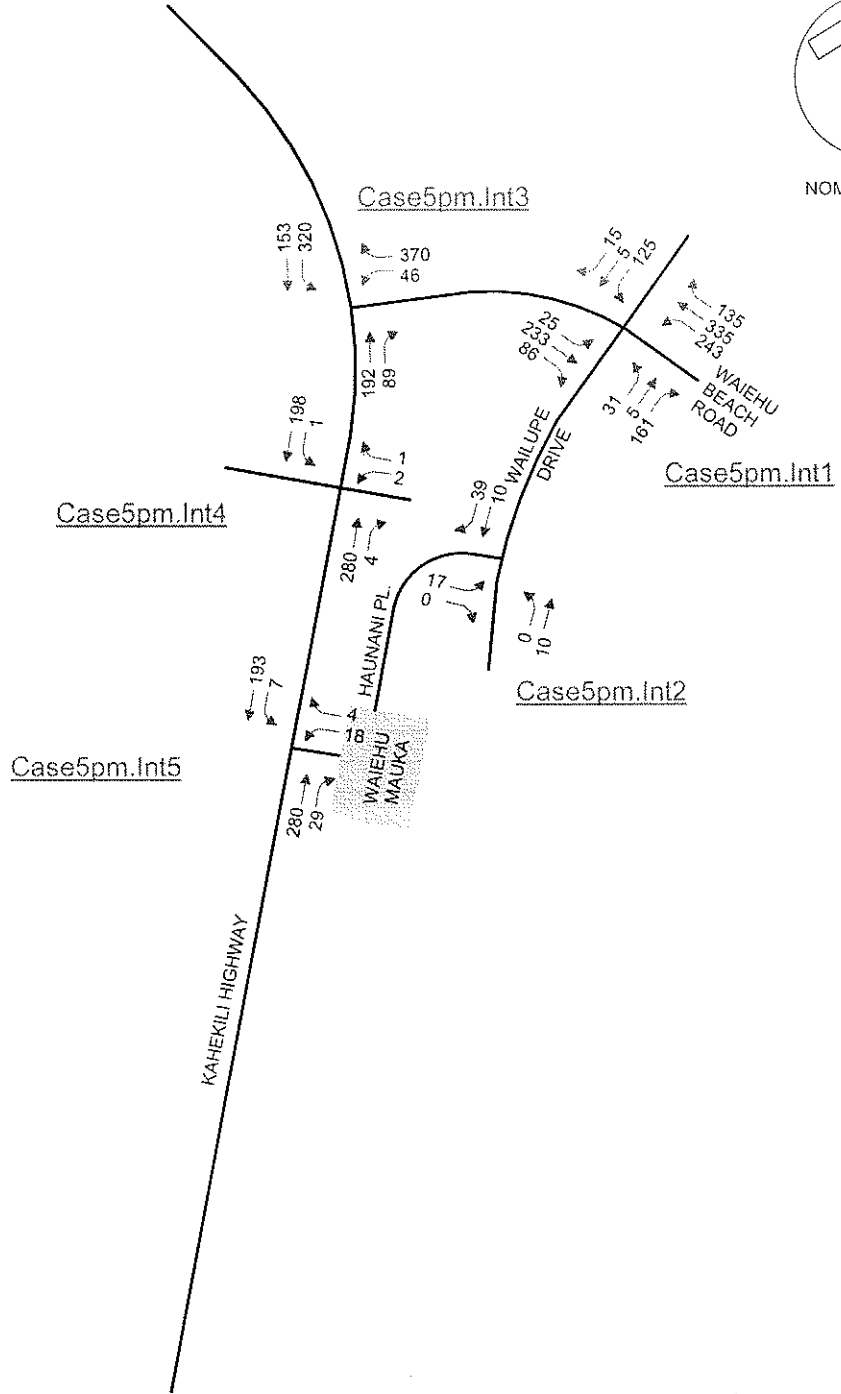
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case5am.Int3			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		242	41	395	341			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	81	0	294		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				77		280		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	415	358	0	0	254	43		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT	LR					
v (veh/h)		415	375					
C (m) (veh/h)		1247	298					
v/c		0.33	1.26					
95% queue length		1.48	17.61					
Control Delay (s/veh)		9.3	176.3					
LOS		A	F					
Approach Delay (s/veh)	--	--	176.3					
Approach LOS	--	--	F					

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case5am.Int4			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hale Mua North/MEO BEST</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		282	2	0	413			
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	3	0	1		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				3		1		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	448	0	0	306	2		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		0		4				
C (m) (veh/h)		1236		424				
v/c		0.00		0.01				
95% queue length		0.00		0.03				
Control Delay (s/veh)		7.9		13.6				
LOS		A		B				
Approach Delay (s/veh)	--	--	13.6					
Approach LOS	--	--	B					

TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case5am.Int5		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hael Mua South/Waiehu Mauka</i>					North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		277	10	2	414			
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	32	0	7		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				30		7		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	2	449	0	0	301	10		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		2		39				
C (m) (veh/h)		1233		405				
v/c		0.00		0.10				
95% queue length		0.00		0.32				
Control Delay (s/veh)		7.9		14.8				
LOS		A		B				
Approach Delay (s/veh)	--	--	14.8					
Approach LOS	--	--	B					



NOMINAL NORTH



Case 5pm
BACKGROUND PLUS PROJECT
WITHOUT HALE MUA

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case5pm.Int1			
Agency/Co.	PRA			Jurisdiction				
Date Performed	1/28/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka</i>								
East/West Street: <i>Waiehu Beach Road</i>				North/South Street: <i>Wailupe Dr/Lower Waiehu Bch Rd</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	25	233	86	243	335	135		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	25	240	88	250	345	139		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	31	5	161	125	5	15		
Peak-Hour Factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97		
Hourly Flow Rate, HFR (veh/h)	31	5	165	128	5	15		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			1		
Lanes	0	1	1	0	1	1		
Configuration	LT		R	LT		R		
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LT		R	LT		R
v (veh/h)	25	250	36		165	133		15
C (m) (veh/h)	1063	1215	116		748	82		632
v/c	0.02	0.21	0.31		0.22	1.62		0.02
95% queue length	0.07	0.77	1.20		0.84	10.94		0.07
Control Delay (s/veh)	8.5	8.7	49.4		11.2	416.1		10.8
LOS	A	A	E		B	F		B
Approach Delay (s/veh)	--	--	18.0			375.0		
Approach LOS	--	--	C			F		

TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case5pm.Int2		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hauani Place</i>					North/South Street: <i>Wailupe Drive</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	10			10	39		
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	19	0	0	0	0	0		
Percent Heavy Vehicles	5	--	--	0	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration	LT						TR	
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	17		0					
Peak-Hour Factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86		
Hourly Flow Rate, HFR (veh/h)	0	11	45	0	11	0		
Percent Heavy Vehicles	5	0	5	0	0	0		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0				0	
Lanes	0	0	0	0	0	0		
Configuration		LR						
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LR	
v (veh/h)	0						19	
C (m) (veh/h)	1530						958	
v/c	0.00						0.02	
95% queue length	0.00						0.06	
Control Delay (s/veh)	7.4						8.8	
LOS	A						A	
Approach Delay (s/veh)	--	--					8.8	
Approach LOS	--	--					A	





TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case5pm.Int3			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Wiehu Bch Rd</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		192	89	320	153			
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	0	0	0	48	0	389		
Percent Heavy Vehicles	0	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				46		370		
Peak-Hour Factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95		
Hourly Flow Rate, HFR (veh/h)	336	161	0	0	202	93		
Percent Heavy Vehicles	0	0	0	5	0	5		
Percent Grade (%)		0			0			
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		336		437				
C (m) (veh/h)		1249		566				
v/c		0.27		0.77				
95% queue length		1.09		7.07				
Control Delay (s/veh)		8.9		29.6				
LOS		A		D				
Approach Delay (s/veh)	--	--	29.6					
Approach LOS	--	--	D					

TWO-WAY STOP CONTROL SUMMARY								
General Information					Site Information			
Analyst	PJR				Intersection	Case5pm.Int4		
Agency/Co.	PRA				Jurisdiction			
Date Performed	2/2/2009				Analysis Year			
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hale Mua North/MEO BEST</i>					North/South Street: <i>Kahekili Highway</i>			
Intersection Orientation: <i>North-South</i>					Study Period (hrs): <i>0.25</i>			
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)		280	4	1	198			
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	2	0	1		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	0	1	0	0	1	0		
Configuration			TR	LT				
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)				2		1		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	1	215	0	0	304	4		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	0	0	0	0	0		
Configuration					LR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT		LR				
v (veh/h)		1		3				
C (m) (veh/h)		1236		566				
v/c		0.00		0.01				
95% queue length		0.00		0.02				
Control Delay (s/veh)		7.9		11.4				
LOS		A		B				
Approach Delay (s/veh)	--	--	11.4					
Approach LOS	--	--	B					

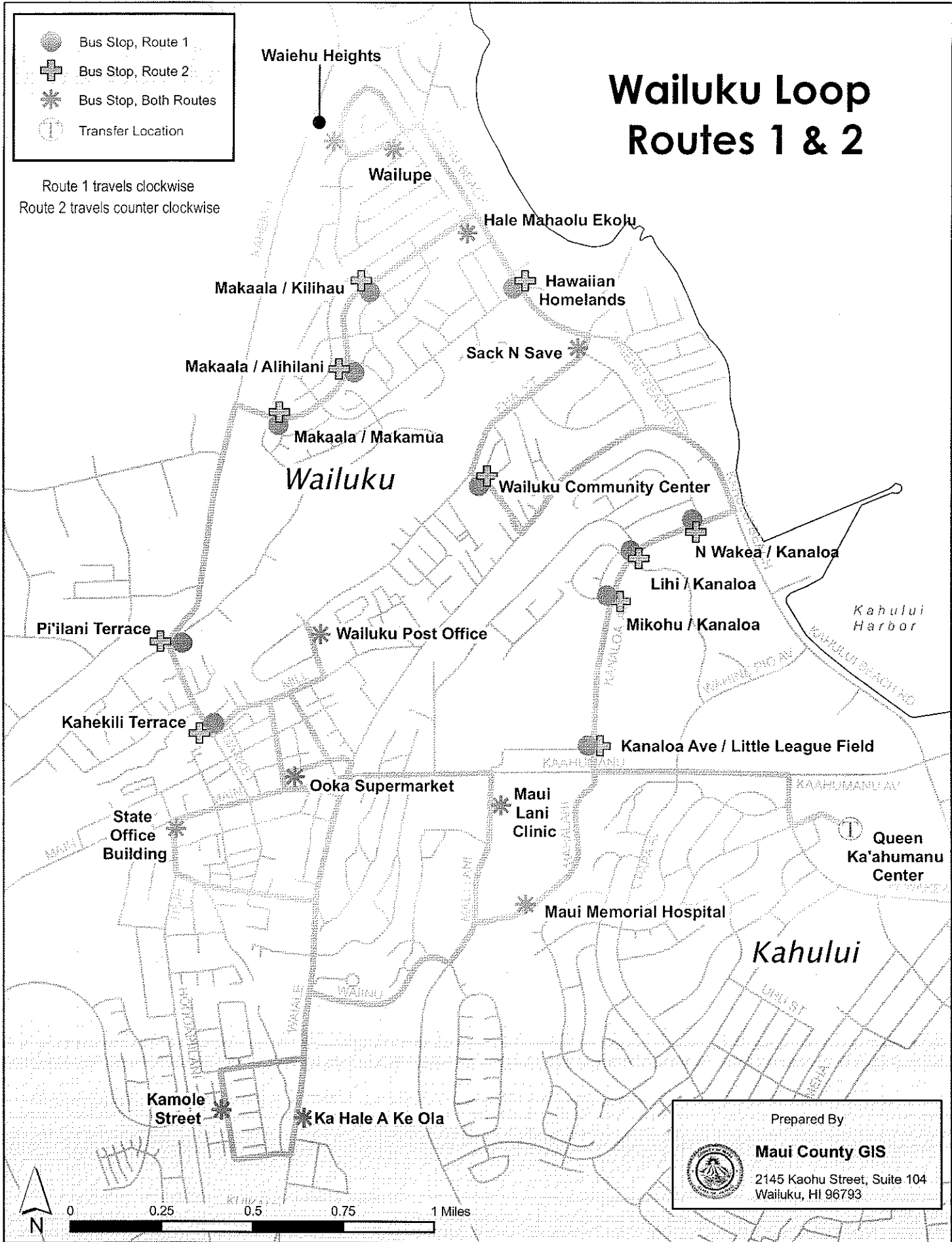
TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	PJR			Intersection	Case5pm.Int5			
Agency/Co.	PRA			Jurisdiction				
Date Performed	2/2/2009			Analysis Year				
Analysis Time Period								
Project Description <i>Waiehu Mauka Subdivision</i>								
East/West Street: <i>Hael Mua South/Waiehu Mauka</i>				North/South Street: <i>Kahekili Highway</i>				
Intersection Orientation: <i>North-South</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Northbound			Southbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	0	280	29	7	193	0		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	0	0	0	19	0	4		
Percent Heavy Vehicles	5	--	--	5	--	--		
Median Type	Undivided							
RT Channelized			0				0	
Lanes	1	1	0	1	1	0		
Configuration	L		TR	L		TR		
Upstream Signal		0			0			
Minor Street	Eastbound			Westbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	0	0	0	18	0	4		
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR (veh/h)	7	209	0	0	304	31		
Percent Heavy Vehicles	5	5	5	5	5	5		
Percent Grade (%)	0			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	1	0	1	0		
Configuration	LT		R		LTR			
Delay, Queue Length, and Level of Service								
Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L	LTR			LT		R
v (veh/h)	0	7	23			0		0
C (m) (veh/h)	1344	1208	475					824
v/c	0.00	0.01	0.05					0.00
95% queue length	0.00	0.02	0.15					0.00
Control Delay (s/veh)	7.7	8.0	13.0					9.4
LOS	A	A	B					A
Approach Delay (s/veh)	--	--	13.0					
Approach LOS	--	--	B					


Attachment R
THE MAUI BUS SERVICE IN WAEHU HEIGHTS AREA

Wailuku Loop Routes 1 & 2

-  Bus Stop, Route 1
-  Bus Stop, Route 2
-  Bus Stop, Both Routes
-  Transfer Location

Route 1 travels clockwise
Route 2 travels counter clockwise



Prepared By

Maui County GIS
 2145 Kaohu Street, Suite 104
 Wailuku, HI 96793

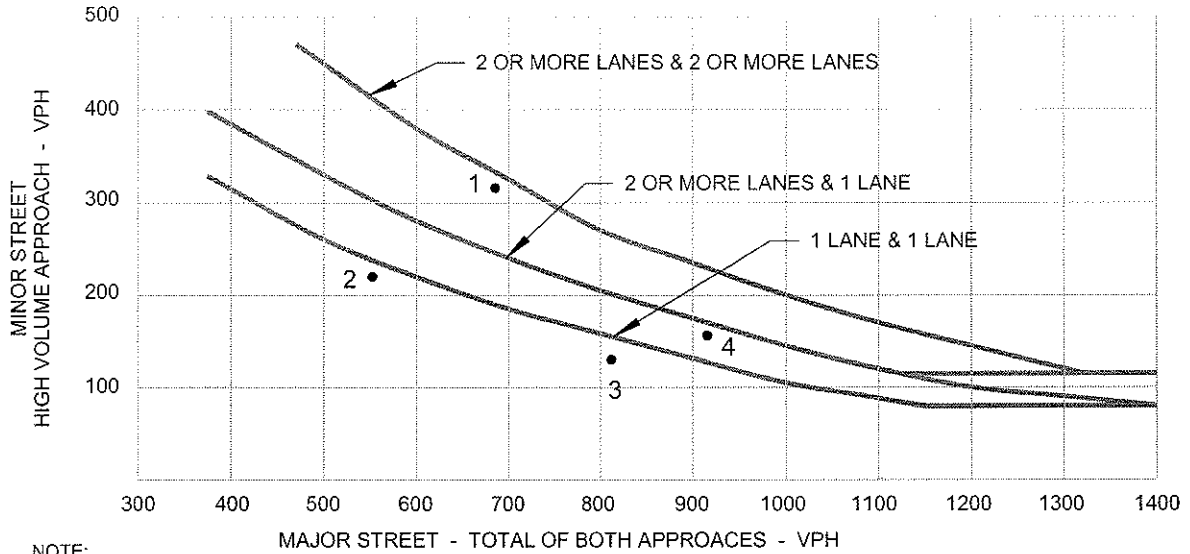
Attachment S
TRAFFIC SIGNAL WARRANT ANALYSIS WARRANT 2 - FOUR HOUR
VEHICULAR WARRANT

WARRANT 2 - FOUR HOUR VEHICULAR WARRANT

100% Satisfied YES NO
 70% Satisfied YES NO

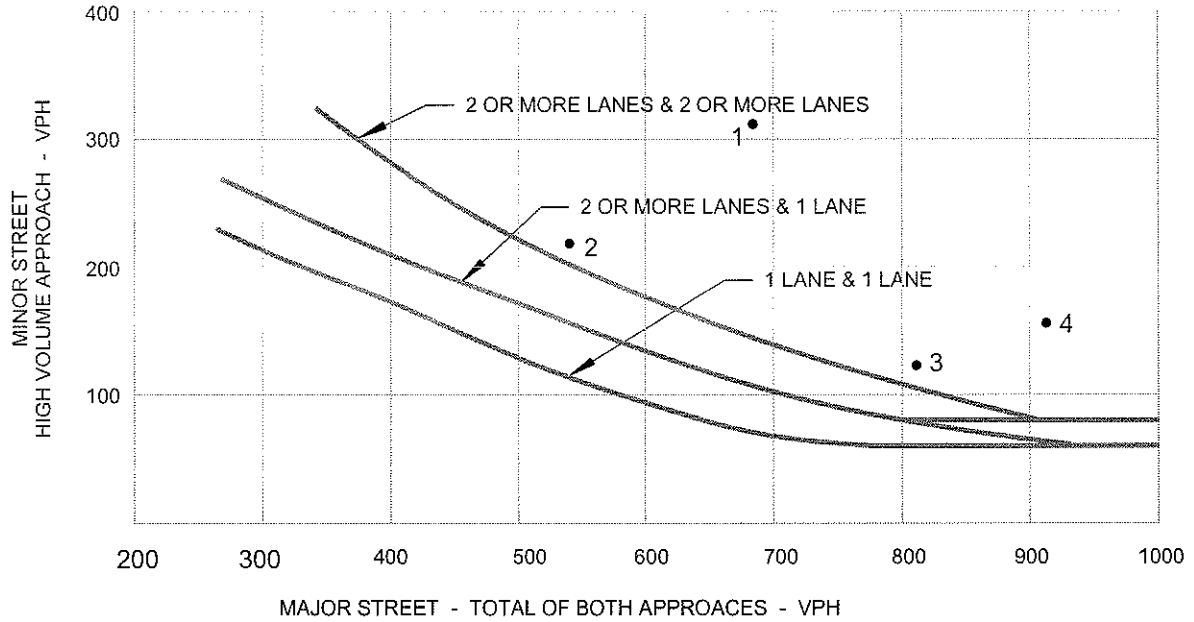
	APPROACH LANES		HOUR			
	one	more	1	2	3	4
Both approaches - Major Street		X	680	541	810	914
Highest approach - Minor Street		X	307	215	127	159

100% CONDITIONS



NOTE:
 115 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND
 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

70% CONDITIONS



NOTE:
 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND
 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

APPENDIX G.

Preliminary Civil Engineering and Drainage Report

PRELIMINARY
CIVIL ENGINEERING AND DRAINAGE REPORT
FOR
PROPOSED WAIEHU MAUKA
AT PAUKUKALO, MAUI, HAWAII
TAX MAP KEY: (2) 3-3-01:102

PREPARED FOR:

LOKAHI PACIFIC
1935 MAIN STREET
WAILUKU, MAUI, HAWAII - 96793

PREPARED BY:



CIVIL ENGINEERING • LAND SURVEYING • CONSTRUCTION MANAGEMENT & INSPECTIONAL SERVICES

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII - 96793
JOB 08-040

JANUARY 2009
Revised: JULY 1, 2009
Revised: August 7, 2009

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I. **INTRODUCTION:**

The purpose of this preliminary report is to investigate the infrastructural requirements of developing Lot 2 of Paukukalo Large Lot Subdivision into single family (SF) and multi-family (MF) residences.

This preliminary study will present a brief description of the existing infrastructure and drainage conditions at the project area. It also provides contemplated improvements, such as roadways, drainage, water and sewer systems, required for the development by appropriate governmental agencies. It also includes probable construction costs of the various infrastructural improvements to support the development.

II. **EXISTING SITE CONDITIONS AND INFRASTRUCTURE:**

A. **LOCATION:**

The site is situated in Waiehu and is about 1½ miles north of the Wailuku Town proper and about 300 feet east of Kahekili highway. It is located at the south end of Haunani Street and is bounded by Waiehu Heights Subdivision to the north; Waiehu Terrace Subdivision (Waiehu Planned Development) to the east; and by undeveloped lands to the south and west.

Figure 1 shows the general location of the proposed project, while Figure 2 shows developments in the vicinity of the proposed project.

B. SOIL:

The U.S. Department of Agriculture Soil Conservation Service's Soils Survey of the Island of Kauai, Oahu, Maui, Molokai and Lanai [3], classifies the soils within the project site as Puuone Sand (PZUE), 7 to 30 percent slopes. Figure 3 shows the soil classification at the site.

PZUE belongs to the Puuone Soil Series that consists of somewhat excessively drained soils which are found on sand hills near the ocean. Runoff is slow, wind erosion hazard is moderate to severe, and permeability is rapid above the cemented layer.

C. FLOOD HAZARD:

The Flood Insurance Rate Maps, Maui County (FIRM) designates the site within Flood Zone "C" (Figure 4).

Zone "C" is a designation for areas of minimal flooding; therefore, the proposed project does not need flood development permits.

D. ACCESS:

The present access to the project site is Haunani Street which is interconnected to Waiehu Beach Road via Wailupe Drive. Refer to Figure 2. There is an existing paved turn around within the property at the end of Haunani Street. The existing roadway system in the area is described in the "Traffic Impact Analysis Report" for the proposed development (by others).

E. WATER:

Domestic and fire protection waters for the area is provided by a 16-inch waterline that is fed by the existing Waiehu Heights 300,000 gallon water tank and wells as shown on Figure 5. The existing 16-inch waterline traverses across the project site and connects to the 12-inch waterline on Haunani Street.

F. SEWER:

Wastewater disposal from adjacent residential developments is provided by a series of 8-inch, 10-inch and 12-inch gravity sewerlines that discharges into the Paukukalo Wastewater Pump Station. See Figure 6. The wastewater flow will then be transmitted to the Wailuku Wastewater Pump Station and eventually pumped to the Wailuku/Kahului Wastewater Reclamation facility east of Kahului Harbor.

G. TOPOGRAPHY:

The existing site is barren, covered with noxious weeds and bushes, except for a temporary paved turnaround at the end of Haunani Street.

The existing ground has elevations ranging from 170 to 254 feet above mean seal level. In general, the ground surface slopes down in a westerly direction toward Kahekili Highway, at an average slope of about 11 percent. A detailed topography of the site is shown on Figure 7.

III. **PROPOSED DEVELOPMENT AND INFRASTRUCTURE IMPROVEMENTS:**

A. **PROPOSED DEVELOPMENT:**

The proposed development consists of the subdivision of Lot 2 of the Paukukalo Large Lot Subdivision into Lots 1 to 9 as shown on Figure 8. Lots 1 to 6 will be used for single family residences. Lots 8 and 9 will be developed into multi-family residences consisting of 58 condominium residential units and 42 rental units. The conceptual layout for the multi-family development is shown on Figure 9.

Appurtenant to the housing development are grading; roadway improvements; water, sewer and drainage systems.

B. **ROADWAY:**

The project will have access from Haunani Street and Kahekili Highway.

The proposed single-family lots (Lots 1 to 6) will be accessed from Haunani Street. The existing paved cul-de-sac will be improved to County standards by providing curb, gutter and sidewalk to tie in to the existing curb and gutter at the end of the street. The curb turnaround will have a radius of 40.50 feet to meet fire apparatus turning radius.

The MF sites will be accessed from Kahekili Highway via an existing 44-foot wide access easement across Lot 1-B. This access will be improved to County standards with at least 20-foot wide paved travelway. This access will remain privately owned and maintained.

Roadway system is further analyzed in the "Traffic Impact Analysis Report" (by others) for the proposed development. Offsite roadway improvements, if required, will be incorporated into the project.

C. WATER SYSTEM:

1. Anticipated Water Requirements:

Determination of anticipated water requirements for the proposed project is presented on Exhibit B. The expected water demands are as follows:

- a. Average Domestic Daily Demand = 59,600 gals./day
- b. Maximum Daily Demand = 89,800 gals./day
= 62 gpm
- c. Peak Hour Demand = 178,800 gals./day
= 124 gpm
- d. Fire Flow Demand = 1,000 gpm (single family)
= 1,500 gpm (low rise apartments)

2. Anticipated Improvements:

The size of the distribution lines is based upon simultaneous delivery of the needed fire flow and maximum daily demand. The anticipated fire flow (1,500 gpm) plus the maximum daily demand for the development is 1,562 gals./minute (gpm). This combined flow could be sufficiently delivered by the existing 16-inch or the 12-inch waterlines that crosses the project site. At a flow rate of 10 feet per second, the 16-inch and 12-inch can deliver about 6,300 gpm and 3,500 gpm, respectively. Due to site grading, the existing onsite 16-inch asbestos cement (AC) waterline will have to be

vertically adjusted and at the same time replaced with new 16-inch ductile iron (DI) pipes pursuant to DWS requirements. Similarly, the onsite 12-inch AC waterline will be replaced with new 12-inch DI pipes. As a matter of DWS policy, cutting and/or drilling of AC pipes is not permitted.

The onsite water system scheme is shown on Figure 10. Domestic water services for the proposed single family lots (Lots 1 to 6) will be connected to the 12-inch waterline. Each lot is expected to be served by a 5/8" water meter whose capacity is about 20 gpm. The fire protection for these lots could be provided by the existing fire hydrant (#98) at the end of Haunani Street.

Water services (fire protection, domestic and irrigation) for the multi-family (MF) sites (Lots 8 and 9) will be connected to the 16-inch waterline. Water services for each site will be separate.

The conceptual fire protection and domestic systems for the MF sites are shown on Figure 10. The proposed fire protection systems consist of double check detector assemblies and fire hydrants. Based on the conceptual site plan, the fire hydrants could be located along the access ramp and within the parking areas. Final location of the hydrants to be determined during the design development of the project. Some of the design criteria to consider are spacing and accessibility. Fire hydrant shall be spaced at no more than 250 feet and located at no less than 40 feet from buildings. Access roads must be at least 20 feet wide

with gradients not exceeding fourteen (14) percent and all turns and required turnarounds shall be provided to accommodate fire apparatus in accordance with the requirements of the Department of Fire and Public Safety.

A 1½ inch water meter is anticipated to serve the condominium units (Lot 8) based on the peak hour demand of 68 gpm while a 1-inch water meter could serve the rental units (Lot 9) based on the peak hour demand of 49 gpm. The capacity of a 1½" and 1" meter is 100 gpm and 50 gpm, respectively. Final domestic flow requirements and sizes of water meters will be determined during the design stage for the proposed project.

Irrigation requirements for the proposed MF developments are undetermined at this time. It is recommended; however, that water meters solely for irrigation purposes should be installed so that irrigation usage will not be included in calculating the bi-monthly sewer fees.

D. WASTEWATER SYSTEM:

1. Anticipated Wastewater Flow:

The total projected average wastewater flow for the proposed development is about 27,600 gallons per day (gpd). The single-family residences could generate about 2,100 gpd; the condominium units about 14,790 gpd; and the rental units about 10,710 gpd. Calculations are given in Exhibit B.

2. Anticipated Improvements:

The onsite sewer system layout is schematically shown on Figure 11. The existing 8" sewerline on Haunani Street will be extended to the end of the new cul-de-sac to serve the single family lots. Each lot will be provided with single service lateral.

Wastewater flow from the multi-family housing units will be collected by gravity sewerlines to discharge into a wastewater pump station (WPS) located at the low portion of the project site. From this point, the flow will be discharged offsite via a variety of options as discussed in the succeeding section.

3. Options for Offsite Wastewater Disposal:

The following options are discussed in general. A more detailed study is required to determine the impact of the proposed project on the area's existing sewer system especially on wastewater pumping facilities. The possible options are partially illustrated on Figure 12.

a. Haunani Street Tie-in (Option 1):

The wastewater flows from the MF housing could be pumped into the new SMH at the Haunani Street cul-de-sac. From hereon, the wastewater will gravity flow to the existing Paukukalo WPS via a series of 8" sewer lines along Haunani, Olena and Analio Streets and 12-inch sewer pipes along Waiehu Beach Road. Refer to Figure 6.

b. Makaala Drive Tie-In (Option 2):

Under this option, wastewater will be pumped along Easement A to Kahekili Highway, then southward along Kahekili Highway to Makaala Drive intersection and then up Makaala Drive to discharge into the existing SMH at its intersection of Makamua Street. The wastewater will be subsequently transmitted to the Paukukalo WPS via existing gravity sewerlines across the southern portion of Waiehu Terrace and through the Paukukalo Residence Lots Subdivision. Refer to Figure 6.

IV. DRAINAGE:

A. GENERAL:

The preliminary Drainage Study, in general, is based on the requirements, formulas, charts and tables of the Rules of the Design of Storm Drainage Facilities of the County of Maui [1] hereinafter referred to as Maui County Drainage Standards.

B. DRAINAGE CONDITIONS:

At present, onsite runoff flows into the adjacent properties from three (3) distinct drain areas as shown on Figure 13. Runoff from drain area 1E which occupies about 78 percent of the project site flows into an existing drainageway located west of the site. This drainageway discharges into Waiehu Stream via a 36-inch underground culvert across Waiehu Beach Road at the intersection of Kahekili Highway. Runoff from

Drain Area 2E flows to Haunani Street; while those from Area 3E sheet flows into the adjacent residential lots along the east side of the property.

At post development condition, it is expected that the existing drainage pattern will be maintained. The new drainage areas are preliminarily shown on Figure 14. Runoff from Area A will flow to the existing drainageway on the west side of the project area; runoff from Area B will flow into Haunani Street; and runoff from Area C will sheet flow into the adjacent lots along the east side of the project.

Based on our preliminary hydrologic calculations (Exhibit A), the following is a comparison of the 1-hour storm peak rate between pre and post development conditions.

To Existing Drainageway West of Project Site:

	<u>10-Yr.</u>	<u>50-Yr.</u>
Existing	= 8.0 cfs	9.8 cfs
Post Development	= 15.0 cfs	18.5 cfs
Increase	= 7.0 cfs	8.7 cfs

To Haunani Street:

Existing	= 1.1 cfs	1.4 cfs
Post Development	= 1.6 cfs	2.0 cfs
Increase	= 0.5 cfs	0.6 cfs

To Adjacent Lots East of Project Site:

Existing	= 1.7 cfs	2.1 cfs
Post Development	= 0.9 cfs	1.2 cfs
Decrease	= 0.8 cfs	0.9 cfs

The results indicate that there is an increase of runoff to the existing drainageway and hence appropriate measures shall be provided in order not to impact the drainageway and downstream properties; increase of runoff to Haunani Street is minimal and is not expected to affect the existing drainage facilities of the existing subdivision; the decrease in runoff to the adjacent lots along the east boundary of the project site will have a positive impact on these lots.

C. ANTICIPATED IMPROVEMENTS:

The main feature of the proposed drainage improvements is the installation of onsite subsurface retention basins to impound the additional runoff that may enter the existing drainageway on the west side of the project site. This is in keeping with the requirements of the Maui County Drainage Standards since there is no existing drainage system or adequate outlet to connect the new drainage system.

Based on the preliminary hydrologic calculations (Exhibit A), the existing 50-year, 1-hour volume to the existing drainageway will be increased by about 23,398 cf, from 19,132 cf to 42,530 cf. The minimum runoff volume to be retained onsite is therefore 23,398 cf; however, to ensure that the proposed development will not have adverse drainage effects on downstream properties and drainage facilities, it is recommended that the retention basins shall be sized to have capacities slightly greater than the anticipated volume increase.

The conceptual drainage plan is shown on Figure 15. It includes subsurface retention basins that consist of perforated pipes with rock envelopes. A typical section is shown on Figure 18. Retention basins are proposed at each parking level. The combined storage capacity of the retention basins is about 27,195 cf (see Exhibit A) which is greater than the anticipated 50-year, 1-hour runoff volume increase of 23,398 cf resulting in a reduction of pre-development runoff volume by about 3,797 cf.

The proposed drainage system also includes grated drain inlets to collect onsite runoff and unperforated pipes to convey the runoff to the retention basins.

The proposed drainage plan also involves the installation of drainage facilities at the low point of the access road. This system will collect runoff from the new access road and ramp. It will also allow the existing drainageway flow to pass under the proposed access road. Easements for the inlet and outlet structures need to be obtained from the owners of Lot 1-B.

D. OPERATION AND MAINTENANCE PLAN:

The operation and maintenance of the onsite drainage system will be handled by the future homeowner's association and the fee owner of the rental project. The recommended operation and maintenance activities will include, but not limited to:

1. Inspection of the drainage facilities annually and after major storms. Repair damages, if any. Remove debris, if any, at grated drain inlets to permit unimpeded flow.
2. Periodic inspection of the drainage system. Remove debris and sediment build-up, as required, specifically inside grated drain inlets upstream of the subsurface retention basins.
3. Preventing grass and landscape cuttings from entering the drainage system.
4. Cleaning of parking areas as often as possible to minimize the entry of debris and sediments into the drainage system.
5. Maintaining healthy growth of grass lawns and landscaping to prevent soil erosion; thereby, reducing sediments that might enter the drainage system.

E. CONCLUSION:

The proposed development will increase the existing storm runoff due to addition of impervious surfaces such as building roofs, pavement and concrete walkways. Despite the increase in runoff, the proposed development is not anticipated to have adverse drainage effects on adjacent and downstream properties. The proposed drainage improvements include the impoundment of runoff volume greater than the anticipated 50-year, 1-hour runoff volume increase generated by the proposed development, resulting in a reduction of runoff to the west drainageway and downstream properties. The present runoff volume to

the west drainageway is about 19,132 cf; while at post development the runoff will be about 15,335 cf resulting in the reduction of 3,797 cf. The future retention basin will also have the effect of reducing the potential for sediments contained in the runoff from entering neighboring properties and eventually the ocean.

V. GRADING AND SOIL EROSION CONTROL:

A. GRADING CONCEPT:

Grading for the proposed development site will be performed in compliance with the applicable requirements of the Maui County Grading Ordinance No. 2884 or Chapter 20.08 of the Maui County Code. The multi-family site will be graded for the proper reception of the proposed buildings, parking areas and other surface improvements. It will include excavation, embankment and retaining walls. Refer to Figure 16 for the Conceptual Grading Plan. There will be minimal grading on the single family portion of the development that involves only the widening and improving the existing paved turnaround.

Prior to commencing land disturbance activities, a grubbing and grading permit must be obtained from the Development Services Administration (DSA) of the Maui County Department of Public Works. Associated submittals for the permit application are grading plan; soil erosion control plan or Best Management Practices Plan; drainage plan; and drainage report.

B. BEST MANAGEMENT PRACTICES (BMPs):

The preliminary plan for temporary control of soil erosion and dust during site improvement is shown on Figure 17; while details of some of the structural control measures are shown on Figure 18. The BMPs will include the following:

1. Control dust by means of water trucks or by installing temporary sprinkler systems or both if necessary.
2. Graded areas shall be thoroughly watered after construction activity has ceased for the day and for weekends and holidays.
3. All exposed areas shall be paved, grassed, or permanently landscaped as soon as finished grading is completed.
4. Storm runoff will be diverted away from graded areas to natural drainageways during construction by means of sand bag berms or lined temporary swales.
5. Time of construction will be minimized.
6. Only areas that are needed for new improvements will be cleared.
7. Early construction of drainage control features.
8. Construction of pit for proposed subsurface retention basins prior to mass grading of project site. The pits will be temporarily utilized as sediment catchment during construction.
9. Installation of dust control fence surrounding the project site.
10. Installation of silt fence, gravel bag berms or other approved sediment trapping devices at the downstream side of the grading area and sediment pit.

11. Temporary control measures shall be in place and functional prior to construction and shall remain operational throughout the construction period or until permanent controls are in place.

The Contractor will also be required to submit a satisfactory soil erosion control plan to minimize soil erosion prior to an issuance of a grubbing and grading permit. Best Management Practices shall be in compliance with Section 20.08.035 of the Maui County Code (Ord. No. 2684) and "Construction Best Management Practices (BMPs) for the County of Maui" of the Department of Public Works & Waste Management, May 2001.

Additionally, since the grading area is expected to be over one (1) acre, a National Pollutant Discharge Elimination System (NPDES) Permit shall be obtained from the Clean Water Branch of the State Department of Health.

VI. PROJECTED CONSTRUCTION COSTS:

The preliminary estimated cost is based on the preceding design concepts and present design standards of responsible government agencies. It is also based on present day costs and that an increase of 5% to 10% per year can be anticipated. A factor of 15%± was added to the construction cost estimate to account for contingencies. The cost presented should be viewed as an "order of magnitude". It does not include cost for planning, engineering services, construction administration; and inspection services. Itemized costs are given

on Exhibit C. The preliminary estimated projected construction costs are summarized below:

Sitework Construction Cost:

A.	General Grading, Roadway and Parking	= \$4,963,000
B.	Water System	= 690,000
C.	Drainage System	= 581,000
D.	Onsite Wastewater System	= 252,000

Projected Total Construction Cost = \$6,486,000

Others:

A.	Water Development Fee	= \$ 86,832
B.	Wastewater Assessment Fee	= 128,463

VII. CONSTRUCTION PLAN APPROVALS:

Approval of construction plans and appropriate permits for site grading and infrastructure improvements of the proposed project will be obtained from the Department of Public Works; Department of Environmental Management; Department of Water Supply; Fire Prevention Bureau; and State Department of Health, Wastewater and Clean Water Branches. The various infrastructures will be designed in compliance with the applicable requirements of these governmental agencies.

Additionally, permits for site grading/grubbing and work to perform on County right-of-ways will be acquired from Development Services Administration of the Department of Public Works.

VIII. REFERENCES:

1. Rules for the Design of Storm Drainage Facilities in the County of Maui, Title MC-15, Department of Public Works and Waste Management, County of Maui, Chapter 4.
2. Construction Best Management Practices (BMPs) for the County of Maui, Department of Public Works and Waste Management, May 2001.
3. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, prepared by U. S. Department of Agriculture, Soil Conservation Service, August 1972.
4. Erosion and Sediment Control Guide for Hawaii, prepared by U. S. Department of Agriculture, Soil Conservation Service, March 1981.
5. Rainfall-Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43, U. S. Department of Commerce, Weather Bureau, 1962.
6. Flood Insurance Rate Maps for the County of Maui, June 1981.
7. Water System Standards, Department of Water Supply, County of Maui, 2002.
8. Wastewater Flow Standards, Wastewater Reclamation Division, Department of Public Works & Environmental Management, February 2, 2000.

EXHIBIT A

PRELIMINARY DRAINAGE CALCULATIONS

EXHIBIT A

PRELIMINARY DRAINAGE CALCULATIONS

I. Reference: Rules for the Design of Storm Drainage Facilities in the County of Maui, 1995. Referred to as Maui County Drainage Standards.

II. Purpose: To determine the pre and post development storm runoff discharges.

III. Hydrologic Criteria:

A. 10-Year, 1-Hour: for surface runoff flow design such as gutter

1-Hr. Rainfall Value = 2.2" (Plate 3)

B. 50-Year, 1-Hour: for design of retention ponds and roadway culverts

1-Hr. Rainfall Value = 2.7" (Plate 4)

IV. Runoff Quantity:

A. Runoff Discharge Rate & Volume:

1. Methodology:

Rational Method, $Q = CIA$

Where Q = Flow rate in cubic feet per second (cfs)

C = Runoff Coefficient

I = Rainfall intensity in inches per hour for a duration equal to the time of concentration

A = Drainage Area in Acres
(Drain areas for existing and developed conditions are shown on Figures 13 and 14, respectively. The drain areas were determined by planimeter.)

Calculations employing this method were performed on computer using hydrologic software "Hydraflow Hydrographs 2004" by Intelisolve. The Standard Rational Method is used to calculate storm

runoff peak discharge rates while the Modified Rational Method is employed to determine storm runoff volumes.

2. Runoff Coefficient, C:

Existing Condition:

$$C = 0.30 \text{ (Unimproved) (Table 2)}$$

Future Condition:

$$C = 0.55 \text{ (Residential) (Table 3)}$$

$$= 0.70 \text{ (Apartment)}$$

Table A shows the runoff coefficients of the different drain areas.

3. Time of Concentration, T_c:

Determined from Pate 1 and are tabulated on Table B.

4. Storm Runoff Quantity:

Refer to Table C, Hydrologic Design Data

The following is a comparison of storm runoff between pre and post development conditions.

10-Year, 1-Hour Storm Peak Discharge Rate:

To Existing Drainageway West of Project Site

$$\text{Unimproved} = 8.0 \text{ cfs (Area 1E)}$$

$$\text{Post Development} = 15.0 \text{ cfs (Area A)}$$

$$\text{Increase} = 7.0 \text{ cfs}$$

To Haunani Street:

Unimproved = 1.1 cfs (Area 2E)

Post Development = 1.6 cfs (Area B)

Increase = 0.5 cfs

To Adjacent Lots East of Project Site:

Unimproved = 1.7 cfs (Area 3E)

Post Development = 0.9 cfs (Area C)

Decrease = 0.8 cfs

Runoff Volume (50-Year, 1-Hour Storm):

(Consider Drain Areas that drains to the existing drainageway west of project site)

Unimproved = 19,132 cf (Area 1E)

Post Development = 42,530 cf (Area A)

Increase = 23,398 cf

The 50-year, 1-hour rainfall volume increase is the minimum volume to be retained onsite in order to attain zero runoff increase to adjacent/downstream properties. However, it is recommended that future retention basins should be designed to impound more than the anticipated volume increase to ensure that the proposed development will not have an adverse drainage effect on downstream properties.

TABLE A
 RUNOFF COEFFICIENT, C

Drain Area Designation	C	Remarks
1E	0.30	Unimproved
2E	0.38	Unimproved Area = 0.74 (C = 0.30) Paved Area = 0.11 (C = 0.95) Total Area = 0.85 Ac. $C_w = \frac{0.74 \times 0.30 + 0.11 \times 0.95}{0.85}$ $= \frac{0.327}{0.85} = 0.38$
3E	0.30	Unimproved
A	0.62	Unimproved Area = 1.15 (C = 0.30) Multi-Family = 5.14 (C = 0.70) Single Family = 0.88 (C = 0.55) Total Area = 7.17 Ac. $C_w = \frac{1.15 \times 0.30 + 5.14 \times 0.70 + 0.88 \times 0.55}{7.17}$ $= \frac{4.427}{7.17} = 0.62$
B	0.55	Single Family Residential Area
C	0.30	Unimproved

TABLE B

TIME OF CONCENTRATION, T_c

Drain Area Designation	Length of Overland Flow, Ft.	Average Slope, %	Character of Ground	T _c (Minutes)
1E	420	9.0	Ave. Grass	16
2E	410	2.0	Ave. Grass	22
3E	80	38.0	Ave. Grass	6
A	190	1.5	Ave. Grass	18
	100	50.0	Ave. Grass	6
B	410	2.0	Ave. Grass	22
C	80	38.0	Ave. Grass	6

TABLE C

HYDROLOGIC DESIGN DATA

Drain Area Designation	Area (Acres)	C	T _c	Peak Rate (cfs)		50-Yr. Volume (cf)	Hyd. No.
				10-Yr.	50-Yr.		
1E	6.61	0.30	16	8.0	9.8	--	1
2E	0.85	0.38	22	1.1	1.4	--	2
3E	1.05	0.30	6	1.7	2.1	--	3
A	7.11	0.62	24	15.0	18.5	--	4
B	0.82	0.55	22	1.6	2.0		5
C	0.58	0.30	6	0.9	1.2	--	6
1E	6.74	0.30	16	--	--	19,132	7
A	7.17	0.62	24	--	--	42,530	8

Note: Drain Areas 1E, 2E and 3E are pre-development. Refer to Figure 13.

Drain Areas A, B, C are post-development. Refer to Figure 14.

V. **RETENTION BASIN(S):**

In accordance with the Maui County Drainage Standards, retention basin(s) shall have a storage capacity to at least equal to the anticipated 50-year runoff volume increase generated by a development with areas less than 100 acres. However, in determining the storage capacity, soil percolation will not be taken into account. Further, if subsurface perforated pipes are used, only 50% of the void volume of the rock envelope will be included.

Subsurface retention basins, consisting of perforated pipes with rock envelopes, are proposed for this project. The proposed retention basin(s) will be placed under the parking areas and are conceptually laid out in Figure 15. A typical section is shown on Figure 18. Preliminarily, a triple 48-inch perforated pipe that has a storage capacity of about 55.5 cubic feet (cf) per linear foot (lf) will be used. The holding capacities are as follows:

Basins A1, A2, A3 and A4 (Parking Level 198)	= 300 lf x 55.5 = 16,650 cf
Basin B (Parking Level 210)	= 50 lf x 55.5 = 2,775 cf
Basin C (Parking Level 194)	= 100 lf x 55.5 = 5,550 cf
Basin D (Parking Level 208)	= 40 lf x 55.5 = 2,220 cf
Total Storage Capacity = 27,195 cf	
50-yr. Volume Increase (MF Sites Only) = 23,398 cf	
Extra Capacity = 3,797 cf	

The combined holding capacity of the proposed retention basins is about 16 percent greater than the anticipated volume increase, thereby reducing the present runoff flowing into the existing drainageway and downstream properties west of the project site.

Hydraflow IDF Report

Return Period (Yrs)	Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	0.0000	0.0000	0.0000	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	30.0568	10.0000	0.6176	-----
25	0.0000	0.0000	0.0000	-----
50	40.7916	11.2000	0.6383	-----
100	0.0000	0.0000	0.0000	-----

H:\Waiehu Mauka 08-040.IDF

Intensity = B / (Tc + D)^E

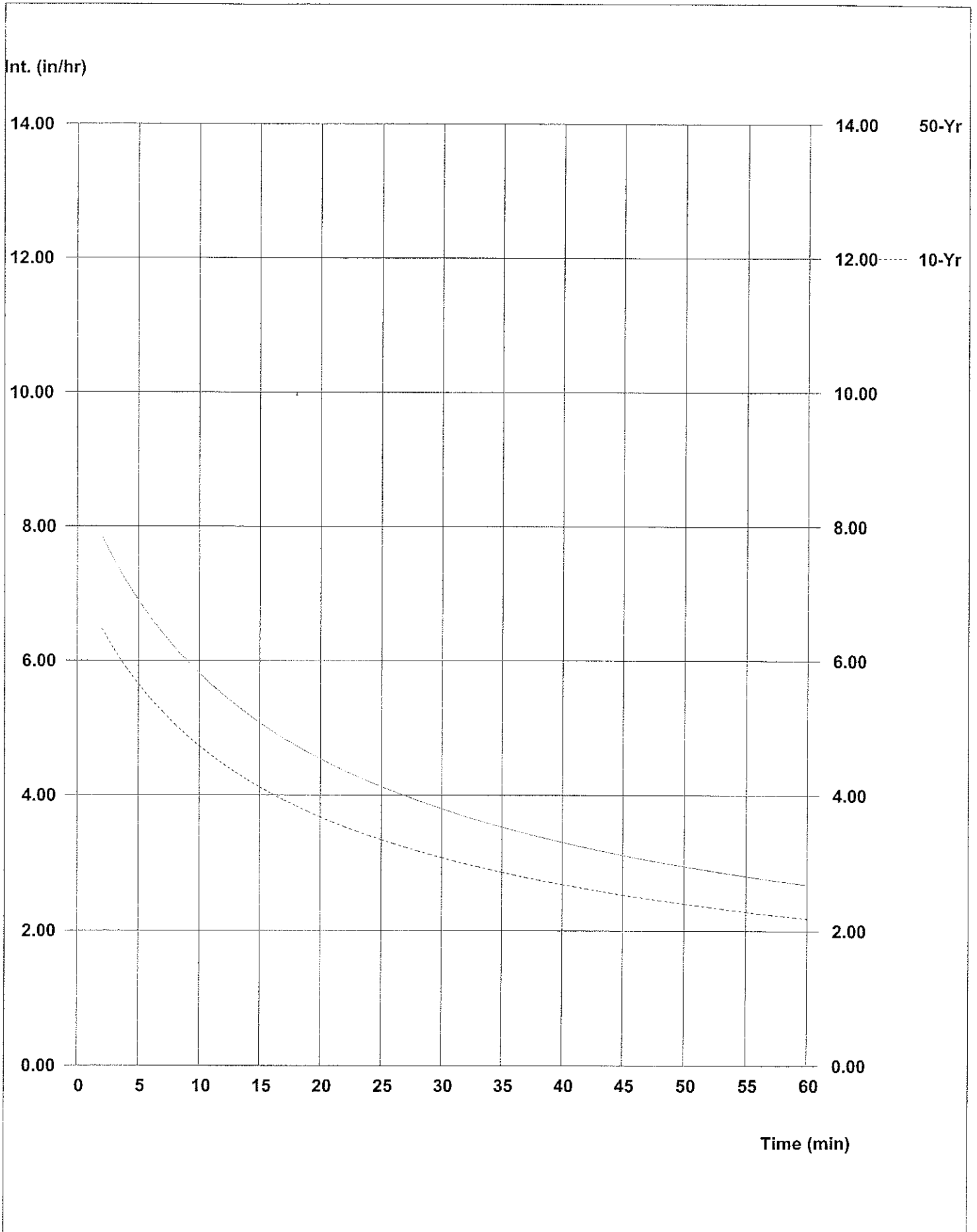
Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	5.64	4.73	4.12	3.68	3.34	3.08	2.86	2.68	2.53	2.40	2.28	2.18
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	6.90	5.81	5.07	4.54	4.13	3.80	3.53	3.31	3.12	2.95	2.81	2.68
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tc = time in minutes

I₁₀ = 2.2"
I₅₀ = 2.7"

Hydrograph IDF Curves

IDF file: Waiehu Mauka 08-040.IDF



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	7.97	1	16	7,650	---	---	---	Drain area 1E (existing)
2	Rational	1.14	1	22	1,507	---	---	---	Drain area 2E (existing)
3	Rational	1.71	1	6	615	---	---	---	Drain area 3E (existing)
4	Rational	15.01	1	24	21,615	---	---	---	Drain area A (developed)
5	Rational	1.59	1	22	2,105	---	---	---	Drain area B (developed)
6	Rational	0.94	1	6	340	---	---	---	Drain area C (developed)
7	Mod. Rational	4.32	1	16	15,563	---	---	---	Drain area 1E runoff vol. (existing)
8	Mod. Rational	9.61	1	24	34,596	---	---	---	Drain area A runoff vol. (developed)
Waiehu Mauka 08-040.gpw					Return Period: 10 Year		Wednesday, Jan 21 2009, 7:46 AM		

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	9.82	1	16	9,429	---	----	----	Drain area 1E (existing)
2	Rational	1.41	1	22	1,860	---	----	----	Drain area 2E (existing)
3	Rational	2.09	1	6	753	---	----	----	Drain area 3E (existing)
4	Rational	18.52	1	24	26,671	---	----	----	Drain area A (developed)
5	Rational	1.97	1	22	2,596	---	----	----	Drain area B (developed)
6	Rational	1.15	1	6	416	---	----	----	Drain area C (developed)
7	Mod. Rational	5.31	1	16	19,132	---	----	----	Drain area 1E runoff vol. (existing)
8	Mod. Rational	11.81	1	24	42,530	---	----	----	Drain area A runoff vol. (developed)
Waiehu Mauka 08-040.gpw					Return Period: 50 Year		Wednesday, Jan 21 2009, 7:46 AM		

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:49 AM

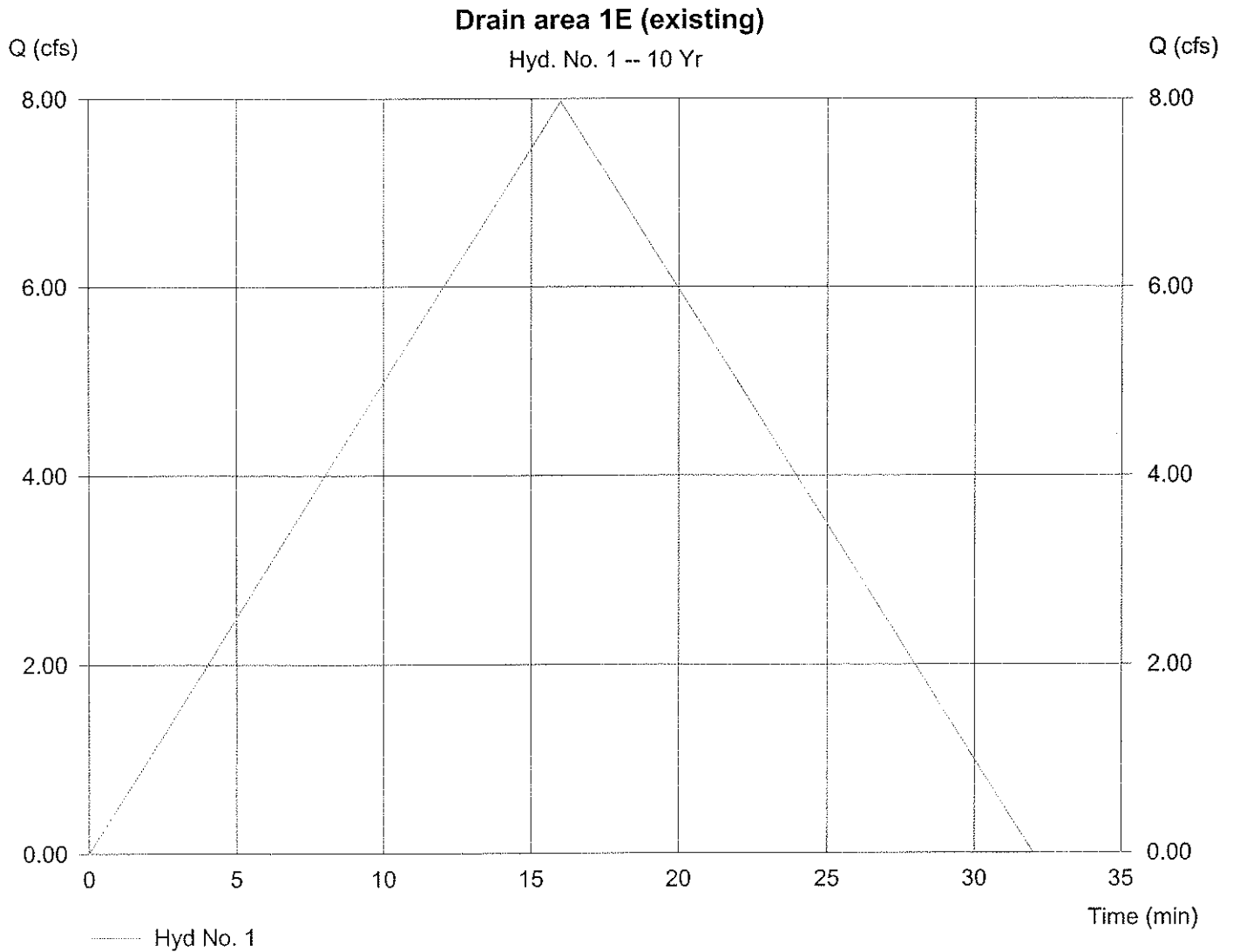
Hyd. No. 1

Drain area 1E (existing)

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 6.610 ac
Intensity = 4.019 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 7.97 cfs
Time interval = 1 min
Runoff coeff. = 0.3
Tc by User = 16.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 7,650 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:49 AM

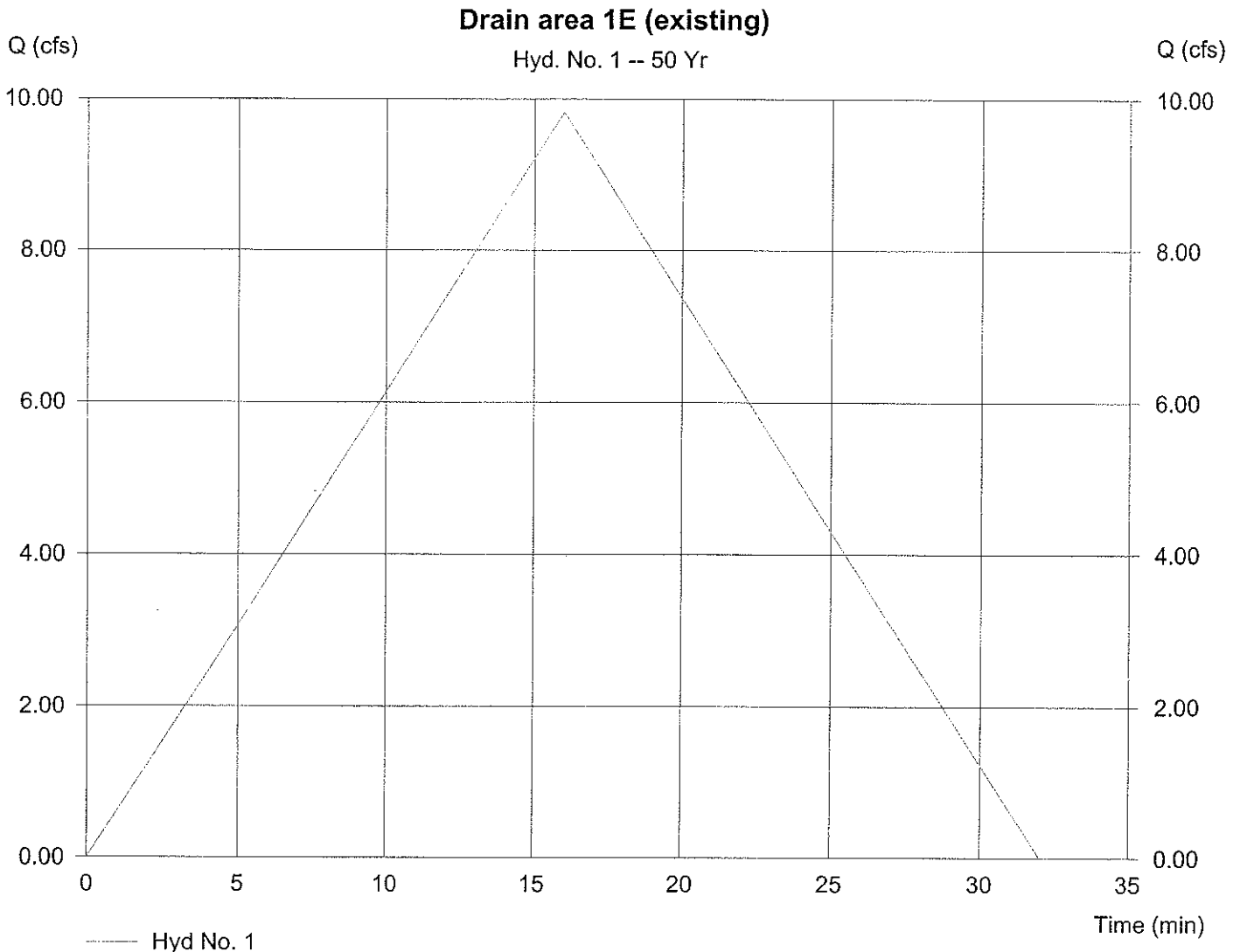
Hyd. No. 1

Drain area 1E (existing)

Hydrograph type = Rational
Storm frequency = 50 yrs
Drainage area = 6.610 ac
Intensity = 4.953 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 9.82 cfs
Time interval = 1 min
Runoff coeff. = 0.3
Tc by User = 16.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 9,429 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:50 AM

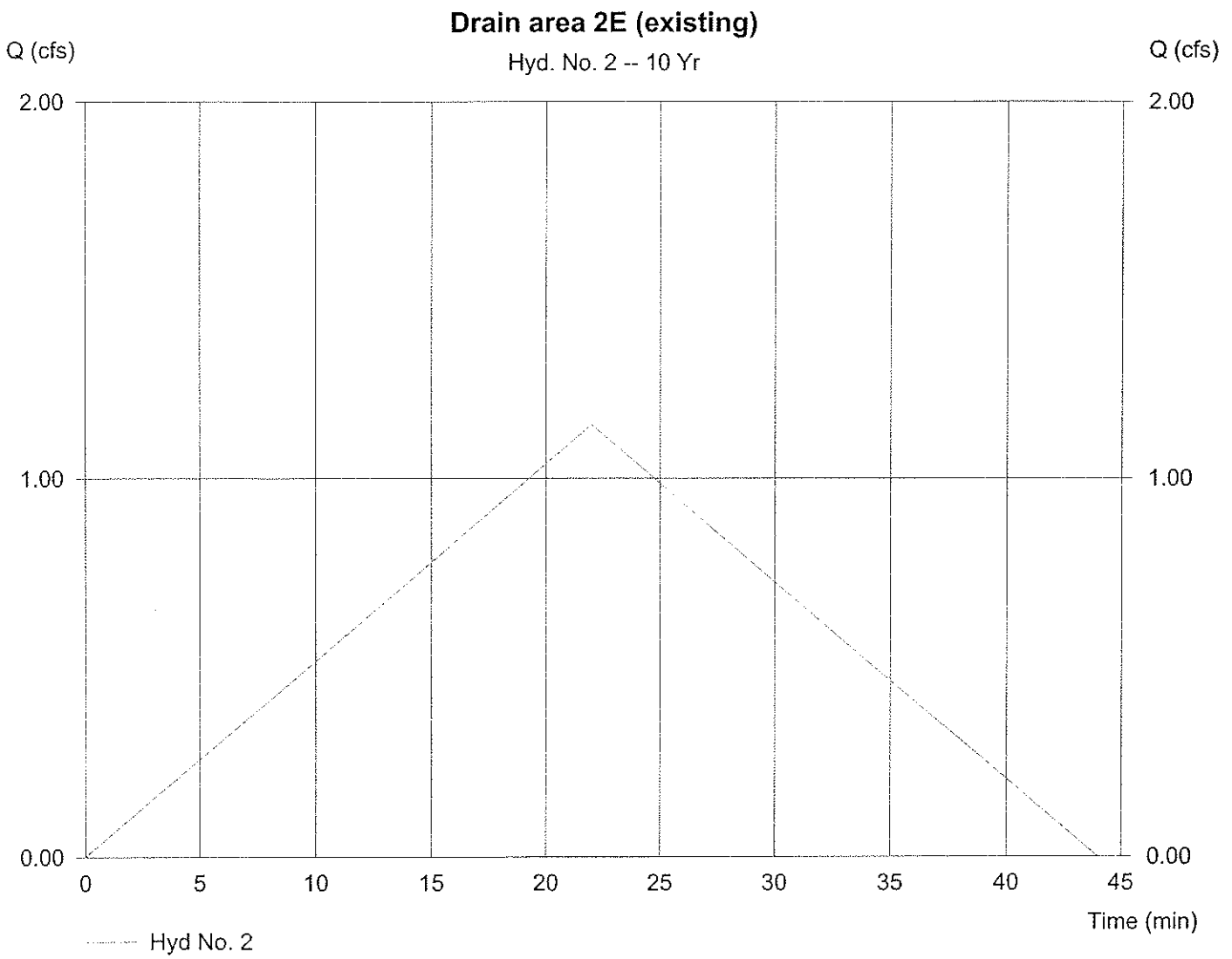
Hyd. No. 2

Drain area 2E (existing)

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.850 ac
Intensity = 3.535 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 1.14 cfs
Time interval = 1 min
Runoff coeff. = 0.38
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1,507 cuft



Hydrograph Plot

Hydraflow Hydrographs by intellisolve

Wednesday, Jan 21 2009, 7:50 AM

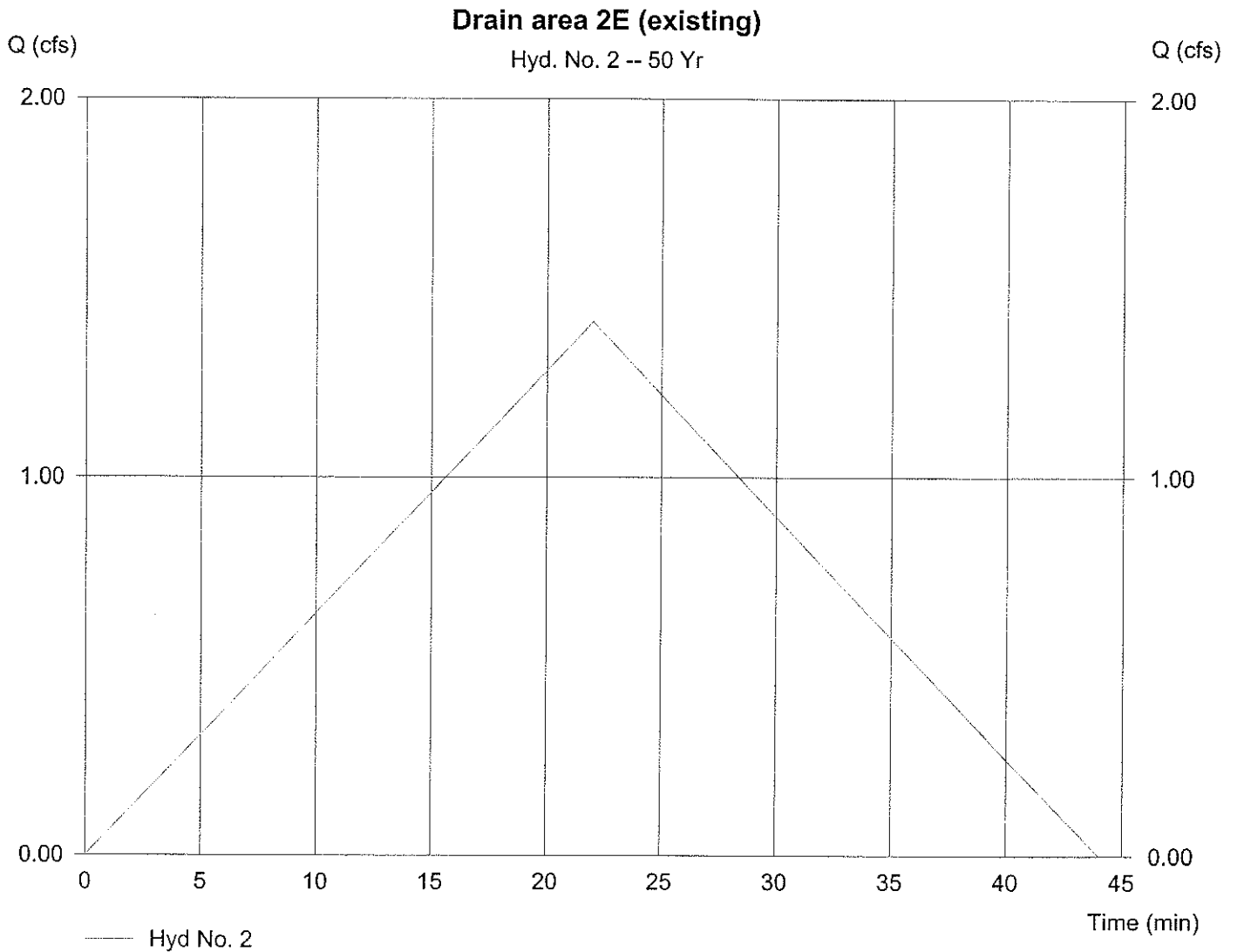
Hyd. No. 2

Drain area 2E (existing)

Hydrograph type = Rational
Storm frequency = 50 yrs
Drainage area = 0.850 ac
Intensity = 4.361 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 1.41 cfs
Time interval = 1 min
Runoff coeff. = 0.38
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1,860 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:51 AM

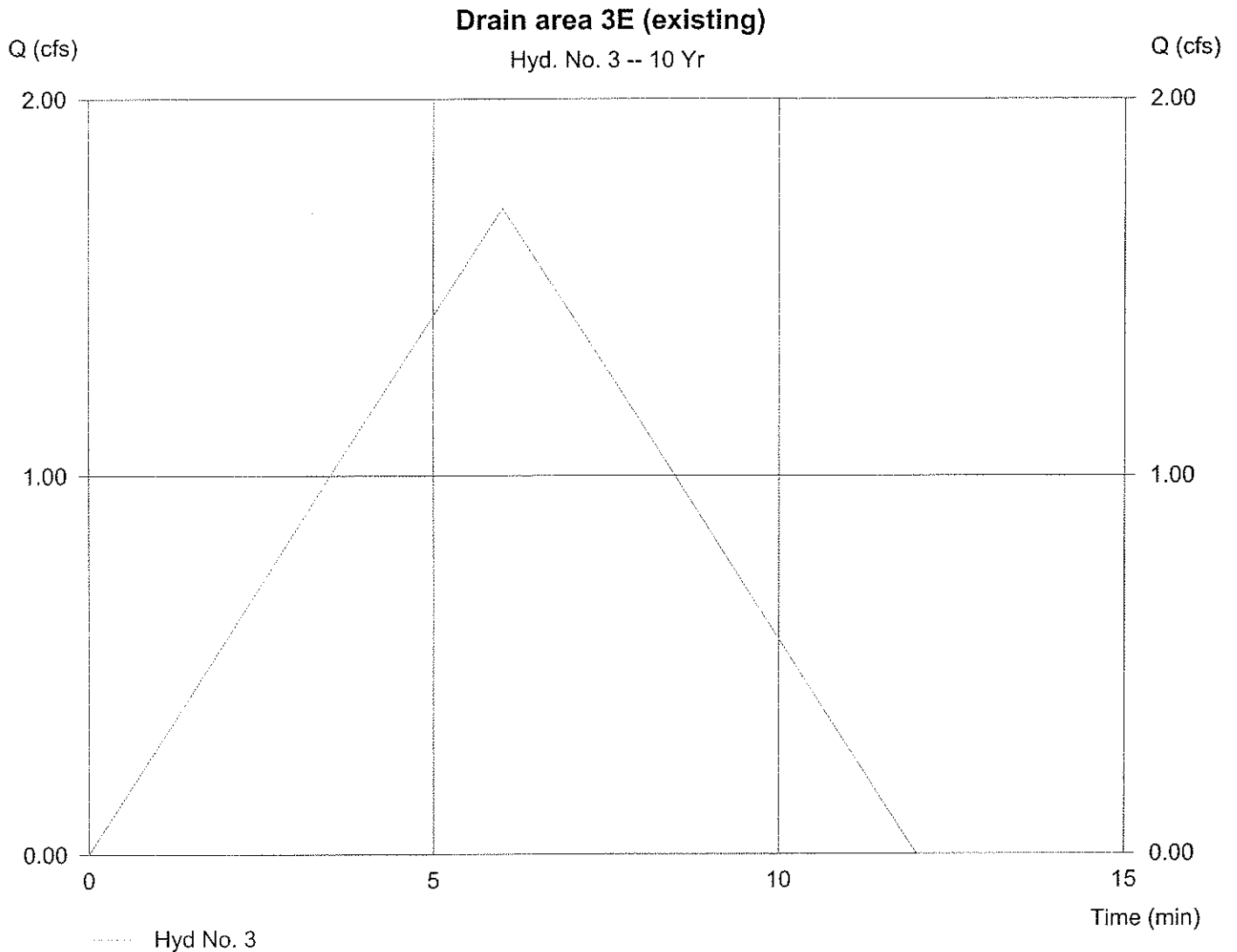
Hyd. No. 3

Drain area 3E (existing)

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 1.050 ac
Intensity = 5.424 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 1.71 cfs
Time interval = 1 min
Runoff coeff. = 0.3
Tc by User = 6.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 615 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

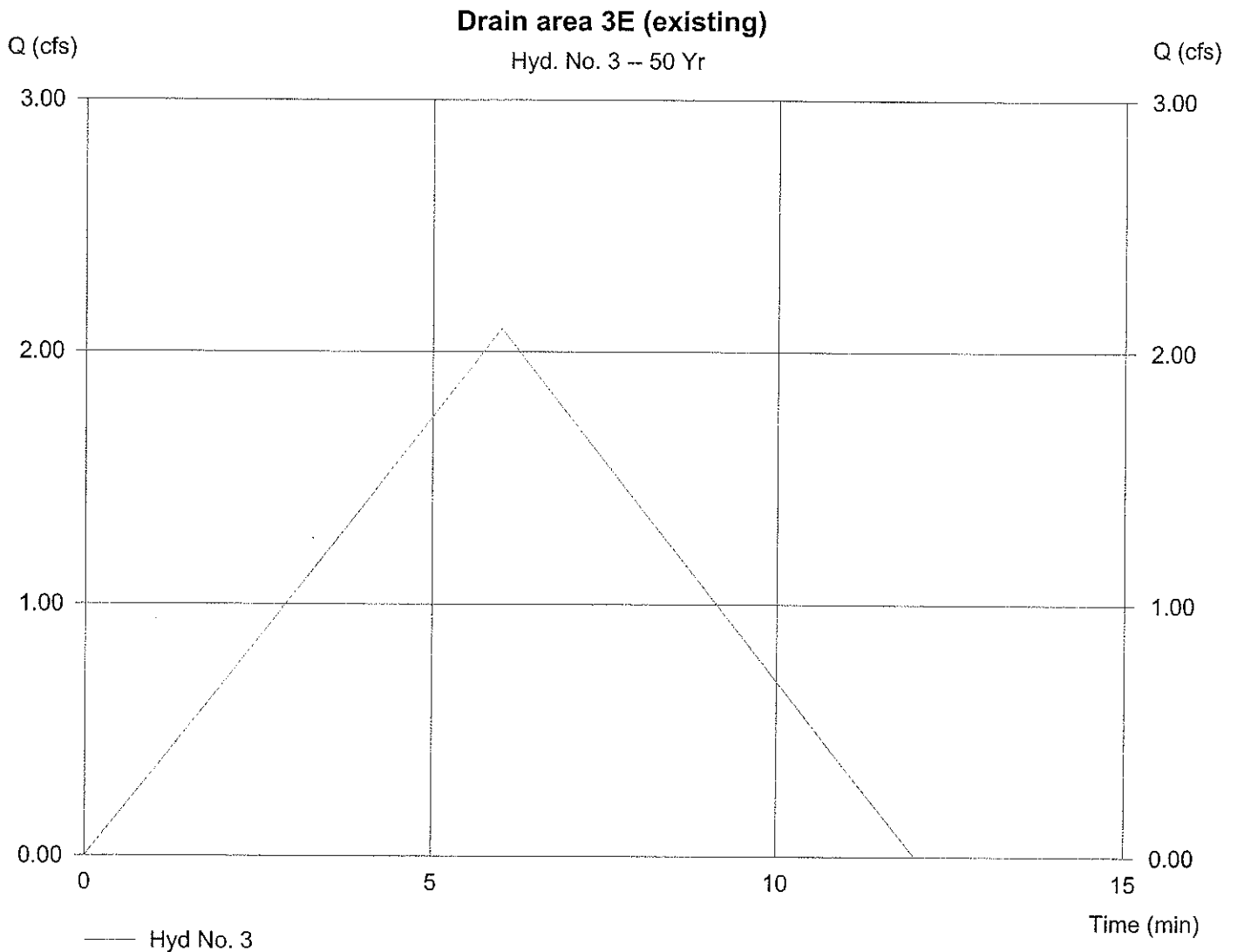
Wednesday, Jan 21 2009, 7:51 AM

Hyd. No. 3

Drain area 3E (existing)

Hydrograph type	= Rational	Peak discharge	= 2.09 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 1.050 ac	Runoff coeff.	= 0.3
Intensity	= 6.636 in/hr	Tc by User	= 6.00 min
IDF Curve	= Waiehu Mauka 08-040.IDF	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 753 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:51 AM

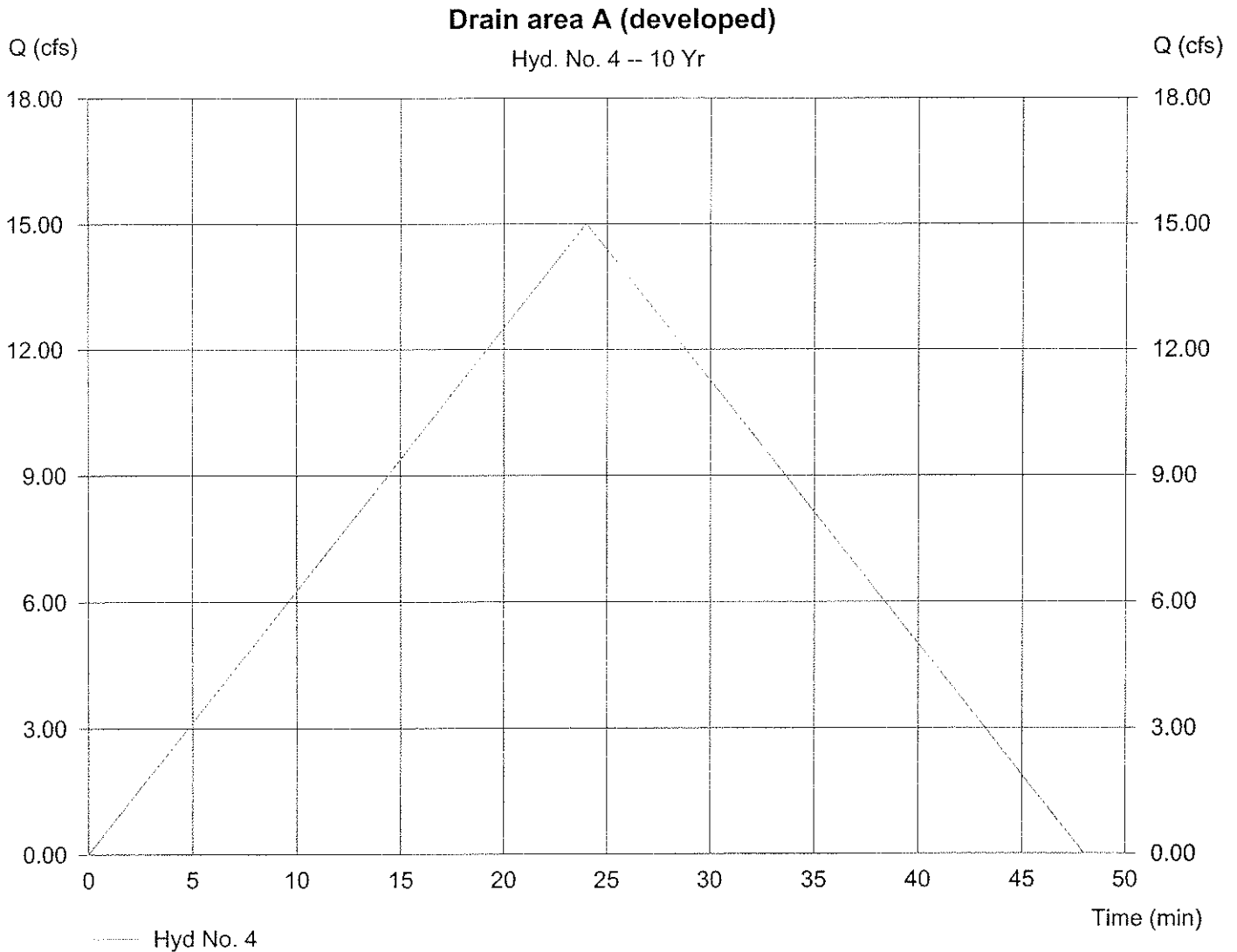
Hyd. No. 4

Drain area A (developed)

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 7.110 ac
Intensity = 3.405 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 15.01 cfs
Time interval = 1 min
Runoff coeff. = 0.62
Tc by User = 24.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 21,615 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

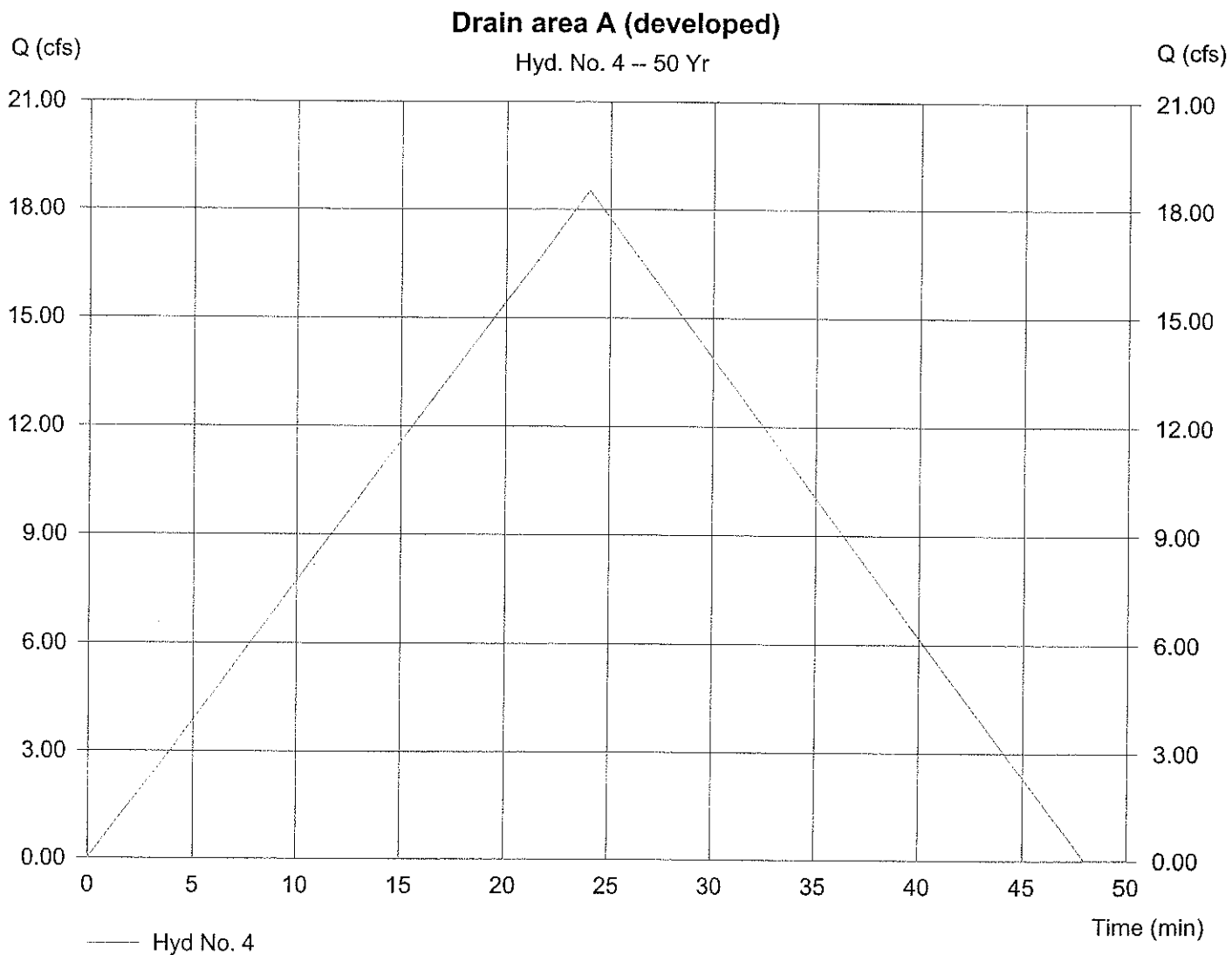
Wednesday, Jan 21 2009, 7:51 AM

Hyd. No. 4

Drain area A (developed)

Hydrograph type	= Rational	Peak discharge	= 18.52 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 7.110 ac	Runoff coeff.	= 0.62
Intensity	= 4.202 in/hr	Tc by User	= 24.00 min
IDF Curve	= Waiehu Mauka 08-040.IDF	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 26,671 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:51 AM

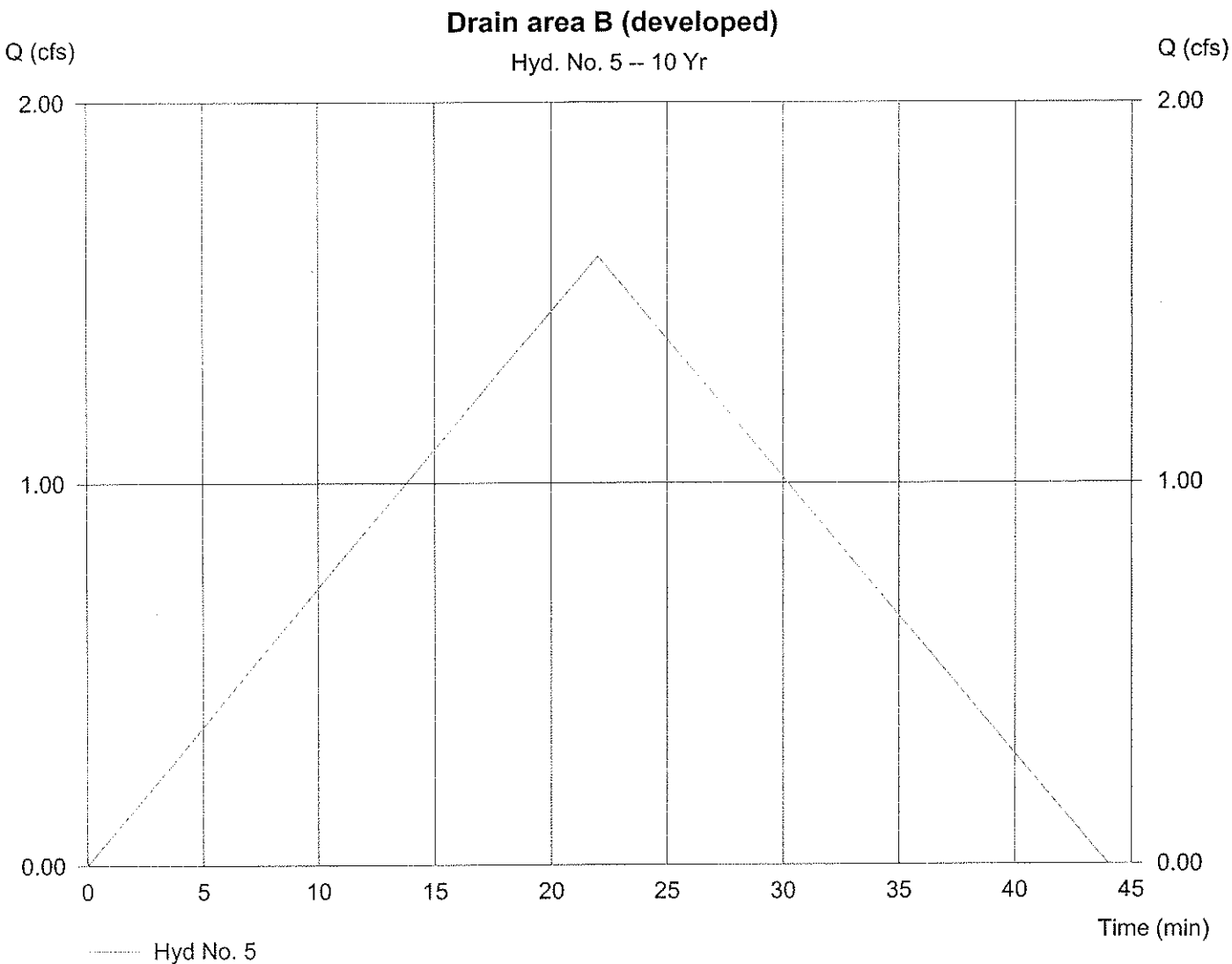
Hyd. No. 5

Drain area B (developed)

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.820 ac
Intensity = 3.535 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 1.59 cfs
Time interval = 1 min
Runoff coeff. = 0.55
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,105 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:51 AM

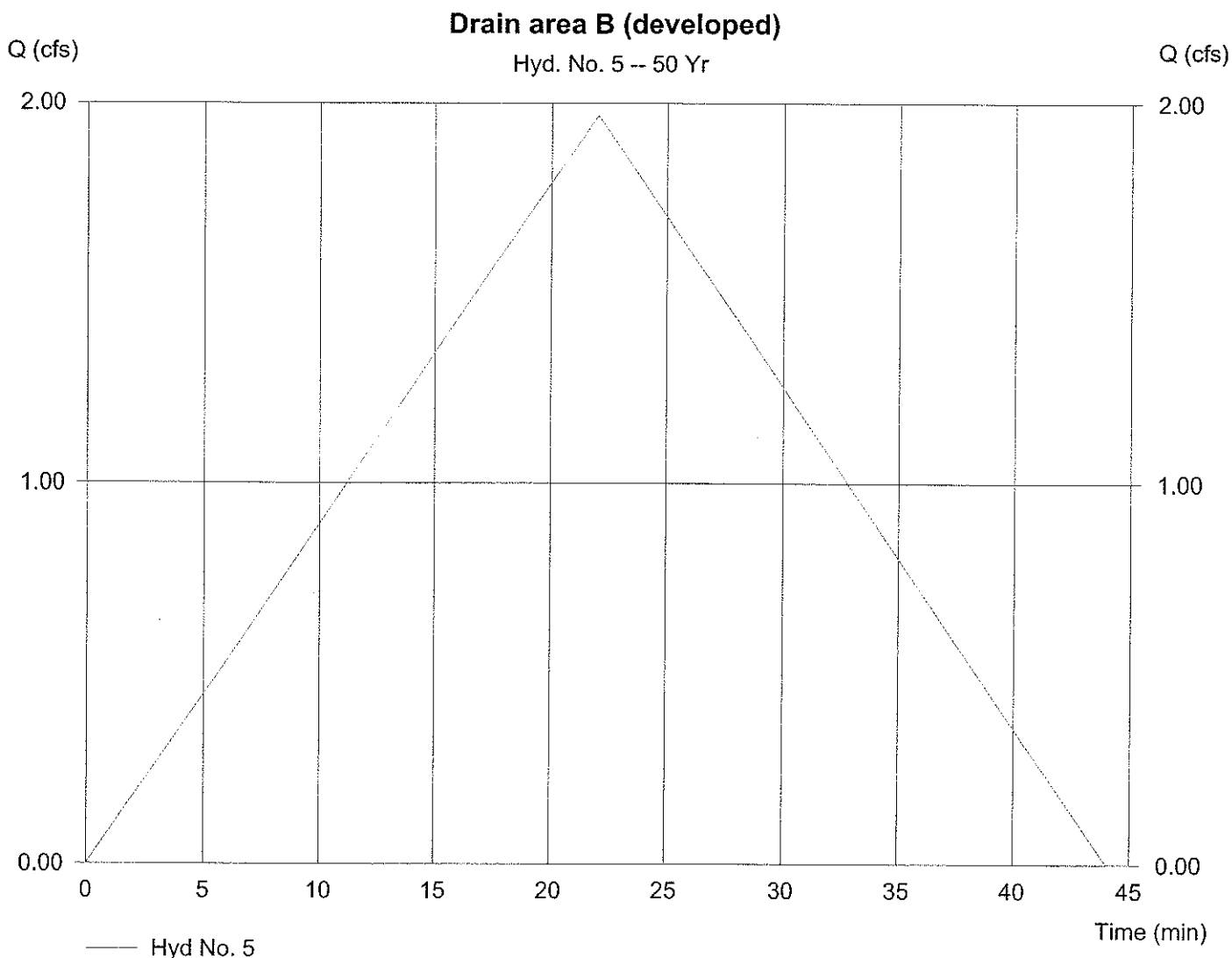
Hyd. No. 5

Drain area B (developed)

Hydrograph type = Rational
Storm frequency = 50 yrs
Drainage area = 0.820 ac
Intensity = 4.361 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 1.97 cfs
Time interval = 1 min
Runoff coeff. = 0.55
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,596 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:52 AM

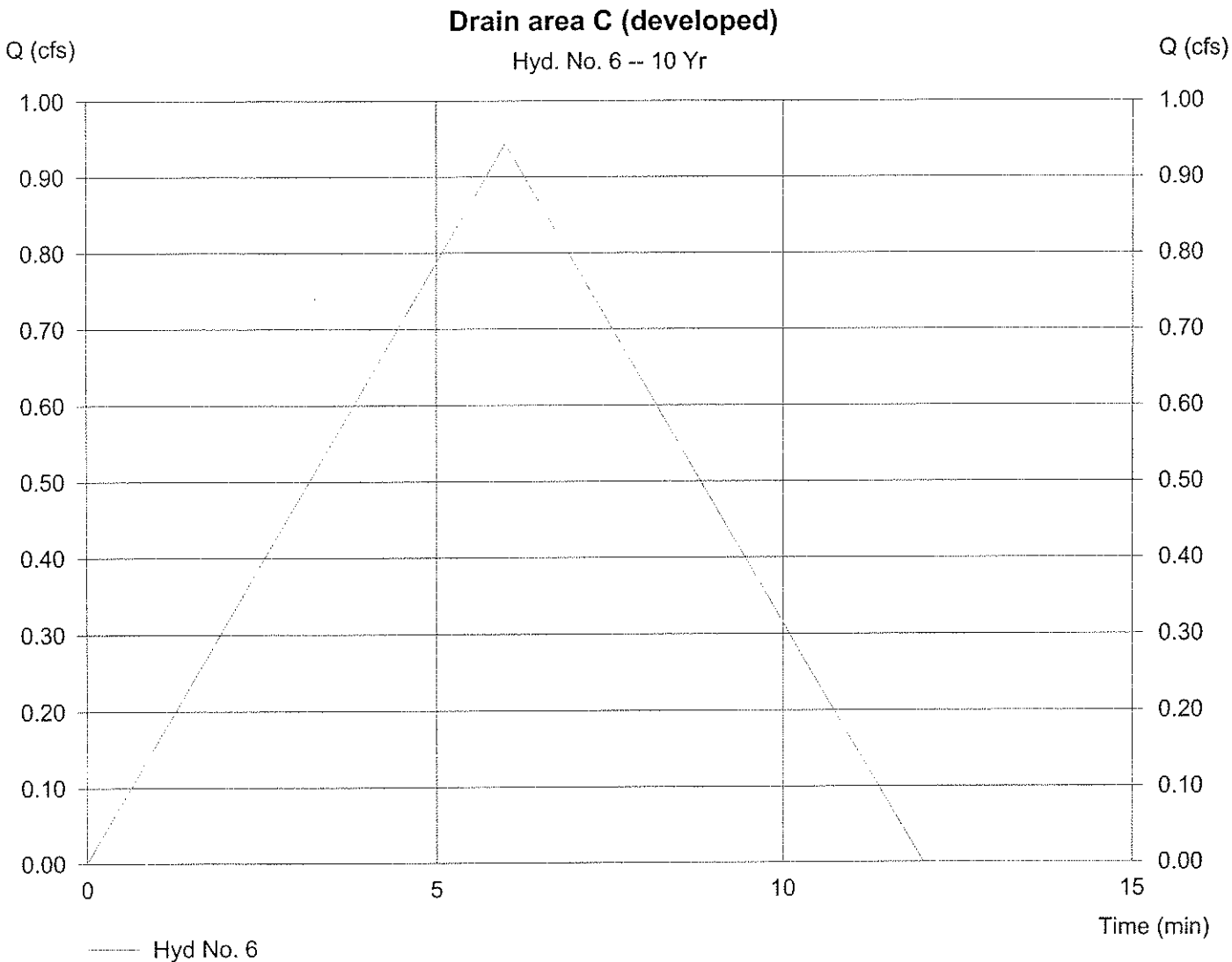
Hyd. No. 6

Drain area C (developed)

Hydrograph type = Rational
 Storm frequency = 10 yrs
 Drainage area = 0.580 ac
 Intensity = 5.424 in/hr
 IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 0.94 cfs
 Time interval = 1 min
 Runoff coeff. = 0.3
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1

Hydrograph Volume = 340 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

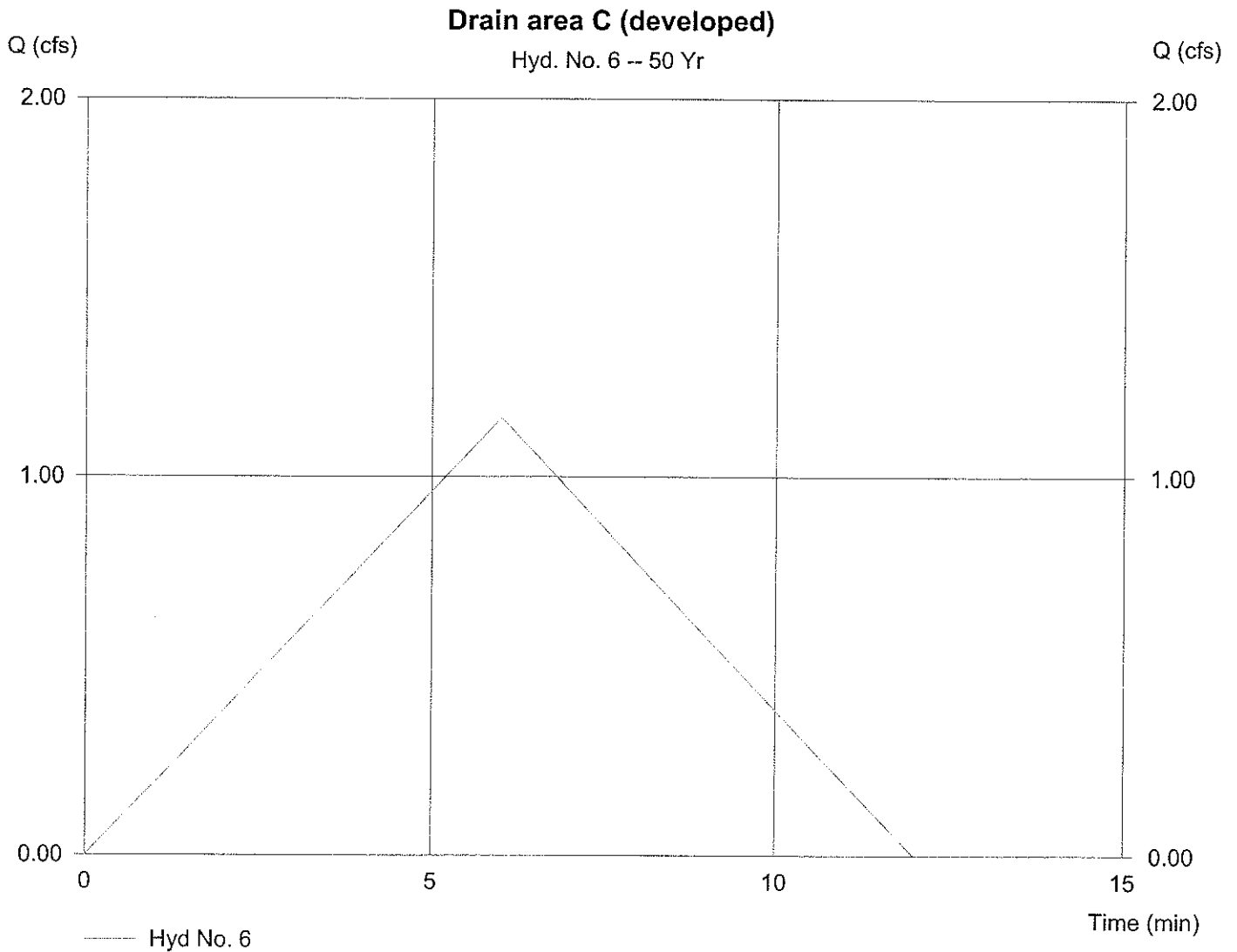
Wednesday, Jan 21 2009, 7:52 AM

Hyd. No. 6

Drain area C (developed)

Hydrograph type	= Rational	Peak discharge	= 1.15 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 0.580 ac	Runoff coeff.	= 0.3
Intensity	= 6.636 in/hr	Tc by User	= 6.00 min
IDF Curve	= Waiehu Mauka 08-040.IDF	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 416 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:52 AM

Hyd. No. 7

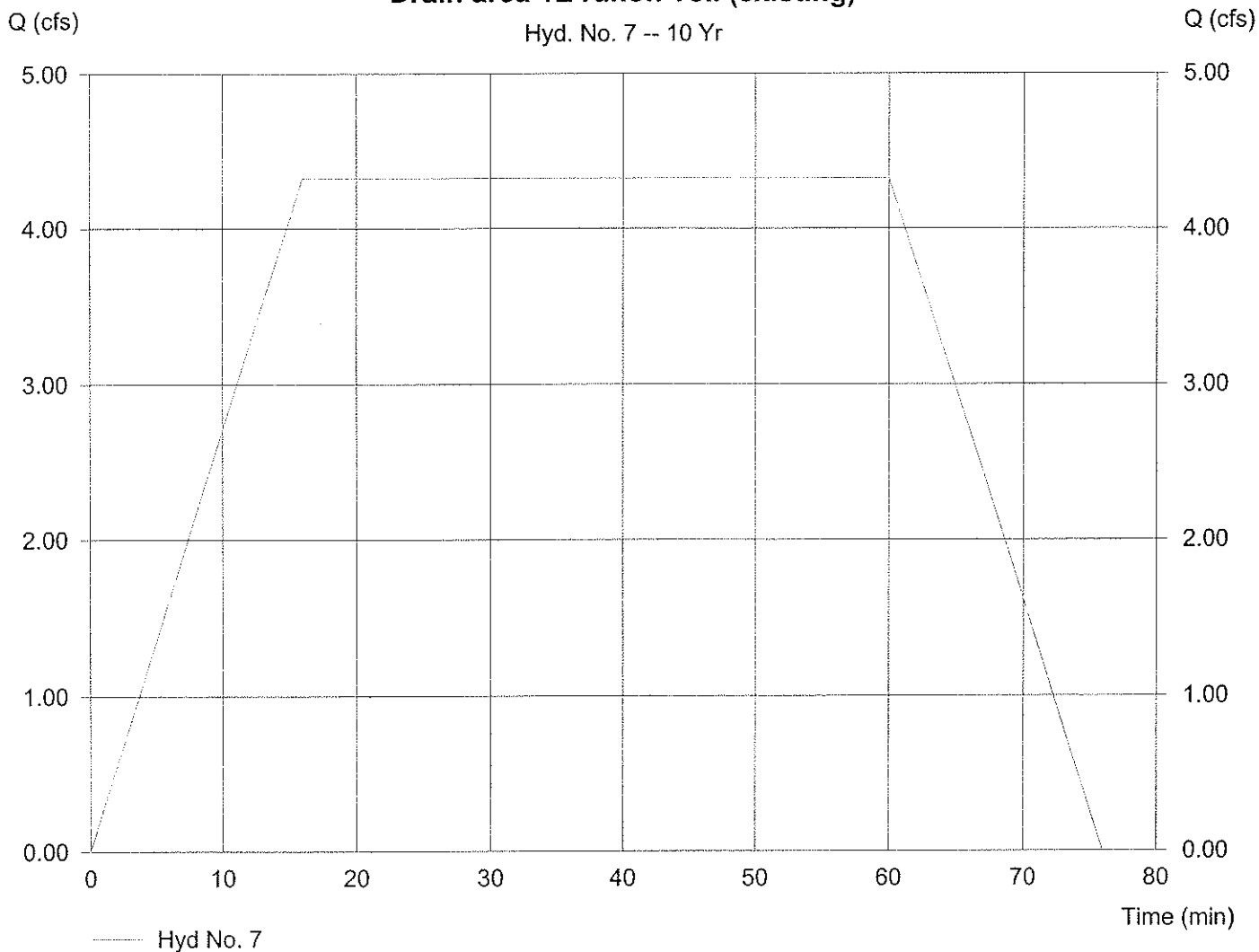
Drain area 1E runoff vol. (existing)

Hydrograph type	= Mod. Rational	Peak discharge	= 4.32 cfs
Storm frequency	= 10 yrs	Time interval	= 1 min
Drainage area	= 6.610 ac	Runoff coeff.	= 0.3
Intensity	= 2.180 in/hr	Tc by User	= 16.00 min
IDF Curve	= Waiehu Mauka 08-040.IDF	Storm duration	= 3.75 x Tc

Hydrograph Volume = 15,563 cuft

Drain area 1E runoff vol. (existing)

Hyd. No. 7 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by intelisolve

Wednesday, Jan 21 2009, 7:52 AM

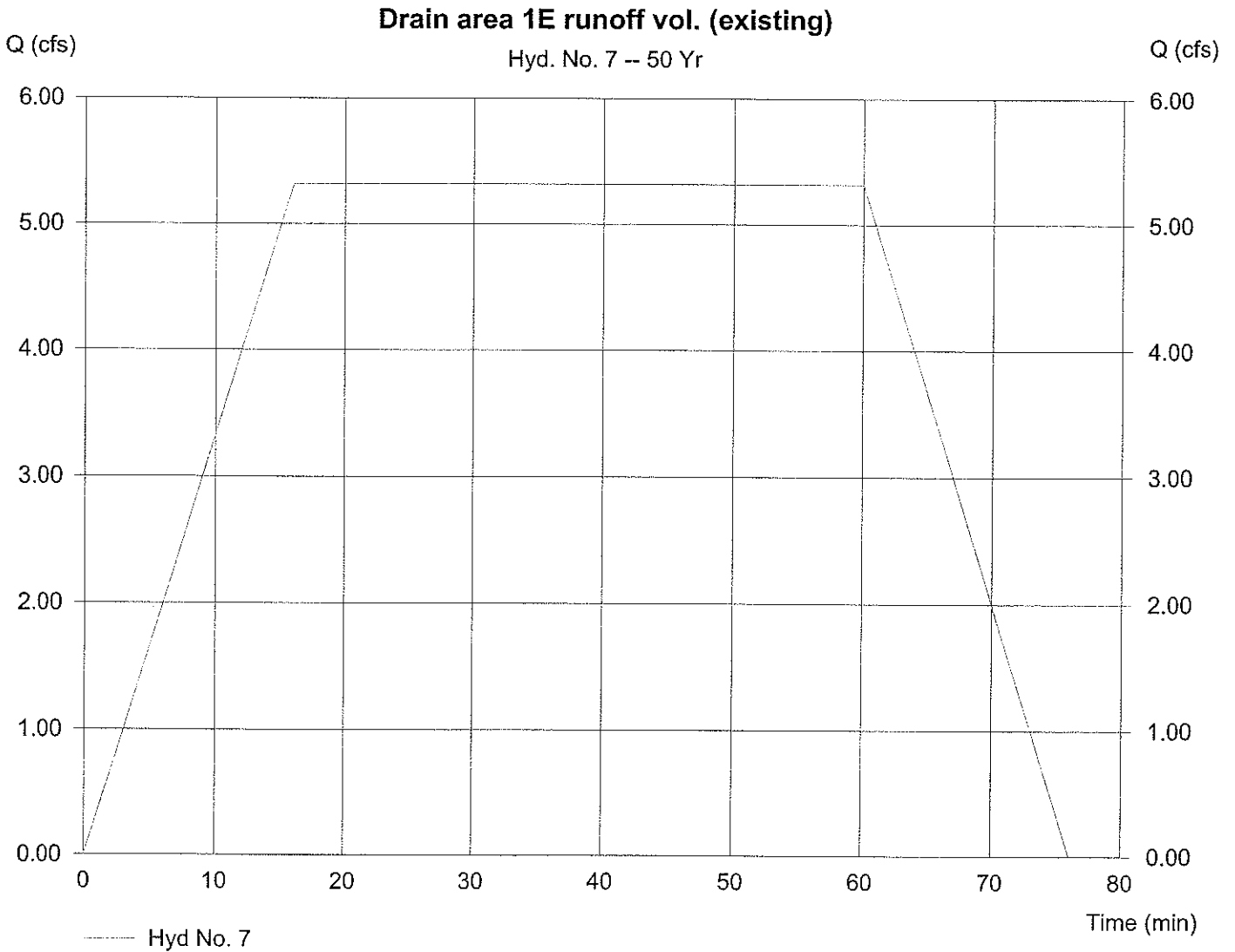
Hyd. No. 7

Drain area 1E runoff vol. (existing)

Hydrograph type = Mod. Rational
Storm frequency = 50 yrs
Drainage area = 6.610 ac
Intensity = 2.680 in/hr
IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 5.31 cfs
Time interval = 1 min
Runoff coeff. = 0.3
Tc by User = 16.00 min
Storm duration = 3.75 x Tc

Hydrograph Volume = 19,132 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:53 AM

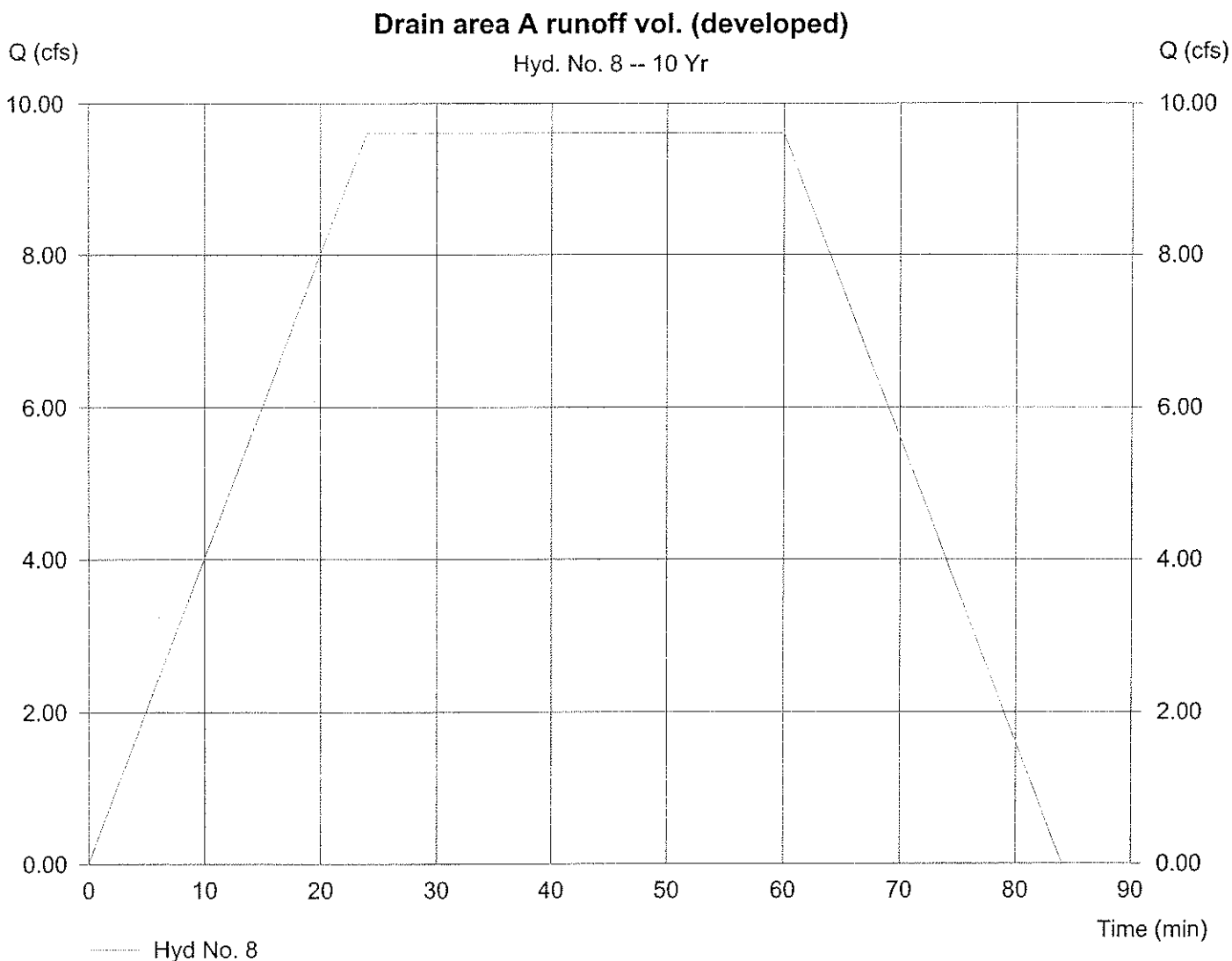
Hyd. No. 8

Drain area A runoff vol. (developed)

Hydrograph type = Mod. Rational
 Storm frequency = 10 yrs
 Drainage area = 7.110 ac
 Intensity = 2.180 in/hr
 IDF Curve = Waiehu Mauka 08-040.IDF

Peak discharge = 9.61 cfs
 Time interval = 1 min
 Runoff coeff. = 0.62
 Tc by User = 24.00 min
 Storm duration = 2.5 x Tc

Hydrograph Volume = 34,596 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Wednesday, Jan 21 2009, 7:53 AM

Hyd. No. 8

Drain area A runoff vol. (developed)

Hydrograph type	= Mod. Rational	Peak discharge	= 11.81 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 7.110 ac	Runoff coeff.	= 0.62
Intensity	= 2.680 in/hr	Tc by User	= 24.00 min
IDF Curve	= Waiehu Mauka 08-040.IDF	Storm duration	= 2.5 x Tc

Hydrograph Volume = 42,530 cuft

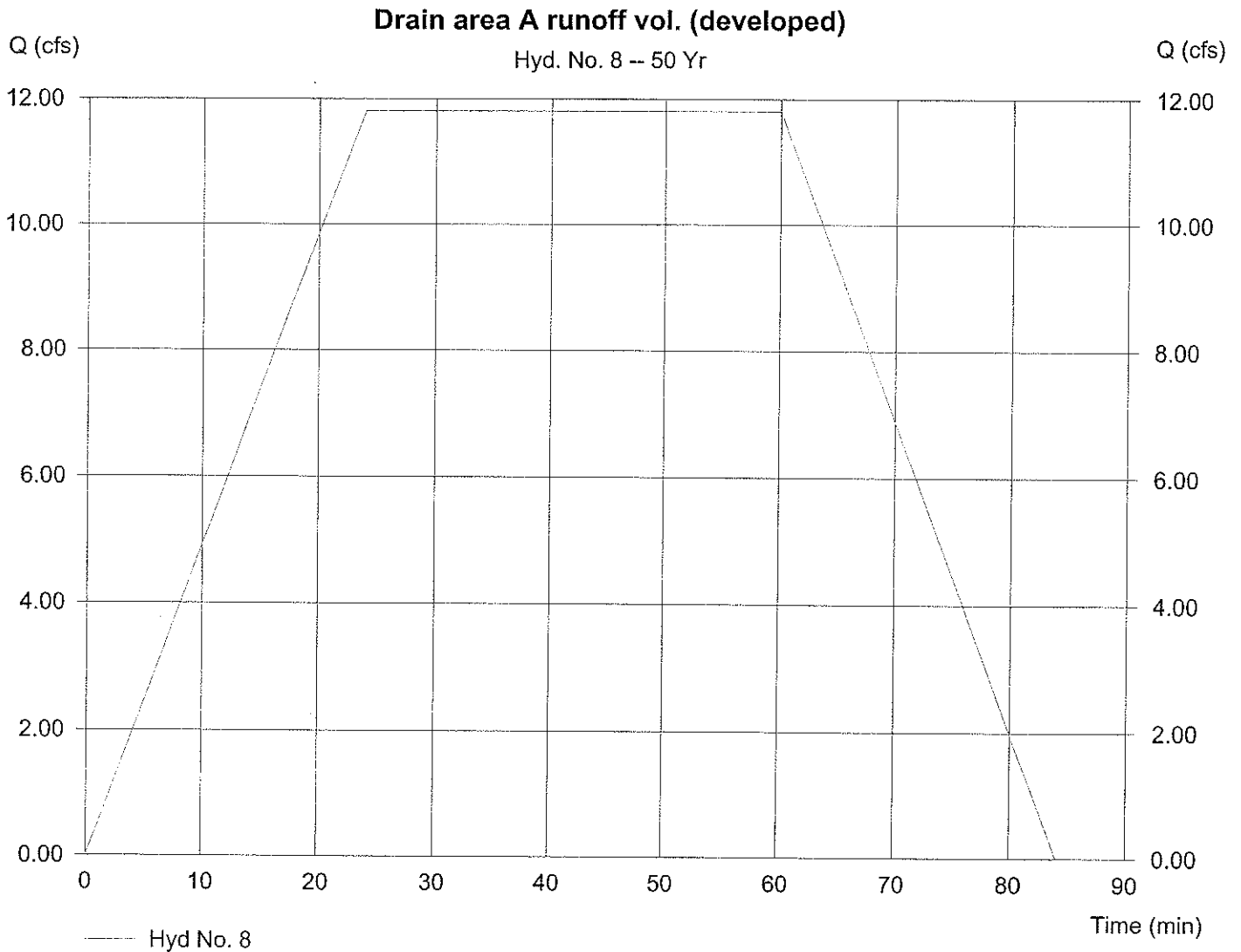


Table 1

GUIDE FOR THE DETERMINATION OF RUNOFF COEFFICIENTS FOR BUILT-UP AREAS*

WATERSHED CHARACTERISTICS	EXTREME	HIGH	MODERATE	LOW
INFILTRATION	NEGLIGIBLE 0.20	SLOW 0.14	MEDIUM 0.07	HIGH 0.0
RELIEF	STEEP (> 25%) 0.08	HILLY (15 - 25%) 0.06	ROLLING (5 - 15%) 0.03	FLAT (0 - 5%) 0.0
VEGETAL COVER	NONE 0.07	POOR (< 10%) 0.05	GOOD (10 - 50%) 0.03	HIGH (50 - 90%) 0.0
DEVELOPMENT TYPE	INDUSTRIAL & BUSINESS 0.55	HOTEL - APARTMENT 0.45	RESIDENTIAL 0.40	AGRICULTURAL 0.15

*NOTE: The design coefficient "c" must result from a total of the values for all four watershed characteristics of the site.

Table 2

RUNOFF COEFFICIENTS

Type of Drainage Area	Runoff Coefficient C
Parks, cemeteries	0.25
Playgrounds	0.35
Railroad yard areas	0.40
Unimproved areas	0.30
Streets:	
Asphaltic	0.95
Concrete	0.95
Brick	0.85
Driveway and walks	0.85
Roofs	0.95
Lawns:	
Sandy soil, flat, 2%	0.10
Sandy soil, avg., 2-7%	0.15
Sandy soil, steep, 7%	0.20
Heavy soil, flat, 2%	0.17
Heavy soil, avg., 2-7%	0.22
Heavy soil, steep, 7%	0.35

Table 3

MINIMUM RUNOFF COEFFICIENTS FOR BUILT-UP AREAS

Residential areas	C=0.55
Hotel, apartment areas	C=0.70
Business areas	C=0.80
Industrial areas	C=0.80

The type of soil, the type of open space and ground cover and the slope of the ground shall be considered in arriving at reasonable and acceptable runoff coefficients.

Table 4

APPROXIMATE AVERAGE VELOCITIES OF RUNOFF FOR CALCULATING TIME OF CONCENTRATION

TYPE OF FLOW	VELOCITY IN FPS FOR SLOPES (in percent) INDICATED			
	0-3%	4-7%	8-11%	12-15%
OVERLAND FLOW:				
Woodlands	1.0	2.0	3.0	3.5
Pastures	1.5	3.0	4.0	4.5
Cultivated	2.0	4.0	5.0	6.0
Pavements	5.0	12.0	15.0	18.0
OPEN CHANNEL FLOW:				
Improved Channels	Determine Velocity by Manning's Formula			
Natural Channel* (not well defined)	1.0	3.0	5.0	8.0

**These values vary with the channel size and other conditions so that the ones given are the averages of a wide range. Wherever possible, more accurate determinations should be made for particular conditions by Manning's formula.*

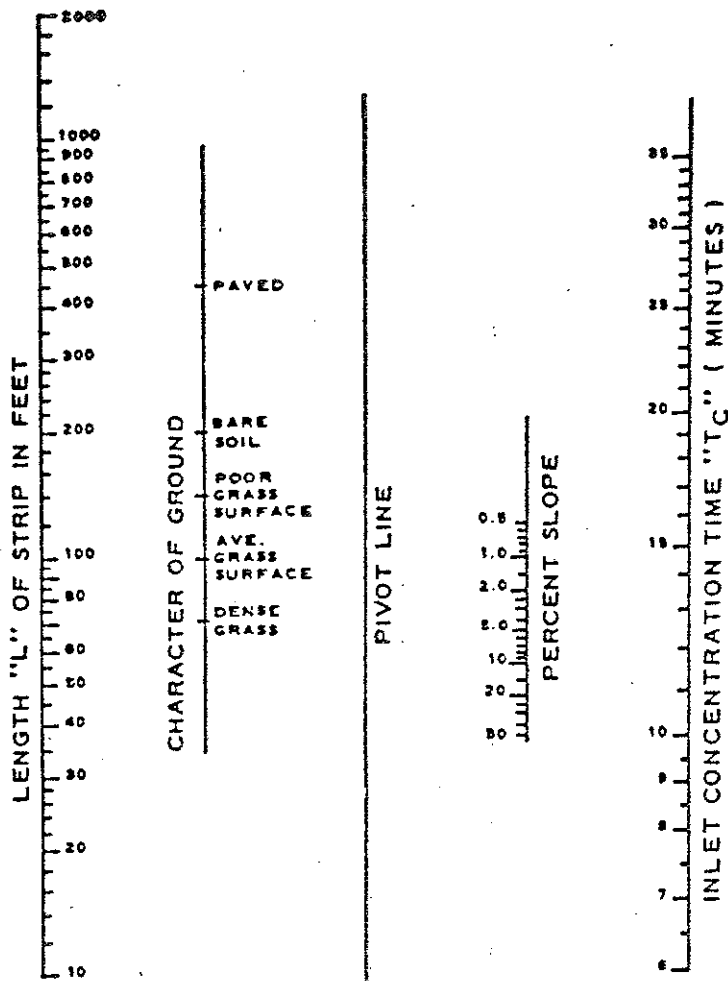


Plate 1

**Overland
Flow
Chart**

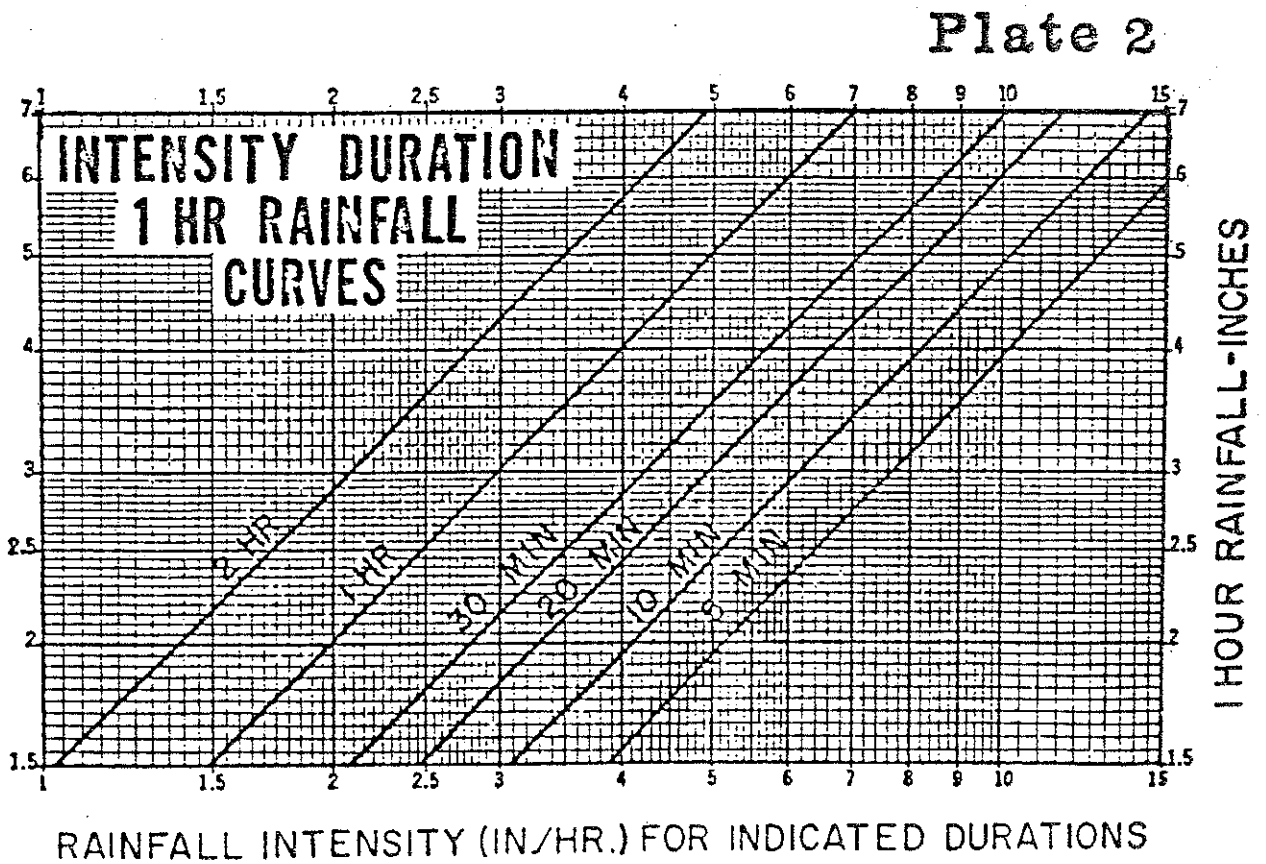
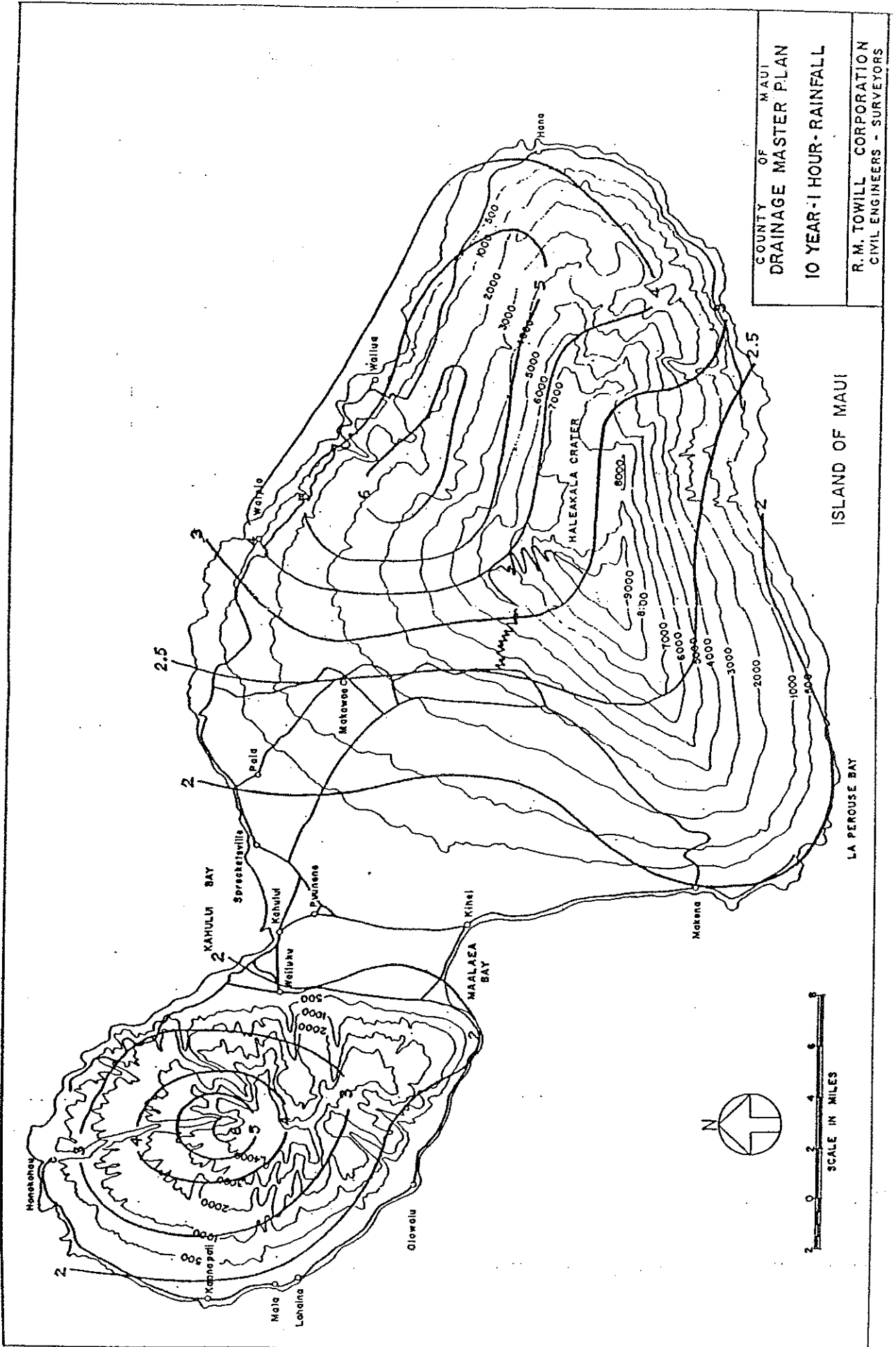


Plate 2



COUNTY OF MAUI
 DRAINAGE MASTER PLAN
 10 YEAR - 1 HOUR - RAINFALL
 R. M. TOWILL CORPORATION
 CIVIL ENGINEERS - SURVEYORS

ISLAND OF MAUI

Plate 3

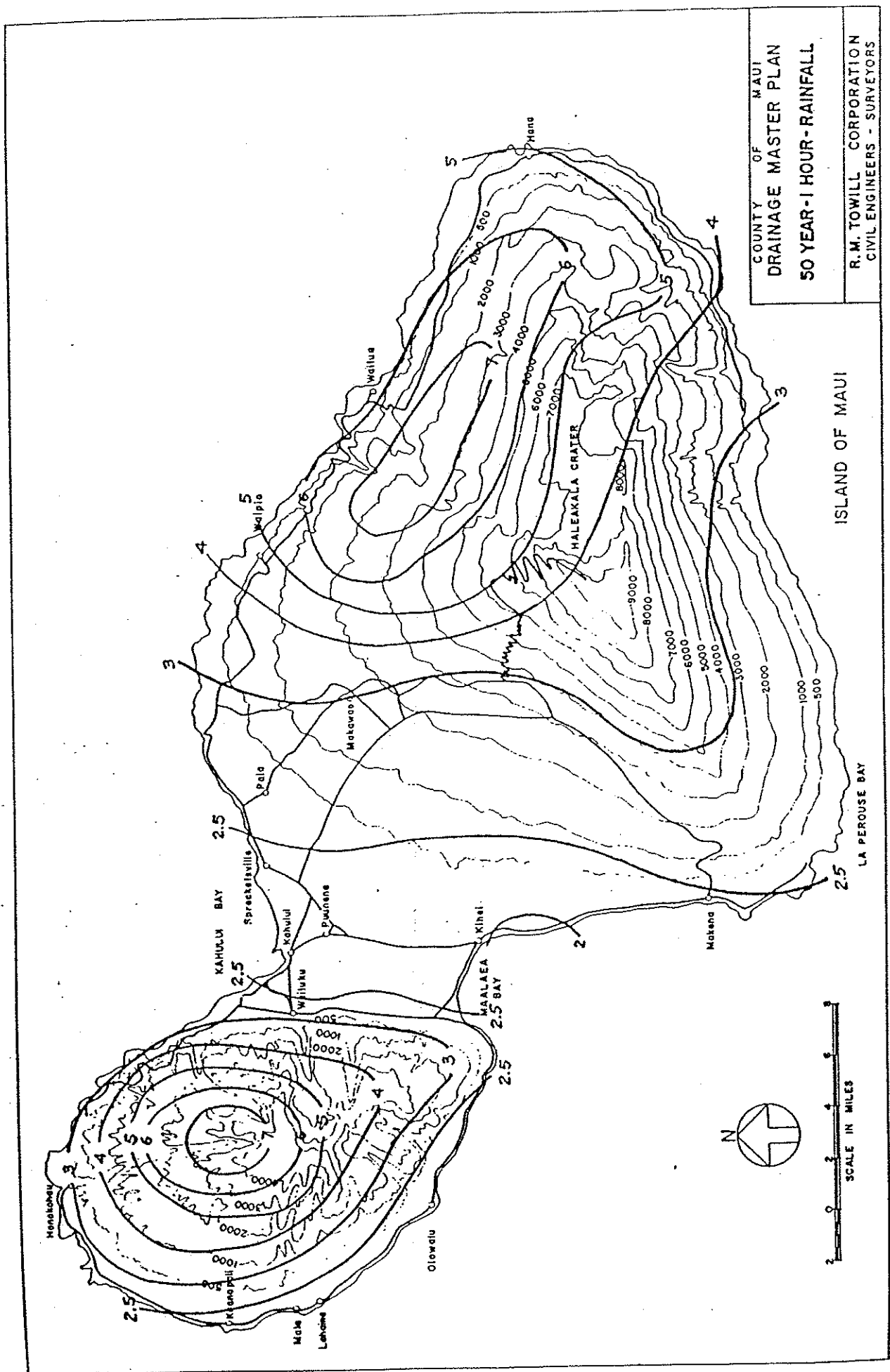


Plate 4

EXHIBIT B

**PRELIMINARY WASTEWATER FLOWS
AND
WATER REQUIREMENTS**

EXHIBIT B

PRELIMINARY WASTEWATER FLOWS AND WATER REQUIREMENTS

I. WASTEWATER FLOWS:

(Reference: Wastewater Flow Standards, February 2, 2000, County of Maui
Wastewater Reclamation Division)

A. Flow Criteria:

1. Apartment/Condominium:
Average Daily Flow = 255 gals./day/unit
2. Residential (Single-Family)
Average Daily Flow = 350 gals./home

B. Anticipated Flow from Single Family Residential Homes:

No. of Lots = 6

Anticipated Average Flow = 350 x 6
= 2,100 gals./day

C. Anticipated Flow from Apartment Building:

1. Condominium (Residential) Units:
Anticipated Average Flow = 255 x 58 units
= 14,790 gals./day

2. Rental Units:
Anticipated Average Flow = 255 x 42 units
= 10,710 gals./day

D. Total Anticipated Flow = 2,100 + 14,790 + 10,710
= 27,600 gals./day

II. DOMESTIC AND FIRE FLOW REQUIREMENTS:
(Reference: Water System Standards, 2002). Table as noted are found in the Standards.

A. Domestic Consumption:

1. Single Family:

No. of Lots = 6 (Lots 1 to 6)

Average Demand = 600 gals./unit (Table 100-18)

a. Anticipated Average Daily Domestic Demand:

= 600 x 6

= 3,600 gals./day

b. Anticipated Max. Daily Demand:

= Ave. Daily Demand x 1.5 (Table 100-20)

= 3,600 x 1.5

= 5,400 gals./day

= 4 gpm

c. Anticipated Peak Hour Demand:

= Ave. Daily Demand x 3.0 (Table 100-20)

= 3,600 x 3.0

= 10,800 gals./day

= 8 gpm

2. Low Rise Multi-Family (Condo Units) (Lot 8):

No. of Units = 58

Average Demand = 560 gals./unit (Table 100-18)

a. Anticipated Average Daily Domestic Demand:

= 560 x 58

= 32,480 gals./day

b. Anticipated Max. Daily Demand:

$$\begin{aligned} &= \text{Ave. Daily Demand} \times 1.5 \text{ (Table 100-20)} \\ &= 32,480 \times 1.5 \\ &= 48,720 \text{ gals./day} \\ &= 34 \text{ gpm} \end{aligned}$$

c. Anticipated Peak Hour Demand:

$$\begin{aligned} &= \text{Ave. Daily Demand} \times 3.0 \text{ (Table 100-20)} \\ &= 32,480 \times 3.0 \\ &= 97,440 \text{ gals./day} \\ &= 68 \text{ gpm} \end{aligned}$$

3. Low Rise Multi-Family Rental Units (Lot 9):

No. of Units = 42

Average Demand = 560 gals./unit (Table 100-18)

a. Anticipated Average Daily Domestic Demand:

$$\begin{aligned} &= 560 \times 42 \\ &= 23,520 \text{ gals./day} \end{aligned}$$

b. Anticipated Max. Daily Demand:

$$\begin{aligned} &= \text{Ave. Daily Demand} \times 1.5 \text{ (Table 100-20)} \\ &= 23,520 \times 1.5 \\ &= 35,280 \text{ gals./day} \\ &= 25 \text{ gpm} \end{aligned}$$

c. Anticipated Peak Hour Demand:

$$= \text{Ave. Daily Demand} \times 3.0 \text{ (Table 100-20)}$$

$$= 23,520 \times 3.0$$

$$= 70,560 \text{ gals./day}$$

$$= 49 \text{ gpm}$$

4. Total Anticipated Domestic Demand:

a. Average Daily Demand = $3,600 + 32,480 + 23,520$
= 59,600 gals./day

b. Maximum Daily Demand = $5,400 + 48,720 + 35,280$
= 89,400 gals./day
= 62 gpm

c. Peak Hour Demand = $10,800 + 97,440 + 70,560$
= 178,800 gals./day
= 124 gpm

B. Fire Flow:

(Table 100-19)

The required fire flow are as follows:

Single Family: 1,000 gpm

Low Rise Apartments (A-1): 1,500 gpm

The controlling fire demand is therefore 1,500 gpm

EXHIBIT C

PRELIMINARY ENGINEER'S ESTIMATE

EXHIBIT C

**WAIEHU MAUKA
PRELIMINARY ENGINEER'S ESTIMATE
Civil Construction Cost
Order of Magnitude
January 2009**

Summary:

The projected sitework construction cost for the proposed development is listed below.

Detailed costs are given on the following pages and are based on the conceptual plans presented in this Report.

SITWORK:

General Grading, Roadway and Parking	=	\$4,963,000
Water System	=	\$690,000
Drainage System	=	\$581,000
Wastewater System	=	\$252,000
Projected Total Construction Cost	=	<u>\$6,486,000</u>

OTHERS:

Water Development Fee

1. SF Residences (5/8" WM)	=	\$36,180	(6 lots x \$6,030/lot)
2. Multi-Family (1½" WM)	=	\$34,974	(1 x \$34,974/WM)
(1" WM)	=	\$15,678	(1 x \$15,678/WM)
	=		
Total	=	<u>\$86,832</u>	

Wastewater Assessment Fees

1. Single Family	=	\$9,597	(6 lots x \$1,599.50/lot)
2. Multi-Family	=	<u>\$118,866</u>	(102 units x 1,165.35/unit)
Subtotal	=	\$128,463	
Total Wastewater Assessment Fee	=	\$128,463	

Item No.	Description	Approx. Quantity	Unit	Unit Cost	Total
<u>GENERAL GRADING, ROADWAY & PARKING:</u>					
1.	Best Management Practices		L.S.		\$100,000
2.	Traffic Control		L.S.		\$20,000
3.	Archaeological Monitoring		Allow		\$100,000
4.	Clear and Grub	7.0	Acres	\$8,000	\$56,000
5.	Unclassified Excavation	53,500	C.Y.	\$30	\$1,605,000
6.	Embankment	3,500	C.Y.	\$20	\$70,000
7.	Aggregate Base Course	1,670	C.Y.	\$300	\$501,000
8.	AC Pavement, Mix IV	1,130	TONS	\$800	\$904,000
9.	4-Inch Thick Reinforced Concrete Sidewalk	2,580	S.Y.	\$250	\$645,000
10.	Standard Concrete Curb & Gutter including Connection to Existing Concrete Curb and Gutter	320	L.F.	\$100	\$32,000
11.	Standard Concrete Curb	4,380	L.F.	\$60	\$262,800
12.	Curb Ramp	5	EA.	\$3,000	\$15,000
13.	Centerline Monument	1	EA.	\$1,500	\$1,500
14.	Regulatory & Warning Signs	8	EA.	\$400	\$3,200
				Subtotal =	\$4,315,500
				Contingency (±15%) =	\$647,500
				Total General Grading, Roadway and Parking =	\$4,963,000

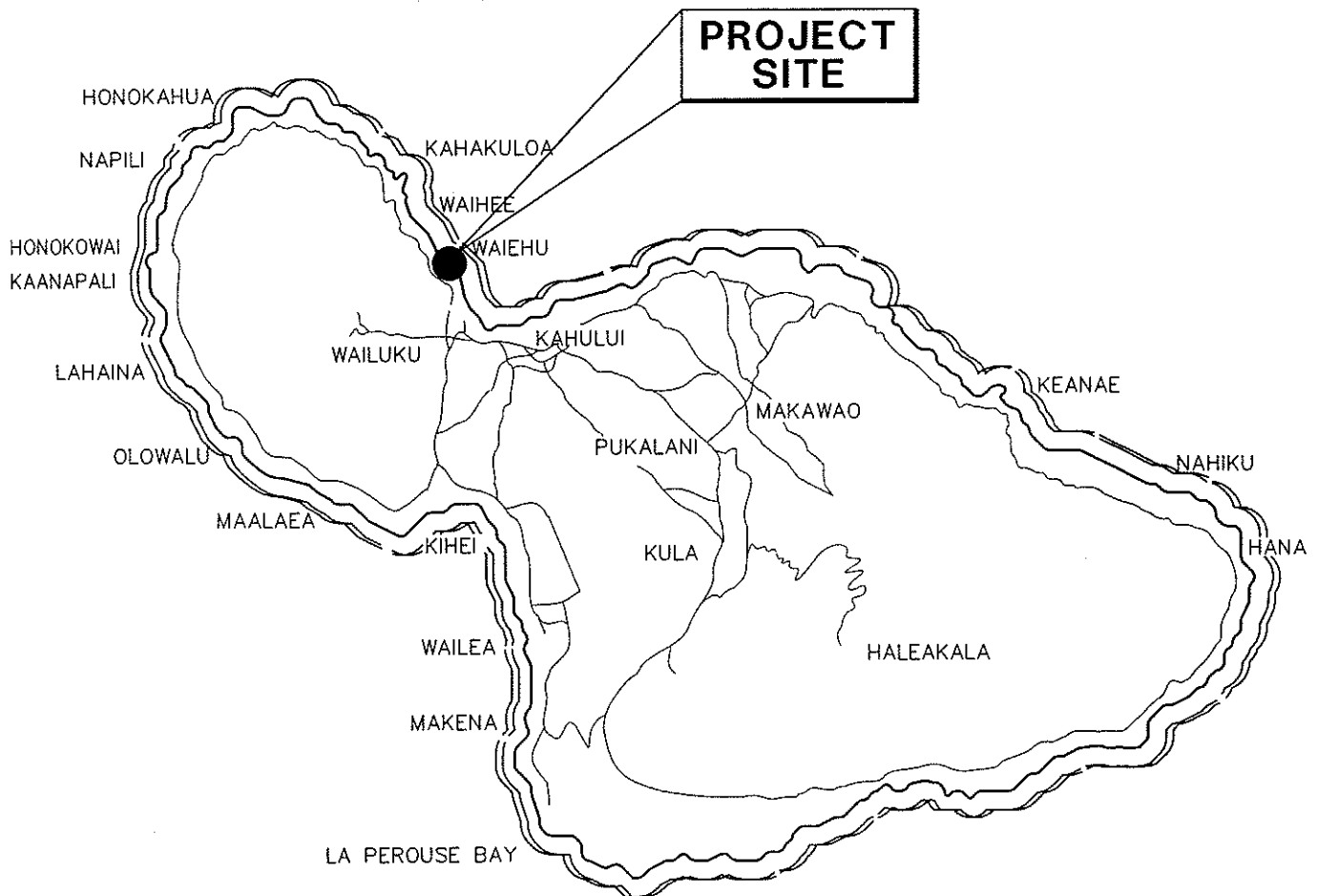
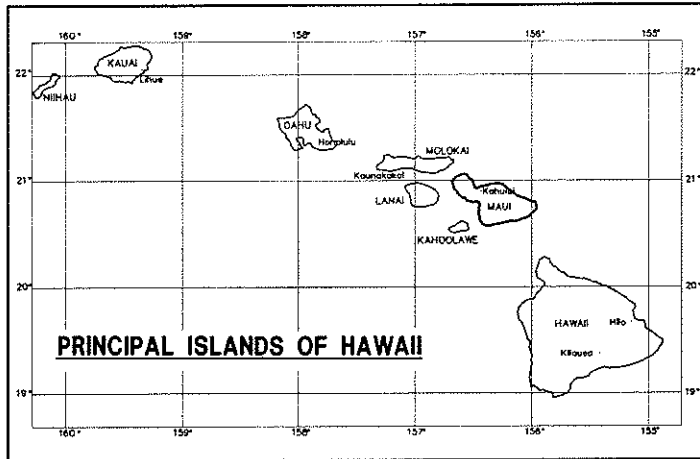
Note: Projected Cost does not include retaining walls and any required offsite improvements on existing County roads.

Item No.	Description	Approx. Quantity	Unit	Unit Cost	Total
<u>WATER SYSTEM:</u>					
1.	6" DI Pipe, Class 52 w/Polywrap	980	L.F.	\$160	\$156,800
2.	8" DI Pipe, Class 52 w/Polywrap	270	L.F.	\$175	\$47,250
3.	12" DI Pipe, Class 52 w/Polywrap	100	L.F.	\$200	\$20,000
4.	16-Inch D.I. Pipe, Class 52 w/Polywrap	400	L.F.	\$400	\$160,000
5.	6" GV, including SVB, Cover and Concrete Collar	6	EA.	\$650	\$3,900
6.	8" GV , including SVB, Cover and Concrete Collar	3	EA.	\$850	\$2,550
7.	Fire Hydrant Assembly, including Concrete Slab	6	EA.	\$5,000	\$30,000
8.	Concrete Reaction Block	18	EA.	\$500	\$9,000
9.	Type A Single Service Lateral	2	EA.	\$2,000	\$4,000
10.	Type A-1 Double Service Lateral	2	EA.	\$2,500	\$5,000
11.	Type B Single Service Lateral	1	EA.	\$4,000	\$4,000
12.	Type C Single Service Lateral including water meter manhole	1	EA.	\$7,000	\$7,000
13.	Connection of New 12" DI Waterline to Existing 12" AC Waterline		L.S.		\$10,000
14.	Connection to New 16" DI Waterline to Existing 16" AC Waterline		L.S.		\$15,000
15.	Chlorination and Testing		L.S.		\$10,000
16.	Removal/Disposal of Existing 12" and 16" AC Waterlines		L.S.		\$50,000
17.	DWS Charges		Allow		\$10,000
18.	Water Services to MF Buildings		L.S.		\$56,000
				Subtotal =	\$600,500
				Contingency (±15%) =	\$89,500
				Total Water System =	\$690,000

Item No.	Description	Approx. Quantity	Unit	Unit Cost	Total
<u>DRAINAGE SYSTEM:</u>					
1.	8-Inch PVC Pipe	90	L.F.	\$50	\$4,500
2.	12-Inch PVC Pipe	150	L.F.	\$75	\$11,250
3.	18-Inch HDPE Pipe	110	L.F.	\$90	\$9,900
4.	24-Inch HDPE Pipe	50	L.F.	\$125	\$6,250
5.	Storm Drain Manhole (Shallow Drain Manhole for Pavement Area)	3	EA.	\$7,500	\$22,500
6.	Catch Basin (Type B w/o Wing)	2	EA.	\$8,500	\$17,000
7.	Grated Drain Inlet (48" x 48")	7	EA.	\$6,500	\$45,500
8.	Grated Drain Inlet (30" x 30")	2	EA.	\$5,500	\$11,000
9.	3 - 48-Inch Perforated Pipes with rock envelopes	490	L.F.	\$750	\$367,500
10.	Inlet/Outlet Structure	2	EA.	\$5,000	\$10,000
				Subtotal =	\$505,400
				Contingency (±15%) =	\$75,600
				Total Drainage System =	\$581,000

Item No.	Description	Approx. Quantity	Unit	Unit Cost	Total
<u>WASTEWATER SYSTEM:</u>					
1.	6-Inch PVC Sewerline	1,560	L.F.	\$75	\$117,000
2.	8-Inch PVC Sewerline	400	L.F.	\$90	\$36,000
3.	Sewer Manhole (Pre-Cast Plain Manhole)	6	EA.	\$5,000	\$30,000
4.	Sewer Manhole (Shallow Drop)	3	EA.	\$7,000	\$21,000
5.	Single Service Lateral with Advance Riser Connection	6	EA.	\$2,200	\$13,200
6.	Connection to Existing SMH at Haunani Street		L.S.		\$2,000
				Subtotal =	\$219,200
				Contingency (±15%) =	\$32,800
				Total Wastewater System =	\$252,000

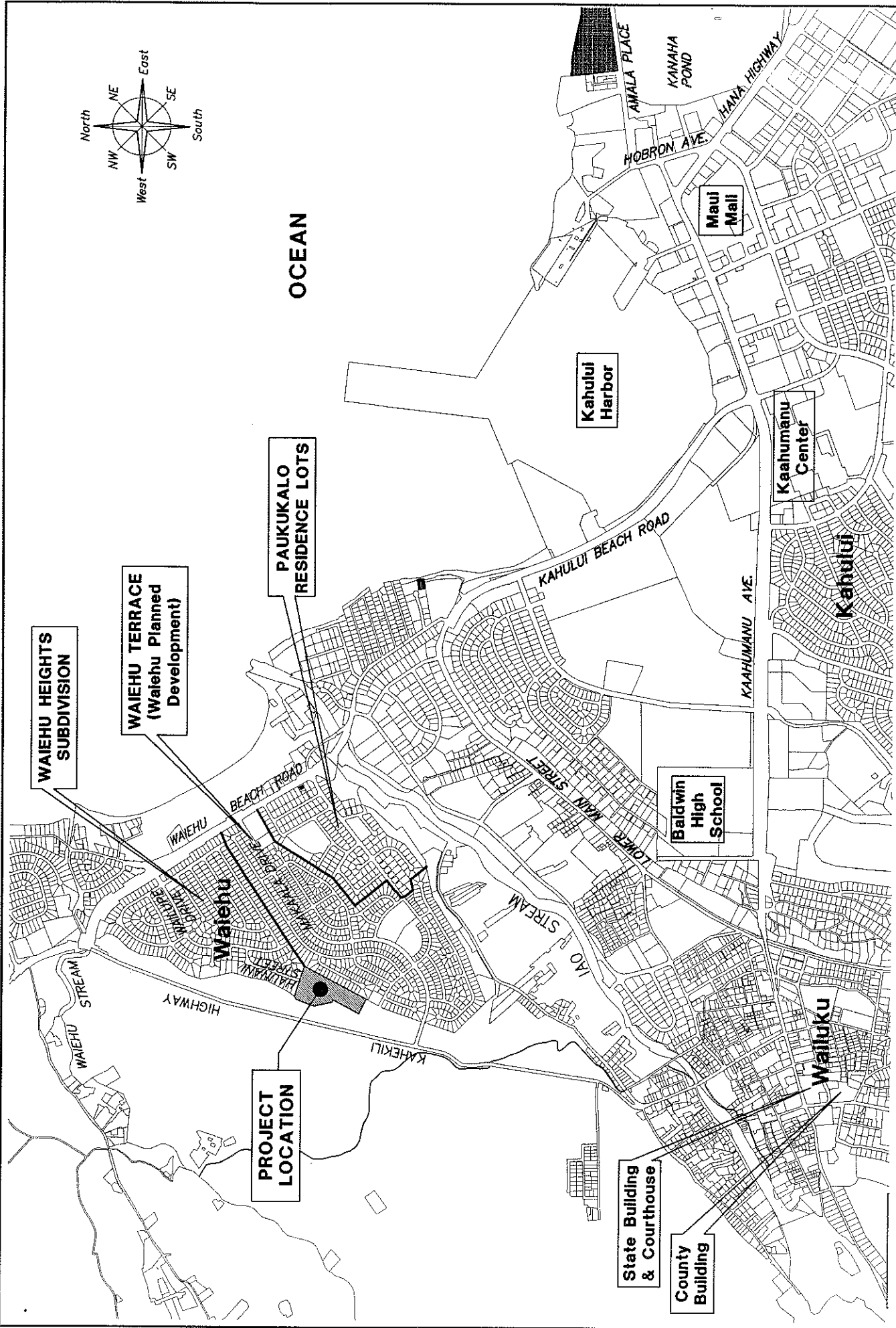
Note: Facilities for offsite wastewater disposal (wastewater pump station, force main, etc.) is not included.



LOCATION MAP
ISLAND OF MAUI

FIGURE 1

Z:\2008\08-040\WAIEHU-MAUIKA_Location & Vicinity_Map.dwg...15-DEC-2008 : Drawn BY: JOY E



VICINITY MAP

SCALE 1" = 2000'

FIGURE 2

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS



APPROXIMATE SCALE IN FEET
1000
0
1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 190 OF 400
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
150003 0190 D
MAP REVISED:
MARCH 16, 1995



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

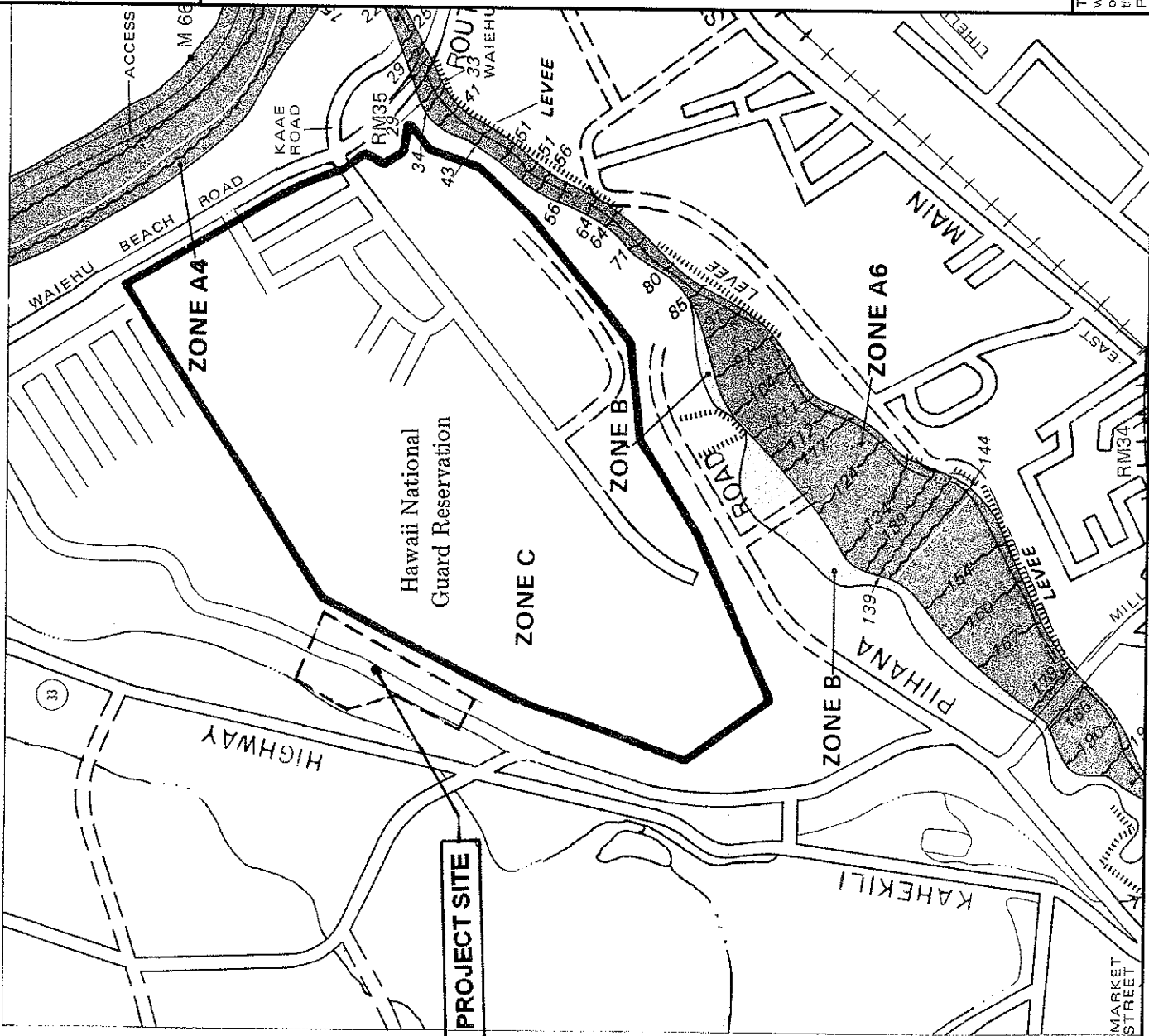
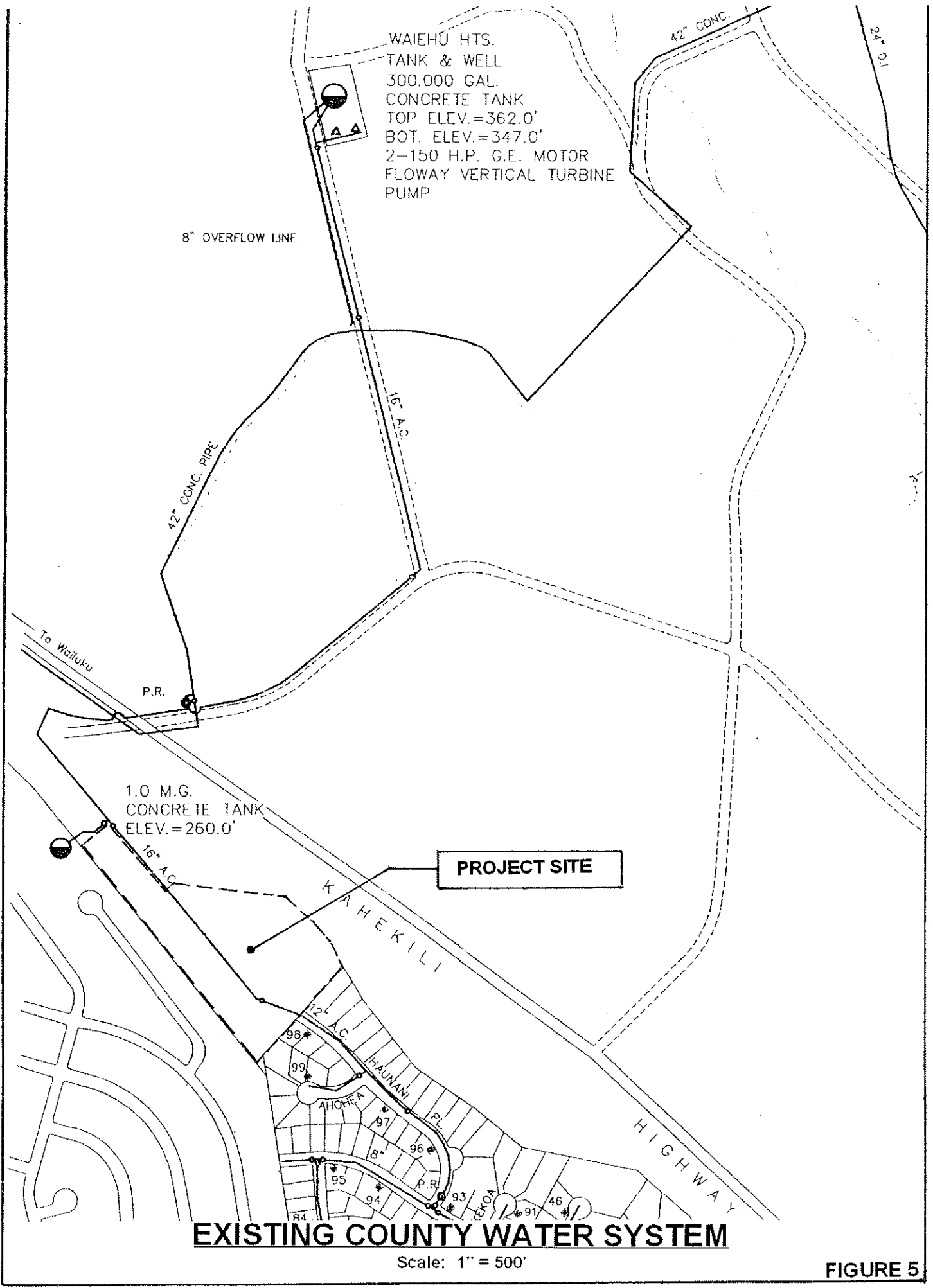


FIGURE 4



WAIEHU HTS.
 TANK & WELL
 300,000 GAL.
 CONCRETE TANK
 TOP ELEV.=362.0'
 BOT. ELEV.=347.0'
 2-150 H.P. G.E. MOTOR
 FLOWAY VERTICAL TURBINE
 PUMP

8" OVERFLOW LINE

42" CONC. PIPE

16" A.C.

42" CONC.

24" DI.

To Wailuku

P.R.

1.0 M.G.
 CONCRETE TANK
 ELEV.=260.0'

16" A.C.

PROJECT SITE

K A H E K I L I

24" A.C.

98

99

AHOHEA

HAUNANI

97

96

8"

95

94

P.R.

93

92

91

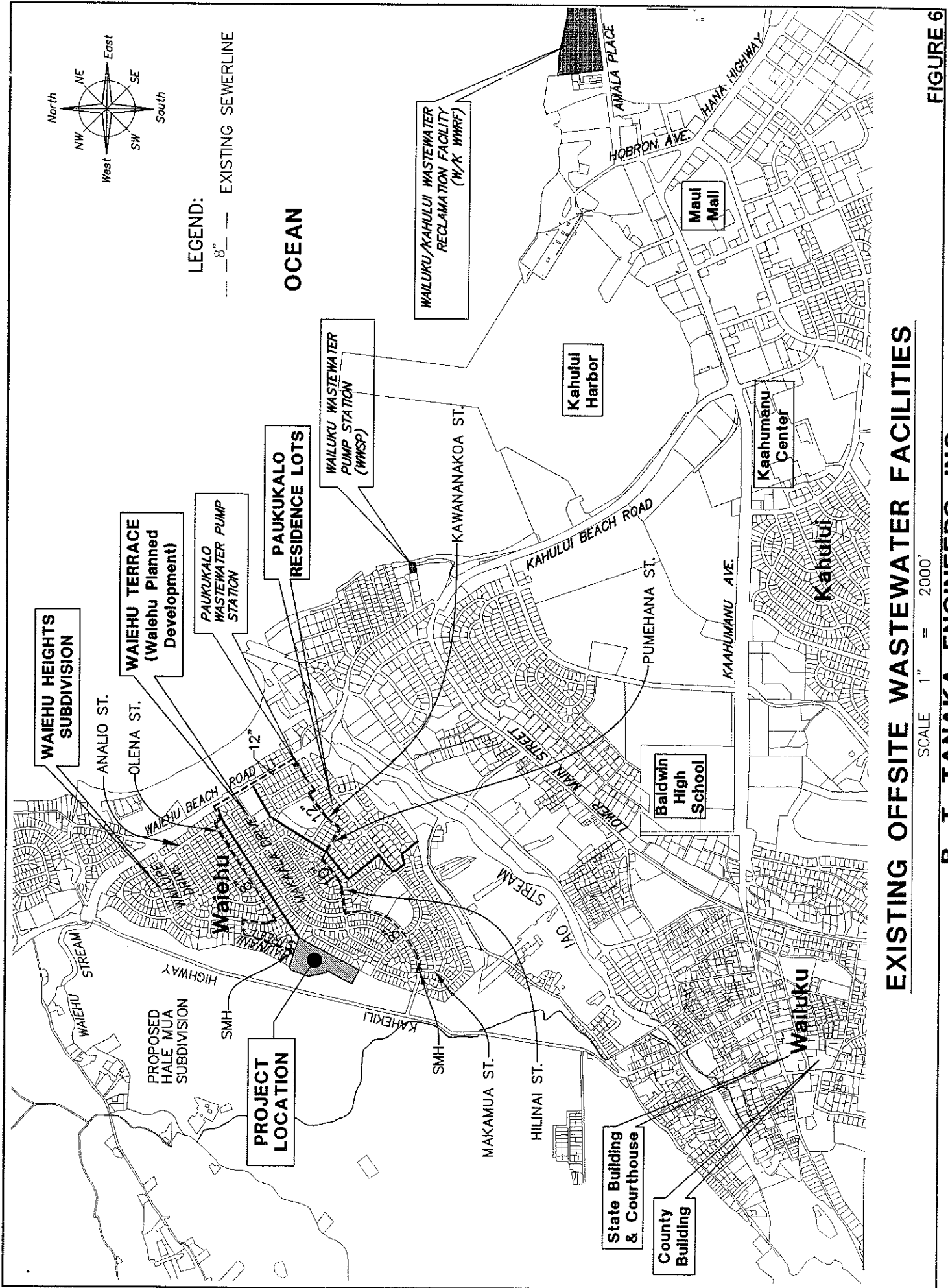
46

HIGHWAY

EXISTING COUNTY WATER SYSTEM

Scale: 1" = 500'

FIGURE 5

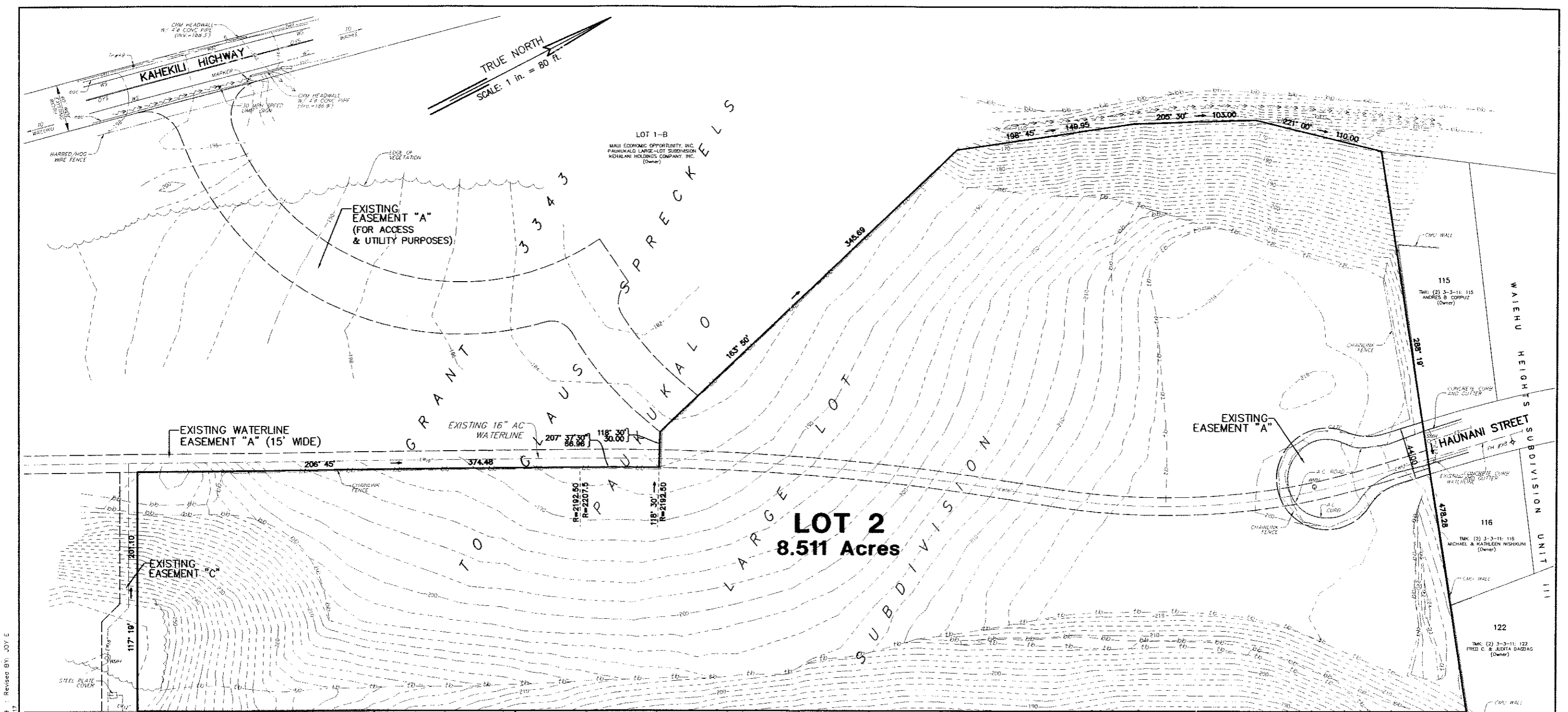


EXISTING OFFSITE WASTEWATER FACILITIES

SCALE 1" = 2000'

FIGURE 6

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS



2:4008-08-010-WAIEHU-MAUKA_CONST_PLANS_DEC2008.dwg : 08-JAN-2009 : Revised BY: JOY E
 DRAWN BY: JOY E, F. B. No. 897225-40, GSD, ELENAHE, PACRIM, LRD, EAS, SUDPO 1117

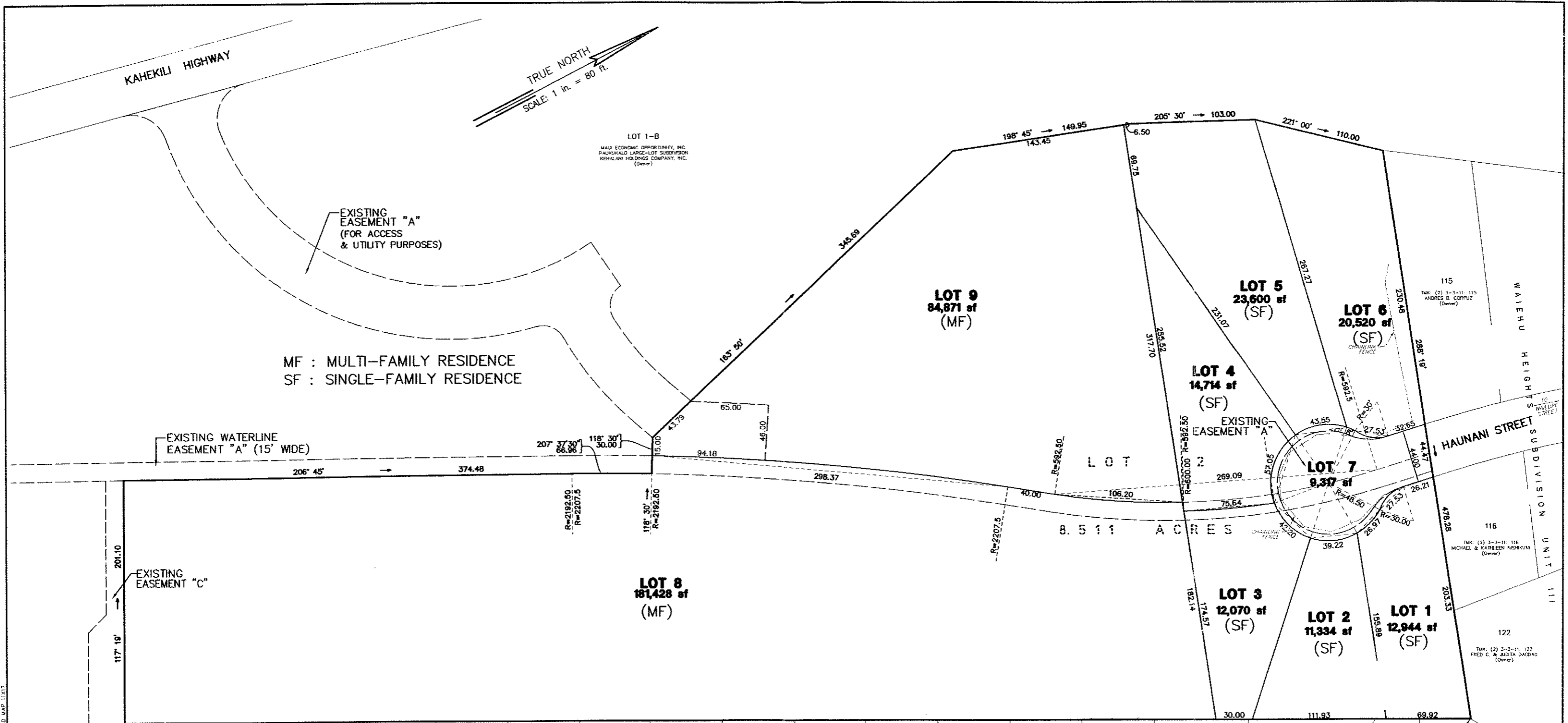
233	27	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10
WATER TANK LOT TKM (2) 3-3-14, 06 DEPT. OF WATER SUPPLY (Owner)	TKM (2) 3-3-14, 05 ISORO FRANCO, ETAL (Owner)	TKM (2) 3-3-14, 04 SHANDA AN MOI HOWARD, ETAL (Owner)	TKM (2) 3-3-14, 03 WILLIAM C. CABRICO, ETAL (Owner)	TKM (2) 3-3-14, 02 SCOTT ROJA OKADA, ETAL (Owner)	TKM (2) 3-3-14, 01 JANET JOYCE HARMON (Owner)	TKM (2) 3-3-13, 22 DEBRA TENARD, TRUST (Owner)	TKM (2) 3-3-13, 21 EDELLEISA M. BAGGIO-LARENA, ETAL (Owner)	TKM (2) 3-3-13, 20 RUSSELL TIMOTHY POJAS (Owner)	TKM (2) 3-3-13, 19 KARI, KARI KARI, ETAL (Owner)	TKM (2) 3-3-13, 18 ELY TACTAY JARAMILLO, ETAL (Owner)	TKM (2) 3-3-13, 17 OLEN YOSHIO TANAKA, ETAL (Owner)	TKM (2) 3-3-13, 16 PRIMITIVA I. MANEGGEO, ETAL (Owner)	TKM (2) 3-3-13, 15 YOLANDA K. SNFFEN (Owner)	TKM (2) 3-3-13, 14 ANTONIO F. GUZDUC, ETAL (Owner)	TKM (2) 3-3-13, 13 ROSTIA G. TUMAP TRUST (Owner)	TKM (2) 3-3-13, 12 DOMINADOR M. BARRI, ETAL (Owner)	TKM (2) 3-3-13, 10 DAVID E. & FLORENDA CRADDOCK (Owner)

EXISTING TOPOGRAPHIC MAP FOR WAIIEHU MAUKA AT PAUKUKALO, WAILUKU, MAUI, HAWAII



- LEGEND AND ABBREVIATIONS:**
- | | | |
|-------|-------------------------|----------------------------------|
| 220 | CONTOUR | TOP BANK |
| 248.8 | EXISTING SPOT ELEVATION | BOTTOM BANK |
| 400 | EDGE AC PAVEMENT | EXISTING OVERHEAD TELEPHONE LINE |
| 85 | WHITE STRIPE | MACADAMIA NUT TREE |
| 015 | DOUBLE YELLOW STRIPING | WATERLINE AND SIZE |
| 1P | TELEPHONE POLE | SEWERLINE |
| WV | WATER VALVE | DRAINLINE AND SIZE |
| SMH | SEWER MANHOLE | |
| WMH | WATER MANHOLE | |

- NOTES FOR TOPOGRAPHIC FEATURES:**
- ELEVATION DATUM = MEAN SEA LEVEL.
 - ALL VISIBLE UTILITY STRUCTURES HAVE BEEN LOCATED IN THE FIELD, HOWEVER, CONNECTION OF UNDERGROUND UTILITY LINES AS SHOWN ARE UNVERIFIED AND COMPILED FROM EXISTING DATA. UNDERGROUND UTILITIES SHOWN HEREON ARE FOR INFORMATION ONLY, HAVING BEEN OBTAINED FROM THE BEST AVAILABLE SOURCES, BUT FROM OTHERS NOT CONNECTED WITH THIS COMPANY. THEREFORE, NO GUARANTEE IS MADE ON THE ACCURACY OR COMPLETENESS OF SAID INFORMATION.



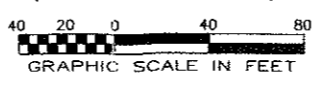
MF : MULTI-FAMILY RESIDENCE
 SF : SINGLE-FAMILY RESIDENCE

8.511 ACRES

233	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10
WATER TANK LOT																		
TK: (2) 3-3-14, 05 ISORO FRANCO, ETAL (Owner)	TK: (2) 3-3-14, 04 SHANDA AH MOI HOWARD, ETAL (Owner)	TK: (2) 3-3-14, 03 WILLIAM C. CABICO, ETAL (Owner)	TK: (2) 3-3-14, 02 SCOTT KOJA OKADA, ETAL (Owner)	TK: (2) 3-3-14, 01 JANET JOYCE HARRISON (Owner)	TK: (2) 3-3-13, 22 DEBRA TENAR, TRUST (Owner)	TK: (2) 3-3-13, 21 EDULISA M. BADOJO-LARENA, ETAL (Owner)	TK: (2) 3-3-13, 20 RUSSELL TIMOTHY POJAS (Owner)	TK: (2) 3-3-13, 19 KARL KABI KAHU, ETAL (Owner)	TK: (2) 3-3-13, 18 ELY TACTAY JARAMILLO, ETAL (Owner)	TK: (2) 3-3-13, 17 OLEN YOSHIO TANAKA, ETAL (Owner)	TK: (2) 3-3-13, 16 PRASITVA F. MANESCEO, ETAL (Owner)	TK: (2) 3-3-13, 15 YOLANDA K. SHIFFEN (Owner)	TK: (2) 3-3-13, 14 ANTONIO T. CUMBOC, ETAL (Owner)	TK: (2) 3-3-13, 13 ROSLA C. TUMPAI TRUST (Owner)	TK: (2) 3-3-13, 12 DOMINADOR M. BARI, ETAL (Owner)	TK: (2) 3-3-13, 11 DAVID E. & FLORENDA CRADDOCK (Owner)		

- NOTES:**
- ADJOINING OWNERS AS SHOWN TAKEN FROM TAX MAP.
 - ALL WATER SERVICE FROM COUNTY SYSTEM.
 - SEWER SERVICE TO BE CONNECTED TO THE COUNTY SEWERAGE SYSTEM.
 - ALL BOUNDARY CORNERS MARKED WITH 1/2-INCH PIPE UNLESS OTHERWISE NOTED.
 - ALL AZIMUTHS AND RECORD COORDINATES AS SHOWN REFERRED TO GOVERNMENT SURVEY TRIANGULATION STATION "LUKE".
 - LOT 7 (44.00 FT. WIDE) IS A ROADWAY LOT TO BE DEDICATED TO THE COUNTY OF MAUI.
 - EXISTING EASEMENT "A" (44.00 FT. WIDE) IS AN ACCESS AND UTILITY EASEMENT AFFECTING LOT 1-B IN FAVOR OF LOT 2 AND IS RECORDED IN DOCUMENT 2005-108749.
 - EXISTING EASEMENT "A" (AREA = 7,964 SQ. FT.) IS FOR WATERLINE PURPOSES AFFECTING LOT 2 IN FAVOR OF THE BOARD OF WATER SUPPLY (RECORDED IN BOOK 12285, PAGE 50) AND FOR ACCESS PURPOSES IN FAVOR OF WAIIEHU HEIGHTS ASSOCIATES (RECORDED IN BOOK 15119, PAGE 401).
 - PURSUANT TO MAUI COUNTY CODE SECTION 3.44.015(C), THE COUNTY OF MAUI IS NOT RESPONSIBLE FOR ANY PARK, ROADWAY, EASEMENT (INCLUDING BUT NOT LIMITED TO DRAINAGE, SEWER, ACCESS, RECLAIMED WATER, OR AVIGATION EASEMENT), OR ANY OTHER INTEREST IN REAL PROPERTY SHOWN ON THIS MAP OR SHOWN ON THESE PLANS, UNLESS THE MAUI COUNTY COUNCIL HAS ACCEPTED ITS DEDICATION BY A RESOLUTION APPROVED BY A MAJORITY OF COUNCIL'S MEMBERS AT A REGULAR OR SPECIAL MEETING OF THE MAUI COUNTY COUNCIL.

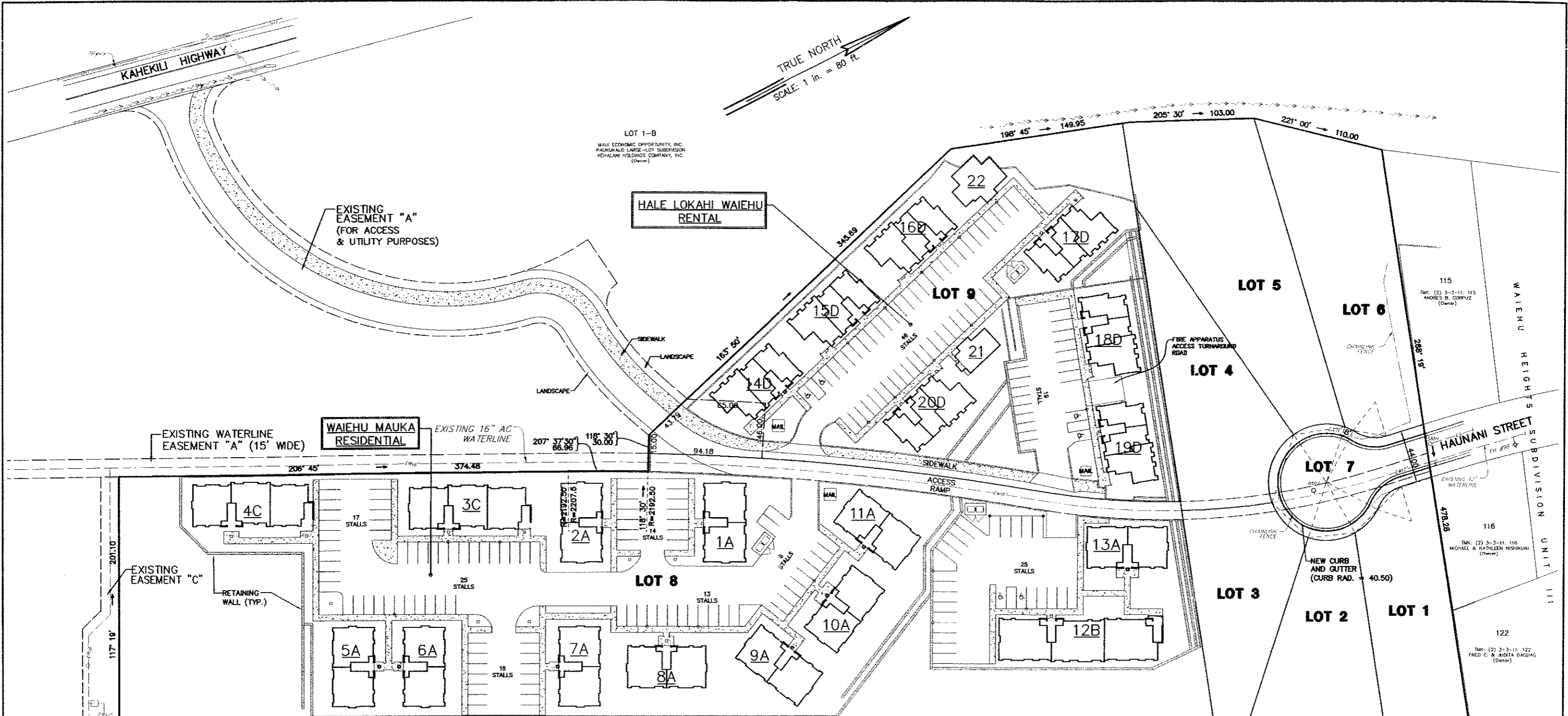
P R E L I M I N A R Y WAIEHU MAUKA SUBDIVISION AT PAUKUKALO, WAILUKU, MAUI, HAWAII



Tax Map Key (2)3-3-01: 102 & 16 (PORTION)
 871 KOLU STREET, SUITE 201
 WAILUKU, MAUI, HAWAII 96793

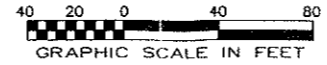
R. T. TANAKA ENGINEERS, INC.

Z:\2008\08-040\WAIIEHU-MAUKA_CONSTR_PLANS_DEC2008.dwg : 20-JAN-2009 : Revised By: JOY E.
 DRAWN BY: JOY E. F.B. No. B927225-40.CRG FILENAME: PACRIM.dwg LAYOUT: SUBD MAP 11X17



**CONCEPTUAL SITE PLAN
FOR
WAIEHU MAUKA
AT WAIEHU, MAUI, HAWAII**

SOURCE : MAUI ARCHITECTURAL GROUP, INC.



233 WATER TANK LOT TMK: (2) 3-3-14-80 DEPT. OF WATER SUPPLY (Owner)	27 TMK: (2) 3-3-14-05 ISORO FRANCO, ETAL (Owner)	26 TMK: (2) 3-3-14-04 SHANDA AH MOI HOWARD, ETAL (Owner)	25 TMK: (2) 3-3-14-03 WILLIAM C. CABICO, ETAL (Owner)	24 TMK: (2) 3-3-14-02 SCOTT KOJI OKADA, ETAL (Owner)	23 TMK: (2) 3-3-14-01 JANEY JOYCE HARNISH (Owner)	22 TMK: (2) 3-3-13-22 DEBRA TENARI, TRUST (Owner)	21 TMK: (2) 3-3-13-21 EDELUISA M. BAGUIO-LARENA, ETAL (Owner)	20 TMK: (2) 3-3-13-20 RUSSELL TIMOTHY POJAS (Owner)	19 TMK: (2) 3-3-13-19 KARL KAU KAMU, ETAL (Owner)	18 TMK: (2) 3-3-13-18 ELY TACIAY JARAMILLO, ETAL (Owner)	17 TMK: (2) 3-3-13-17 OLEN YOSHO TAMAKA, ETAL (Owner)	16 TMK: (2) 3-3-13-16 PRIMEVA I. MANEQUEZ, ETAL (Owner)	15 TMK: (2) 3-3-13-15 YOLANDA K. SHIFFEN (Owner)	14 TMK: (2) 3-3-13-14 ANTONIO F. CIMBAC, ETAL (Owner)	13 TMK: (2) 3-3-13-13 ROSTA G. TUMPAP TRUST (Owner)	12 TMK: (2) 3-3-13-12 DOMINADOR M. BARRI, ETAL (Owner)	11 TMK: (2) 3-3-13-11 DAVID E. & FLORENDA CHADOCK (Owner)	10 TMK: (2) 3-3-11-122 FRED C. & ADELA DASING (Owner)	116 TMK: (2) 3-3-11-116 MICHAEL & KATHLEEN NISHIKUNI (Owner)	115 TMK: (2) 3-3-11-115 ANDRES B. CORPUZ (Owner)
---	---	---	--	---	--	--	--	--	--	---	--	--	---	--	--	---	--	--	---	---

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

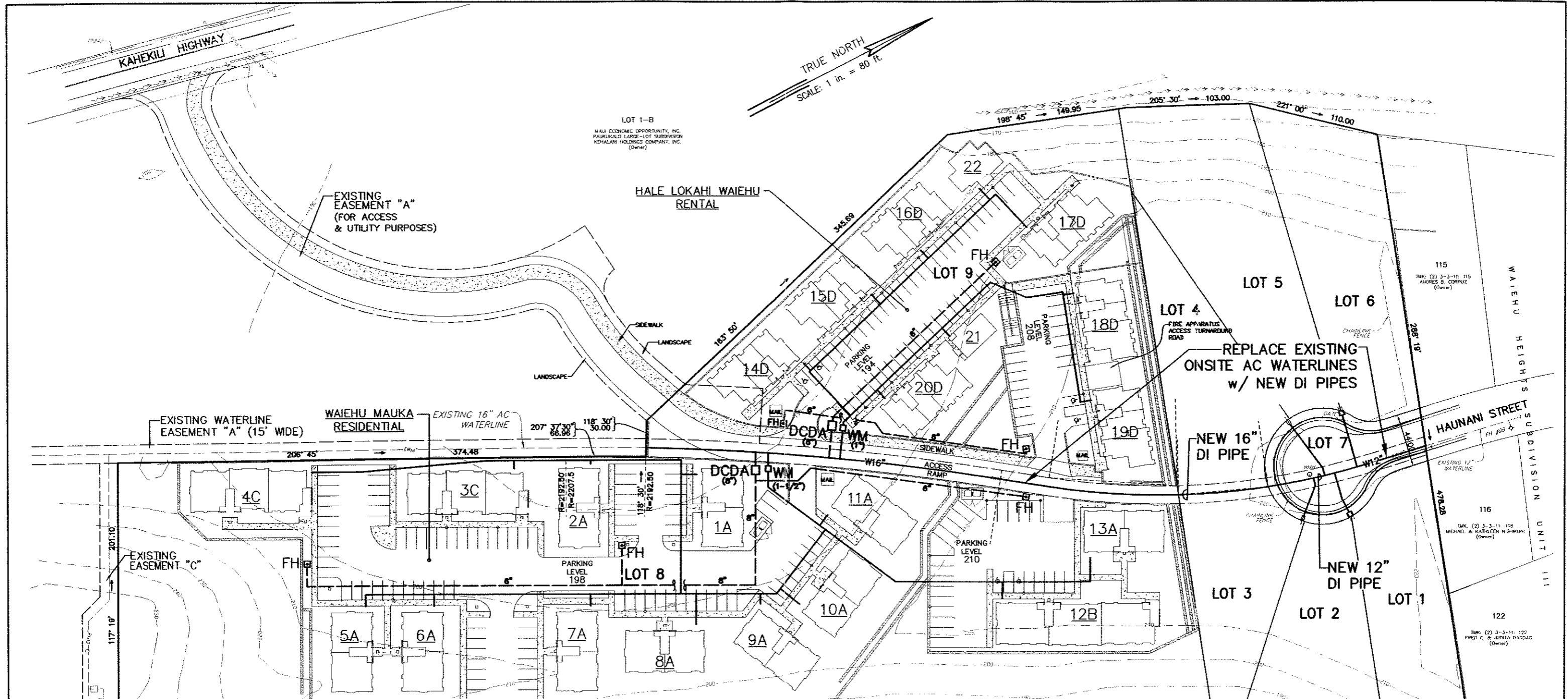
671 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

FIGURE 9

JANUARY 07, 2009
JOB NO. 08-040

Z:\2008\08-040\WAIEHU-MAUKA_CONST_PLANS_DEC2008.dwg : 20-JAN-2009 : Revised By: JOY E. Drawn by: J.E. FB#897/25-40 "PACRIM.CRD" (SITE PLAN 11x17)



233	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10
WATER TANK LOT																		
TMK: (2) 3-3-14: 86 DEPT. OF WATER SUPPLY (Owner)	TMK: (2) 3-3-14: 05 ISROD FRANCO, ETAL (Owner)	TMK: (2) 3-3-14: 04 SHANDA AH MOY HOWARD, ETAL (Owner)	TMK: (2) 3-3-14: 03 MULIANI C. CABRERO, ETAL (Owner)	TMK: (2) 3-3-14: 02 SCOTT KOLB OKADA, ETAL (Owner)	TMK: (2) 3-3-14: 01 JANEY JOYCE HARRISON (Owner)	TMK: (2) 3-3-13: 22 CEBRIA TENARI, TRUST (Owner)	TMK: (2) 3-3-13: 21 BACALO-LARENA, ETAL (Owner)	TMK: (2) 3-3-13: 20 RUSSELL THOMAS POJAS (Owner)	TMK: (2) 3-3-13: 19 KARL KAHU KAHU, ETAL (Owner)	TMK: (2) 3-3-13: 18 ELY FACTORY JARAMILLO, ETAL (Owner)	TMK: (2) 3-3-13: 17 GLEN YGOSH TANAWA, ETAL (Owner)	TMK: (2) 3-3-13: 16 PRIMITIVA I MANEDEGO, ETAL (Owner)	TMK: (2) 3-3-13: 15 YOLANDA K. SNEFFEN (Owner)	TMK: (2) 3-3-13: 14 ANTONIO F. CLARRO, ETAL (Owner)	TMK: (2) 3-3-13: 13 ROSA C. JUMPAP TRUST (Owner)	TMK: (2) 3-3-13: 12 DOMINADOR M. BARUT, ETAL (Owner)	TMK: (2) 3-3-13: 10 DAVID E. & FLORENDA DRADICK (Owner)	TMK: (2) 3-3-11: 122 FRED C. & AESTIA DANGDAG (Owner)

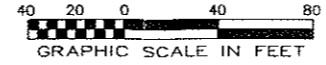
CONCEPTUAL WATER SYSTEM LAYOUT

FOR

WAIIEHU MAUKA

AT WAIIEHU, MAUI, HAWAII

- LEGEND AND ABBREVIATIONS:**
- EXISTING WATER MANHOLE
 - EXISTING WATERLINE
 - EXISTING WATER VALVE
 - PROPOSED FIRE HYDRANT
 - PROPOSED FIRELINE
 - PROPOSED WATERLINE



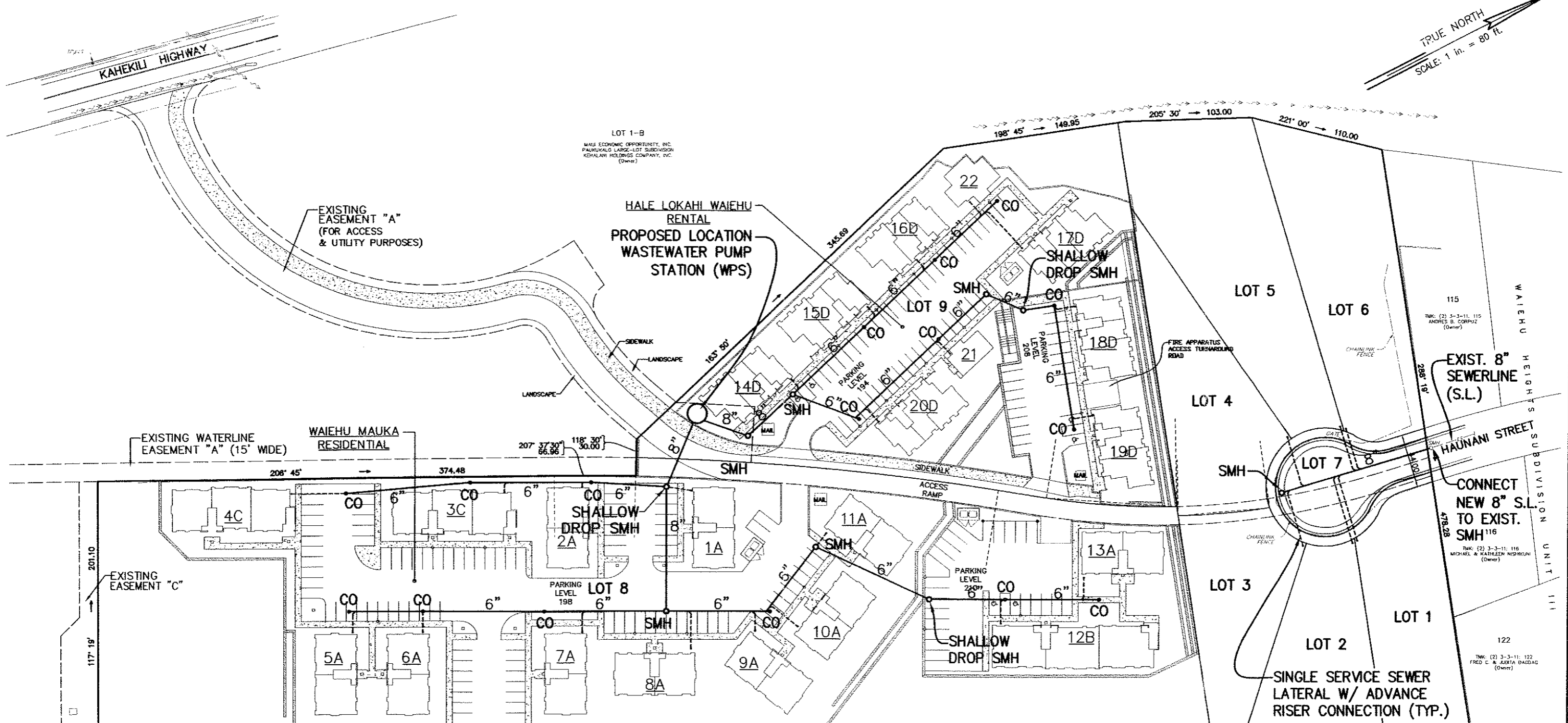
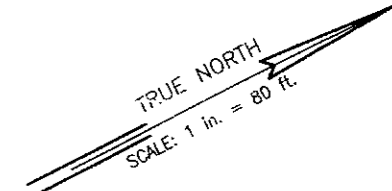
Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

FIGURE 10
JANUARY 07, 2009
JOB NO. 08-040

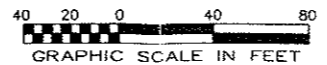
Z:\2008\08-040\WAIIEHU-MAUKA_CONST_PLANS_DEC2008.dwg : 20-JAN-2009 : Revised By: JOY E
DRAWN BY: JOY E, F.B. No. 897242-40, CED, FILENAME: PACRMA.dwg, LAYOUT: WATER 11X17



233	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11
WATER TANK LOT TMK (2) 3-3-14: 06 DEPT. OF WATER SUPPLY (Owner)	TMK (2) 3-3-14: 05 ISORO FRANCO, ETAL (Owner)	TMK (2) 3-3-14: 04 SHANDA AH MOI HOWARD, ETAL (Owner)	TMK (2) 3-3-14: 03 MULIAN C. CABICO, ETAL (Owner)	TMK (2) 3-3-14: 02 SCOTT KOLA OKADA, ETAL (Owner)	TMK (2) 3-3-14: 01 JANET JOYCE HARMON (Owner)	TMK (2) 3-3-13: 22 DEBRA TENARS, TRUST (Owner)	TMK (2) 3-3-13: 21 LOUISA W. BAZING-LARSEN, ETAL (Owner)	TMK (2) 3-3-13: 20 RUSSELL TIMOTHY PIGAS (Owner)	TMK (2) 3-3-13: 19 KARL KALI KAIULI, ETAL (Owner)	TMK (2) 3-3-13: 18 ELY TACTAY JARAMILLO, ETAL (Owner)	TMK (2) 3-3-13: 17 GLENN YOSHO TANAKA, ETAL (Owner)	TMK (2) 3-3-13: 16 PRERIVA J. MANGIACI, ETAL (Owner)	TMK (2) 3-3-13: 15 YOLANDA K. SHIFFEN (Owner)	TMK (2) 3-3-13: 14 ANTONIO F. GOMBOS, ETAL (Owner)	TMK (2) 3-3-13: 13 ROSITA G. TIMPAP TRUST (Owner)	TMK (2) 3-3-13: 12 DOMINADOR M. BARUT, ETAL (Owner)	TMK (2) 3-3-13: 10 DAVID E. & FLORENDA DRABICK (Owner)

- LEGEND AND ABBREVIATIONS:**
- SMH EXISTING SEWER MANHOLE
 - EXISTING SEWERLINE
 - SMH PROPOSED SEWER MANHOLE (Plain Manhole Unless Noted)
 - CO PROPOSED CLEANOUT
 - 8" PROPOSED SEWERLINE & SIZE
 - FM PROPOSED FORCEMAIN

CONCEPTUAL ONSITE SEWER SYSTEM LAYOUT FOR WAIIEHU MAUKA AT WAIIEHU, MAUI, HAWAII



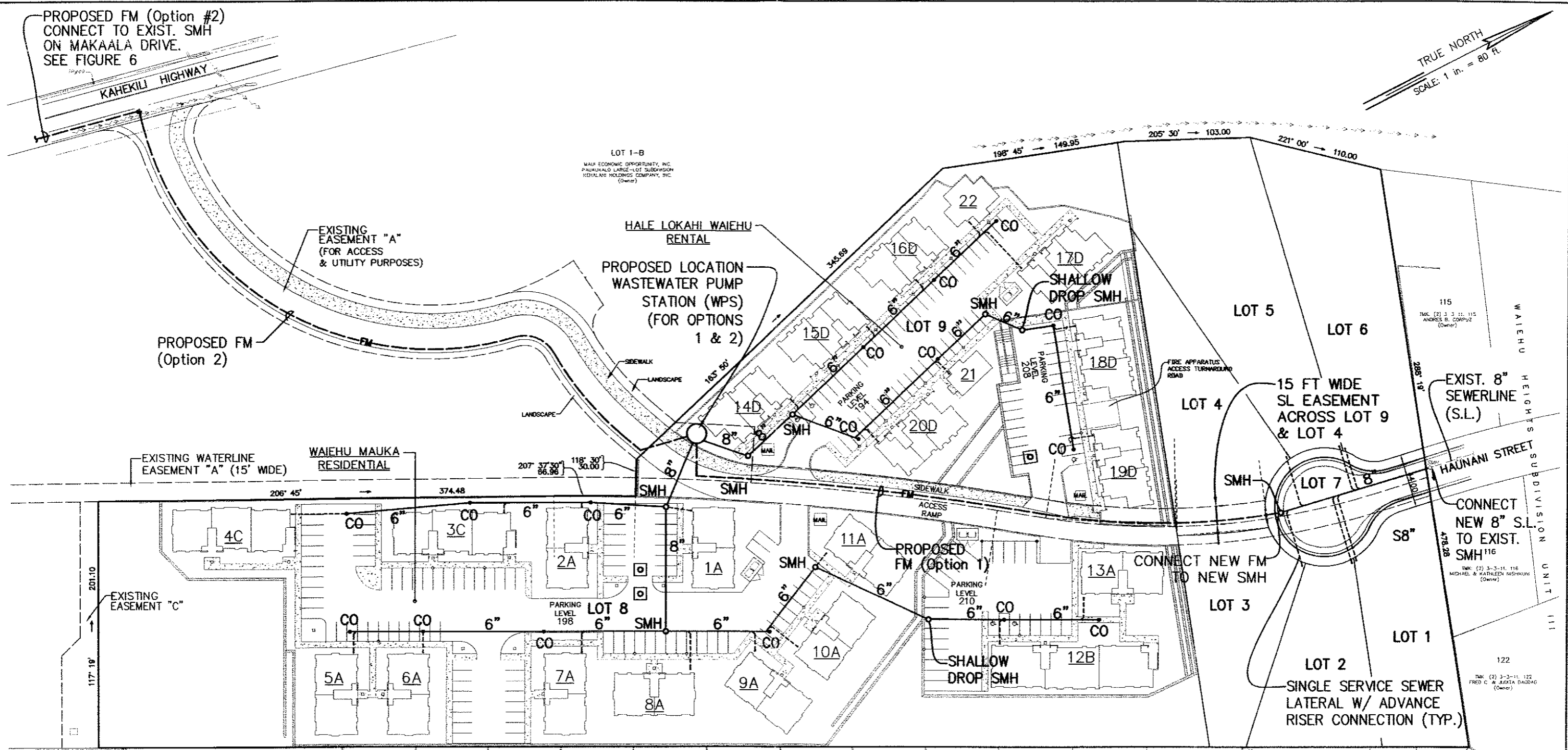
Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

FIGURE 11

JANUARY 07, 2009
JOB NO. 08-040

DRAWN BY: J.T. DATE: 01/07/09
 CHECKED BY: J.T. DATE: 01/07/09
 DESIGNED BY: J.T. DATE: 01/07/09
 PROJECT: WAIIEHU MAUKA
 SHEET: 11 OF 11



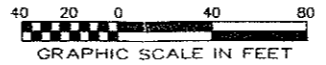
TRUE NORTH
SCALE: 1 in. = 80 ft.

Z:\DRAWING\2008\08-040\WAIIEHU-MAUKA_CONST_PLANS_DEC2008.dwg 02-JUL-2009 10:09:11 AM Revised BY:Nancy
DRAWN BY: ST E L F B No. 887625-40 (DR) FILENAME: P:\AGRI\WAIIEHU\WAIIEHU OFFSITE WASTEWATER 11A17

233	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10
WATER TANK LOT TKM (2) 3-3-14, 98 DEPT. OF WATER SUPPLY (Owner)	TKM (2) 3-3-14, 05 ISORO FRANCO, ETAL (Owner)	TKM (2) 3-3-14, 04 SHANDA AH MO HOWARD, ETAL (Owner)	TKM (2) 3-3-14, 03 WILLIAM C. CABICO, ETAL (Owner)	TKM (2) 3-3-14, 02 SCOTT KOLE OKADA, ETAL (Owner)	TKM (2) 3-3-14, 01 JANET JOYCE HARMON (Owner)	TKM (2) 3-3-13, 22 DEBRA TENAR, TRUST (Owner)	TKM (2) 3-3-13, 21 EDELURSA M BAGGIO-LARSEN, ETAL (Owner)	TKM (2) 3-3-13, 20 RUSSELL TUDNEY POLIAS (Owner)	TKM (2) 3-3-13, 19 KARL KALI KAHUI, ETAL (Owner)	TKM (2) 3-3-13, 18 ELY TACTAY JARAMILLO, ETAL (Owner)	TKM (2) 3-3-13, 17 GLEN YOSHIO TANAKA, ETAL (Owner)	TKM (2) 3-3-13, 16 PRIMRIVA F MANUELO, ETAL (Owner)	TKM (2) 3-3-13, 15 YOLANDA K. SNIFTER (Owner)	TKM (2) 3-3-13, 14 ANTONIO F. QUIROGA, ETAL (Owner)	TKM (2) 3-3-13, 13 ROSITA G. TUMPAI TRUST (Owner)	TKM (2) 3-3-13, 12 DOMANADOR N. BARUT, ETAL (Owner)	TKM (2) 3-3-13, 11 DAVID E. & FLORENDA CRADDOCK (Owner)	TKM (2) 3-3-11, 122 FRED C. W. BATA DAUDAC (Owner)

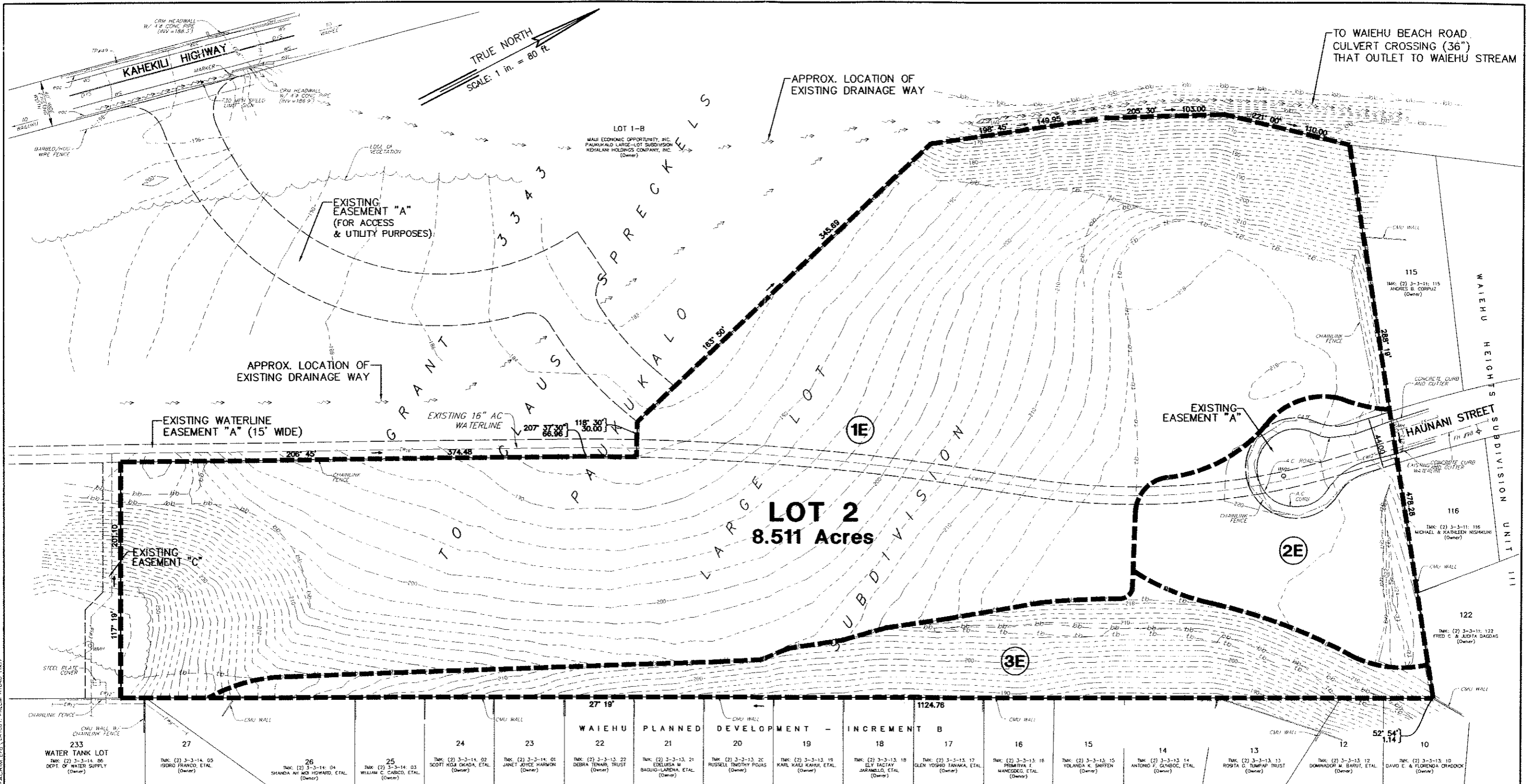
- LEGEND AND ABBREVIATIONS:**
- SMH EXISTING SEWER MANHOLE
 - CO EXISTING SEWERLINE
 - SMH PROPOSED SEWER MANHOLE (Plain Manhole Unless Noted)
 - CO PROPOSED CLEANOUT
 - 8" PROPOSED SEWERLINE & SIZE
 - FM PROPOSED FORCEMAIN

OPTIONS FOR OFFSITE WASTEWATER DISPOSAL SYSTEM FOR WAIIEHU MAUKA AT WAIIEHU, MAUI, HAWAII



Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

FIGURE 12



PRELIMINARY HYDROLOGIC MAP - EXISTING CONDITION

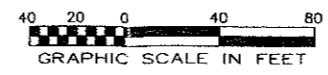
FOR

WAIEHU MAUKA

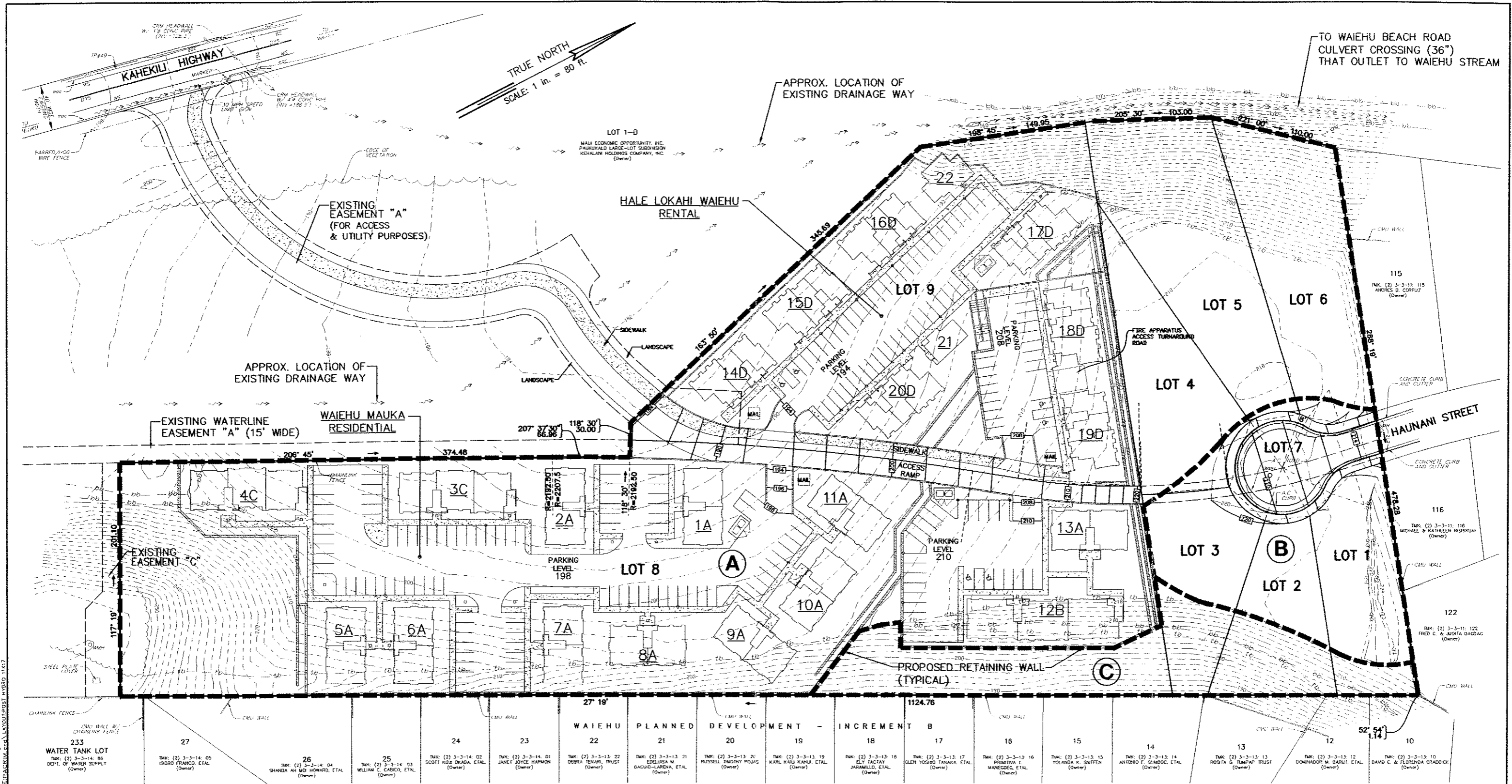
AT PAUKUKALO, WAILUKU, MAUI, HAWAII

LEGEND:

 2E DRAIN AREA DESIGNATION



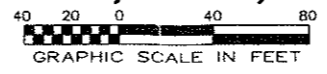
2. 2008.08.06-040 WAIEHU MAUKA - CONDET PLANS - DEC 2008.dwg : 20-JAN-2009 Revised By: JOY E
 DRAWN BY: JOY E, L.V.B. No. 49-025 - CIVIL ENGINEER, REG. LAND SURVEYOR, HAWAII



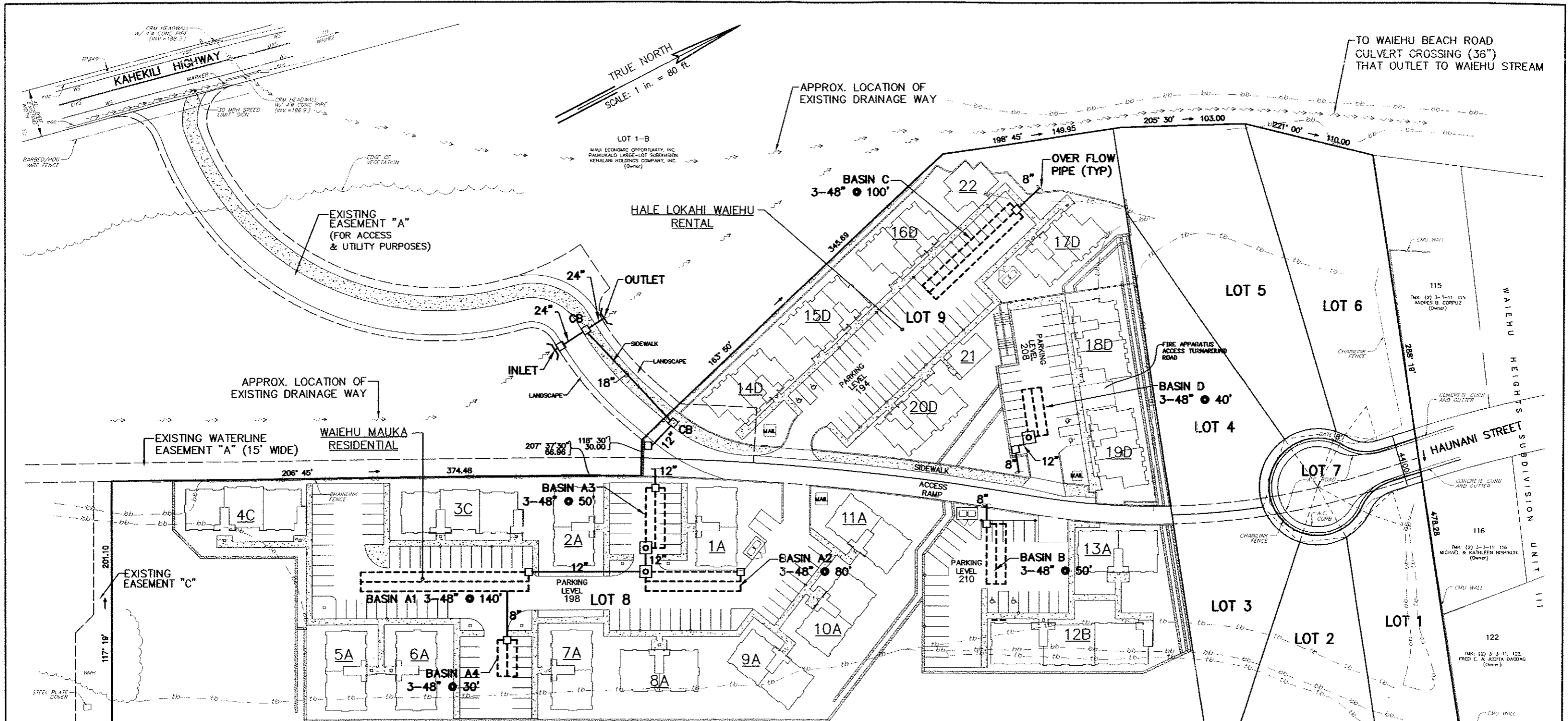
PRELIMINARY HYDROLOGIC MAP - POST DEVELOPMENT CONDITION

**FOR
WAIEHU MAUKA
AT WAIEHU, MAUI, HAWAII**

LEGEND:
(A) DRAIN AREA DESIGNATION



Z:\2008\08-040\WAIEHU-MAUKA_CONST_PLANS_DEC2008.dwg : 20-JAN-2009 : Revised BY: JOY E
DRAWN BY: J.T.C.F.B. No. 887275-40 GEO. ENGINEERING

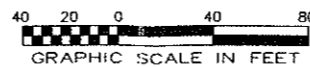


CONCEPTUAL DRAINAGE SYSTEM LAYOUT FOR WAIIEHU MAUKA AT WAIIEHU, MAUI, HAWAII

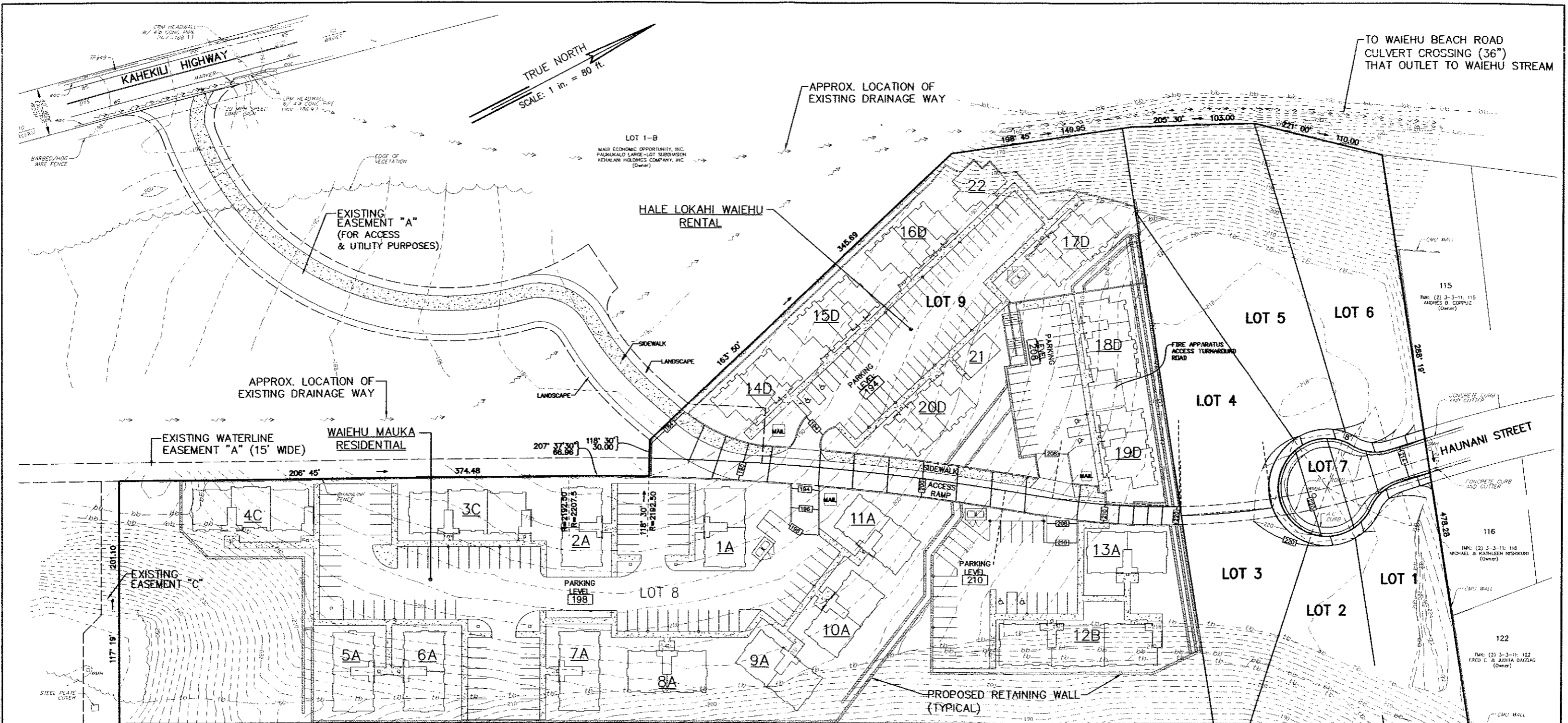
LEGEND AND ABBREVIATIONS:

- EXISTING DRAIN MANHOLE
- EXISTING DRAINLINE
- PROPOSED DRAIN MANHOLE
- PROPOSED DRAIN INLET UNLESS NOTED (CB=CATCH BASIN)
-
- PROPOSED SUBSURFACE PERFORATED PIPE

NOTE:
SEE FIGURE 16 FOR TYPICAL SECTION OF SUBSURFACE RETENTION BASIN.



2: 2008\08-040\WAIIEHU-MAUKA_CONCEPT_PLANS_DRAINAGE.dwg, 20-JAN-2009, 10:58:11 AM, JOY E
 Drawn by: J.E. E:\989725-40 - PLANNING\CRB



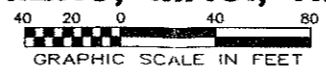
2. 2008-09-04-040-WAIEHU-MAUKA-CONST-PLANS-PLANS-DEC2008.dwg : 20-JAN-2009 : Revised By: JOY E
 DRAWN BY: JOY E, E.B. NO. 468762-40-CED, FILENAME: P:\CADD\1117.LAYOUT\GRADING 1117

233 WATER TANK LOT TMK: (2) 3-3-14: 08 DEPT. OF WATER SUPPLY (Owner)	27 TMK: (2) 3-3-14: 05 ISIDRO FRANCO, ETAL (Owner)	26 TMK: (2) 3-3-14: 04 SHANDA AH MOI HOWARD, ETAL (Owner)	25 TMK: (2) 3-3-14: 03 WILLIAM C. CABCO, ETAL (Owner)	24 TMK: (2) 3-3-14: 02 SCOTT KOE OKADA, ETAL (Owner)	23 TMK: (2) 3-3-14: 01 JANE I. JOYCE HARMON (Owner)	22 TMK: (2) 3-3-13: 22 DEBRA TENARI, TRUST (Owner)	21 TMK: (2) 3-3-13: 21 EDELISA M. BACUO-LARENA, ETAL (Owner)	20 TMK: (2) 3-3-13: 20 RUSSELL TIMOTHY POJAS (Owner)	19 TMK: (2) 3-3-13: 19 KARL KALI KAHU, ETAL (Owner)	18 TMK: (2) 3-3-13: 18 ELY TACTAY JARAMILO, ETAL (Owner)	17 TMK: (2) 3-3-13: 17 GLEN YOSHO TANAKA, ETAL (Owner)	16 TMK: (2) 3-3-13: 16 PRIMITIVA I. MANEGOTE, ETAL (Owner)	15 TMK: (2) 3-3-13: 15 YOLANDA K. SHEFFEN (Owner)	14 TMK: (2) 3-3-13: 14 ANTONIO F. GOMEZ, ETAL (Owner)	13 TMK: (2) 3-3-13: 13 ROSITA G. TUMAPAP TRUST (Owner)	12 TMK: (2) 3-3-13: 12 DOMINADOR M. SANSIT, ETAL (Owner)	10 TMK: (2) 3-3-13: 10 DAVID E. & FLORENDA CRAZDICK (Owner)
--	---	--	--	---	--	---	---	---	--	---	---	---	--	--	---	---	--

- LEGEND AND ABBREVIATIONS:**
- 220 --- EXISTING CONTOUR
 - 15 --- 16 --- EXISTING TOP BANK
 - 15 --- 16 --- EXISTING BOTTOM BANK
 - 220 --- PROPOSED FINISH CONTOUR
 - 220.2 PROPOSED FINISH SPOT ELEV.

NOTE:
 PRELIMINARY GRADING PLAN AS SHOWN
 BASED ON CONCEPTUAL GRADING PLAN
 PREPARED BY MAUI ARCHITECTURAL GROUP,
 INC.

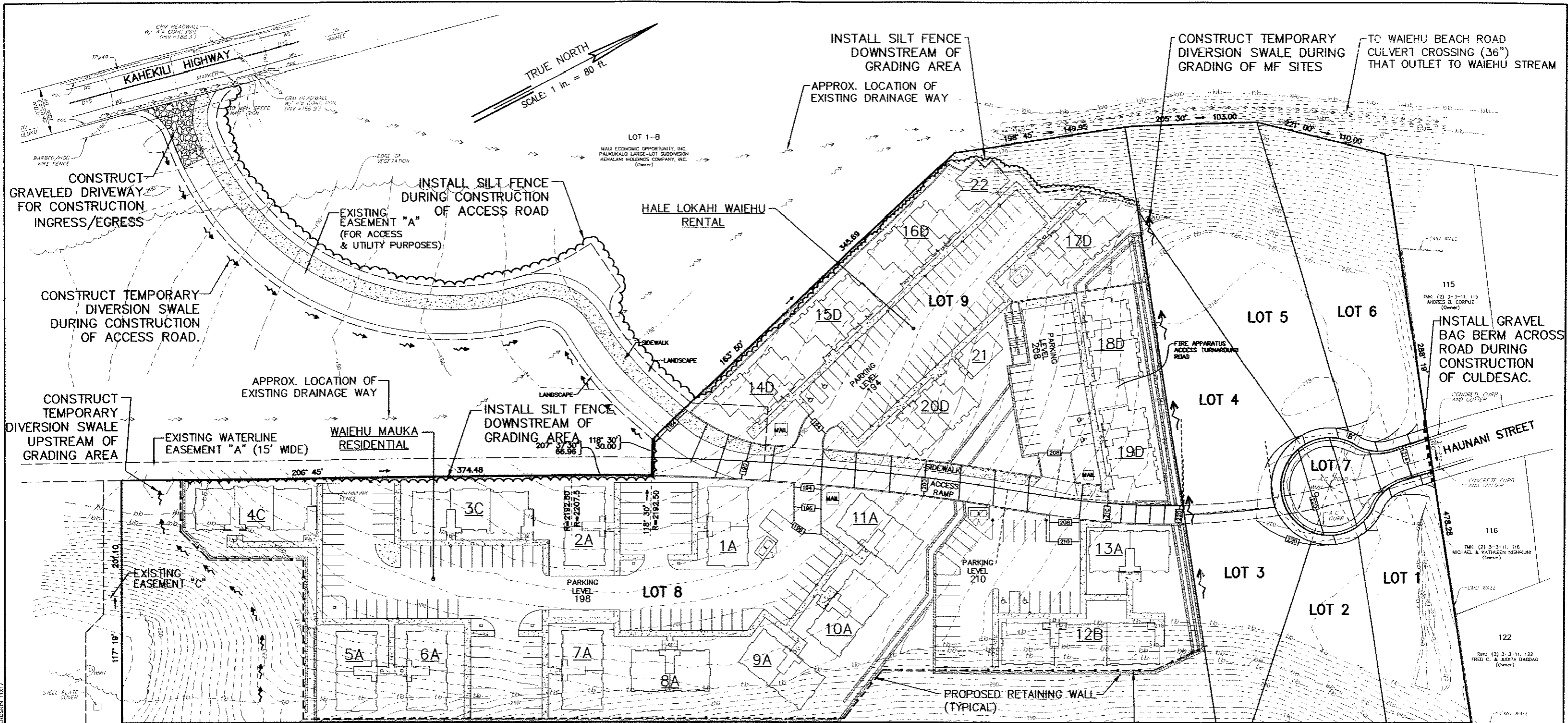
CONCEPTUAL GRADING PLAN FOR WAIEHU MAUKA AT WAIEHU, MAUI, HAWAII



Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

R. T. TANAKA ENGINEERS, INC.
 LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

FIGURE 16
 JANUARY 07, 2009
 JOB NO. 08-040



233	27	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10
WATER TANK LOT				WAIEHU PLANNED DEVELOPMENT - INCREMENT B												
TKM (2) 3-3-14, 86 DPT. OF WATER SUPPLY (Owner)	TKM (2) 3-3-14, 05 ISORO FRANCO, ETAL (Owner)	TKM (2) 3-3-14, 02 SCOTT KOB OKADA, ETAL (Owner)	TKM (2) 3-3-14, 01 JANEI JOYCE HAWKON (Owner)	TKM (2) 3-3-13, 22 DEBRA TERANO, TRUST (Owner)	TKM (2) 3-3-13, 21 CORLEISA W. BAGLO-LARENA, ETAL (Owner)	TKM (2) 3-3-13, 20 RUSSELL TIMOTHY POAS (Owner)	TKM (2) 3-3-13, 19 KARL WALKER, ETAL (Owner)	TKM (2) 3-3-13, 18 O'LY FACAY JARAMILLO, ETAL (Owner)	TKM (2) 3-3-13, 17 GLEN YOSHIO TANAKA, ETAL (Owner)	TKM (2) 3-3-13, 16 PRIMITIVA T. MAREGEE, ETAL (Owner)	TKM (2) 3-3-13, 15 YOLANDA K. SHIFFEN (Owner)	TKM (2) 3-3-13, 14 ANTONIO F. GUARDIA, ETAL (Owner)	TKM (2) 3-3-13, 13 ROSTA G. TAMPAK TRUST (Owner)	TKM (2) 3-3-13, 12 DOMINADOR M. BARUT, ETAL (Owner)	TKM (2) 3-3-13, 10 DAVID E. & FLORIANA CRADDOCK (Owner)	

- LEGEND AND ABBREVIATIONS:**
- 200 — EXISTING CONTOUR
 - tb tb EXISTING TOP BANK
 - - - - - EXISTING BOTTOM BANK
 - 220 — PROPOSED FINISH CONTOUR
 - 220.2 PROPOSED FINISH SPOT ELEV.

CONCEPTUAL SOIL EROSION CONTROL PLAN FOR WAIEHU MAUKA AT WAIEHU, MAUI, HAWAII



Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

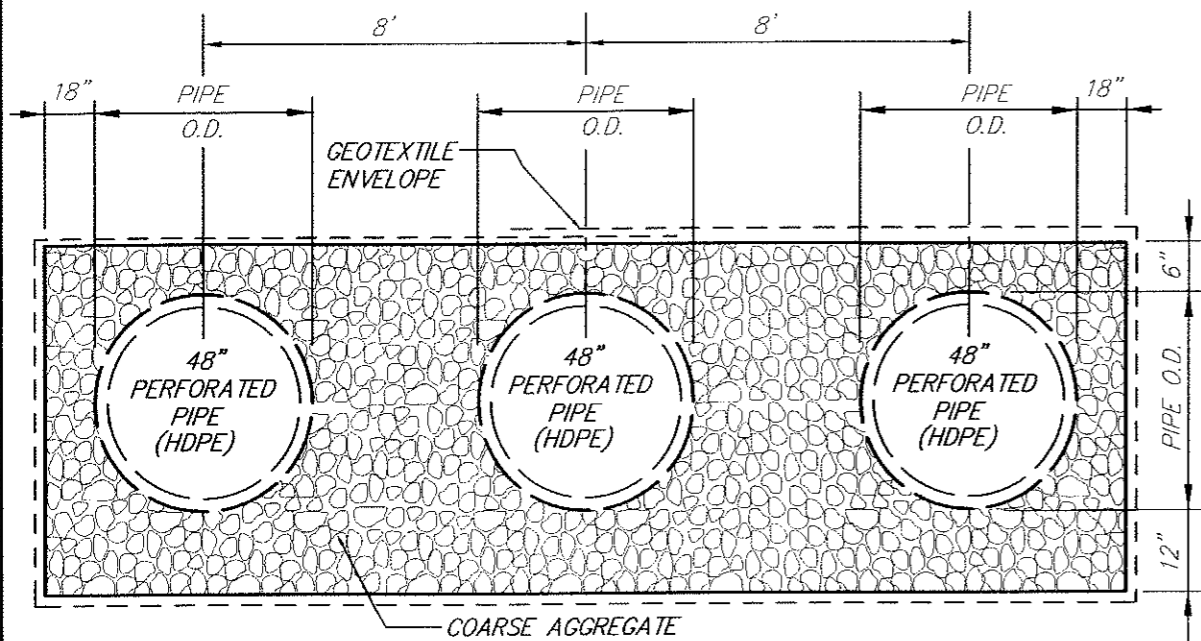
871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

FIGURE 17
JANUARY 07, 2008
JOB NO. 08-040

Z:\2008\08-040\WAIEHU-MAUKA_CONSTR_PLANS_DEC2008.dwg : 20-JAN-2008 : Revised BY: JOY E. GRABY, S. L. E. B. No. 8972625-40A.BB FILED:\2008\08-040\WAIEHU-MAUKA_CONSTR_PLANS_DEC2008.dwg

Z:\2008\108-040\MISC DRAINAGE&BMP DETS.dwg : 20-JAN-2009 : Revised By: JOY E



DETERMINE HOLDING CAPACITY:

Stone Void Ratio = 40%

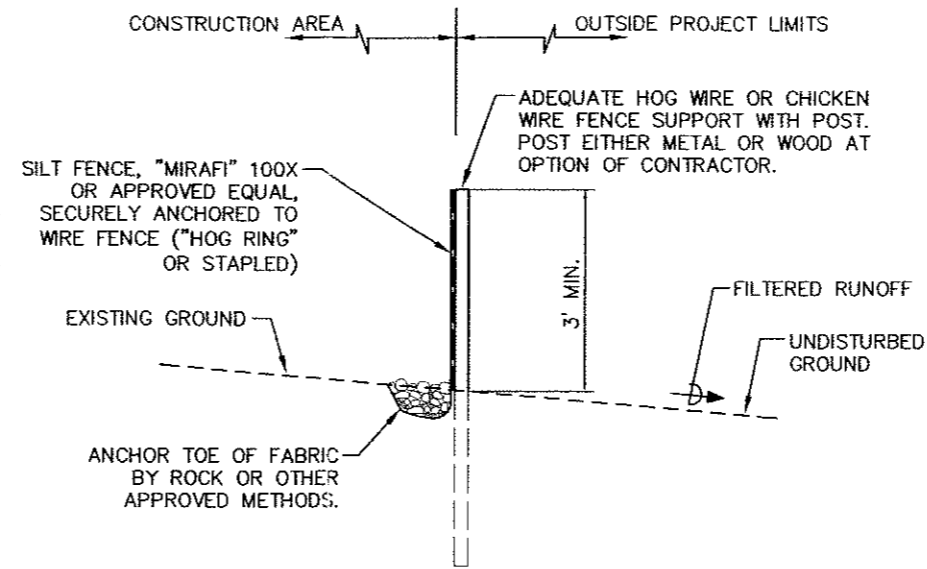
Capacity per Linear Foot:

Pipe Capacity = $3 \pi R^2$
 = $3 \times 3.1416 \times 2^2$
 = 3×12.6
 = 37.8 cf

Stone Capacity = 50% of Void Volume
 = $0.50 \times (23' \times 5.5' - 37.8) \times 0.40$
 = $0.50 \times 57.3 \times 0.40$
 = 17.7 cf

Capacity/LF = $37.8 + 17.7$
 = 55.5 cf

**TYPICAL SECTION
SUBSURFACE RETENTION BASIN
(TRIPLE BARREL)**
NOT TO SCALE

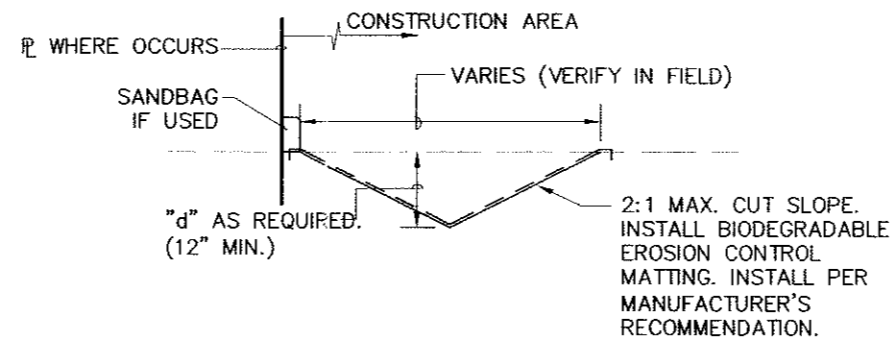


TYPICAL INSTALLATION - SILT FENCE

NOT TO SCALE

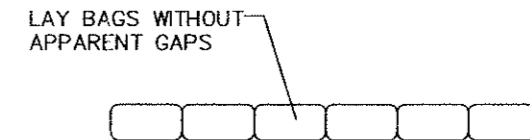
MAINTENANCE NOTES:

1. SILT FENCES OR FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SHOULD THE FABRIC ON THE SILT FENCE OR FILTER BARRIER DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
3. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEEDED.



TYPICAL TEMPORARY SWALE

NOT TO SCALE



**PLACEMENT OF TEMPORARY
SANDBAG OR GRAVEL BAG BERM**

NOT TO SCALE

MISC. DRAINAGE AND BMP DETAILS

**FOR
WAIEHU MAUKA
AT WAIEHU, MAUI, HAWAII**