DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

JAN 08 2010

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December 24, 2009

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

Dear Ms. Kealoha:

**SUBJECT: FINAL ENVIRONMENTAL ASSESSMENT (EA) FOR THE PROPOSED WAIEHU MAUKA AFFORDABLE HOUSING PROJECT (TMK NOS. (2) 3-3-001:102 AND 016 (POR.))**

The County of Maui, Department of Housing and Human Concerns, the approving agency for the Draft Environmental Assessment (EA) for the subject project, has reviewed the comments received during the 30-day public comment period which began on November 8, 2009. We have determined that this project will not have significant environmental effects and have issued a Finding of No Significant Impact (FONSI) determination. Please publish this notice in the next edition of the OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form and Project Summary, a CD (PDF file) and one (1) copy of the Final EA.

Please feel free to contact Carol Matasci, Munekiyo & Hiraga, Inc. at planning@mhplanning.com or at (808) 244-2015, should you have any questions.

Sincerely,

Lori Tsuhako

LORI TSUHAKO, LSW, ACSW
Director of Housing and Human Concerns

Enclosures
cc: Kamaile Sombelon, Lokahi Pacific
Carol Matasci, Munekiyo & Hiraga, Inc.

# Final 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**

**December 2009**

MUNEKIYO HIRAGA, INC.

# CONTENTS

Executive Summary . . . . . Page i

I. PROJECT OVERVIEW . . . . . Page 1

A. PROJECT LOCATION, CURRENT LAND USE, AND OWNERSHIP . . Page 1

B. PROPOSED ACTION . . . . . Page 4

C. PROJECT NEED . . . . . Page 7

D. AFFORDABLE HOUSING PROGRAM . . . . . Page 7

E. ENTITLEMENTS REQUIRED . . . . . Page 8

F. CHAPTER 343, HAWAII REVISED STATUTES REQUIREMENT . . . . Page 9

G. IMPLEMENTATION TIME FRAME . . . . . Page 10

II. DESCRIPTION OF EXISTING CONDITIONS, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES . . . . . Page 11

A. PHYSICAL ENVIRONMENT . . . . . Page 11
1. Surrounding Land Uses . . . . . Page 11
2. Climate . . . . . Page 12
3. Topography and Soil Characteristics . . . . . Page 13
4. Agriculture . . . . . Page 17
5. Flood and Tsunami Hazards . . . . . Page 19
6. Flora and Fauna . . . . . Page 21
7. Wetlands and Streams . . . . . Page 22
8. Archaeological and Historical Resources . . . . . Page 23
9. Cultural Resources . . . . . Page 24
10. Air and Noise Quality . . . . . Page 27
11. Scenic and Open Space Resources . . . . . Page 29
12. Traditional Beach and Mountain Access . . . . . Page 30

B. SOCIO-ECONOMIC ENVIRONMENT . . . . . Page 30
1. Regional Setting . . . . . Page 30
2. Population . . . . . Page 30
3. Economy and Labor Force . . . . . Page 31
4. Housing . . . . . Page 32

C. PUBLIC SERVICES . . . . . Page 33
1. Recreational Facilities . . . . . Page 33
2. Police and Fire Services . . . . . Page 34
3. Medical Services . . . . . Page 35
4. Solid Waste . . . . . Page 35
5. Schools . . . . . Page 36

D. INFRASTRUCTURE . . . . . Page 38
1. Roadways . . . . . Page 38
2. Wastewater . . . . . Page 43
3. Water . . . . . Page 47
4. Drainage . . . . . Page 49
5. Electrical, Telephone, and Cable Television Services . . . . . Page 51

E. CUMULATIVE AND SECONDARY IMPACTS . . . . . Page 52

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS . . . . . Page 53

A. STATE LAND USE DISTRICTS . . . . . Page 53

B. LAND USE COMMISSION RULES, CHAPTER 15-15, HAWAII ADMINISTRATIVE RULES (HAR) . . . . . Page 53

C. CHAPTER 226, HRS, HAWAII STATE PLAN . . . . . Page 59
1. Objectives and Policies of the Hawaii State Plan . . . . . Page 60
2. Priority Guidelines of the Hawaii State Plan . . . . . Page 62

D. STATE FUNCTIONAL PLANS . . . . . Page 63
1. State Agricultural Functional Plan . . . . . Page 63
2. State Housing Functional Plan . . . . . Page 63

E. MAUI COUNTY GENERAL PLAN . . . . . Page 64

F. WAILUKU-KAHULUI COMMUNITY PLAN . . . . . Page 67

G. MAUI COUNTY ZONING . . . . . Page 70

H. HAWAII COASTAL ZONE MANAGEMENT PROGRAM . . . . . Page 70
1. Recreational Resources . . . . . Page 70
2. Historical/Cultural Resources . . . . . Page 71
3. Scenic and Open Space Resources . . . . . Page 72
4. Coastal Ecosystem . . . . . Page 73
5. Economic Use . . . . . Page 73
6. Coastal Hazards . . . . . Page 74

7. Managing Development . . . . . Page 75
8. Public Participation . . . . . Page 75
9. Beach Protection . . . . . Page 76
10. Marine Resources . . . . . Page 76

I. SECTION 201H-38, HAWAII REVISED STATUTES . . . . . Page 78

J. OTHER REGULATORY APPROVALS . . . . . Page 78

IV. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED . . . . . Page 79

V. ALTERNATIVES TO THE PROPOSED ACTION . . . . . Page 81

A. PREFERRED ALTERNATIVE . . . . . Page 81

B. NO ACTION ALTERNATIVE . . . . . Page 81

C. AGRICULTURAL USES . . . . . Page 81

D. ALTERNATIVE LOCATIONS . . . . . Page 82

E. ALTERNATIVES FOR OFFSITE WASTEWATER DISPOSAL . . . . . Page 82
1. Haunani Street Tie-In (Option 1) - Preferred Alternative for Offsite Wastewater Disposal . . . . . Page 82
2. Makaala Drive Tie-In (Option 2) . . . . . Page 83

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES Page 84

VII. SIGNIFICANCE CRITERIA ASSESSMENT . . . . . Page 85

VIII. LIST OF PERMITS AND APPROVALS . . . . . Page 89

IX. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED; AND RESPONSES TO SUBSTANTIVE COMMENTS . . . . . Page 91

X. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT REVIEW PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS . . Page 174

XI. REFERENCES . . . . . Page i

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# LIST OF FIGURES

**Figure 1.** Regional Location Map . . . . . Page 2
**Figure 2.** Site Location Map . . . . . Page 3
**Figure 3.** Site Plan . . . . . Page 5
**Figure 4.** Soil Association Map . . . . . Page 14
**Figure 5.** Soil Classification Map . . . . . Page 15
**Figure 6.** Agricultural Lands of Importance to the State of Hawaii . . . . . Page 18
**Figure 7.** Flood Insurance Rate Map . . . . . Page 20
**Figure 8.** Existing Offsite Wastewater Disposal System . . . . . Page 44
**Figure 9.** Options for Offsite Wastewater Disposal System . . . . . Page 46
**Figure 10.** State Land Use District Map . . . . . Page 54
**Figure 11.** Community Plan Land Use Map . . . . . Page 68

# LIST OF APPENDICES

**Appendix A.** Architectural Plans for Proposed Waiehu Mauka Affordable Housing Project
**Appendix B.** Proposed Section 201H-38 HRS Exemptions
**Appendix C.** Flora and Fauna Survey and Assessment Report
**Appendix D.** Archaeological Assessment Report
**Appendix D-1.** Archaeological Monitoring Plan
**Appendix D-2.** Letter from the State Historic Preservation Division, February 11, 2009
**Appendix E.** Cultural Impact Assessment Report
**Appendix F.** Traffic Impact Assessment Report
**Appendix G.** Preliminary Civil Engineering and Drainage Report
**Appendix H.** November 17, 2009 Community Meeting Minutes

## Executive Summary

| | |
|---|---|
| **Project Name:** | Waiehu Mauka Affordable Housing Project |
| **Type of Document:** | Final Environmental Assessment |
| **Legal Authority:** | Chapter 343, Hawaii Revised Statutes |
| **Agency Determination:** | Finding of No Significant Impact (FONSI) |
| **Applicable Environmental Assessment review "Trigger":** | Proposed Use of County Lands and Funds |
| **Location:** | Maui Island<br>Wailuku<br>TMK No. 3-3-001:016(por.) and 102 |
| **Landowner:** | Parcel 102: Goodfellow Brothers, Inc. and Lokahi Pacific<br><br>Parcel 016 (por.): Kehalani Holdings Company, Inc. (Access easement) |
| **Applicant:** | Lokahi Pacific |
| **Approving Agency:** | Department of Housing and Human Concerns<br>200 South High Street<br>Wailuku, Hawaii 96793<br>Contact: Lori Tsuhako, Director<br>Phone: (808) 270-7805 |
| **Consultant:** | Munekiyo & Hiraga, Inc. (under contract to Lokahi Pacific)<br>305 High Street, Suite 104<br>Wailuku, Hawaii 96793<br>Contact: Carol Matasci, Planner<br>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

# I. PROJECT OVERVIEW

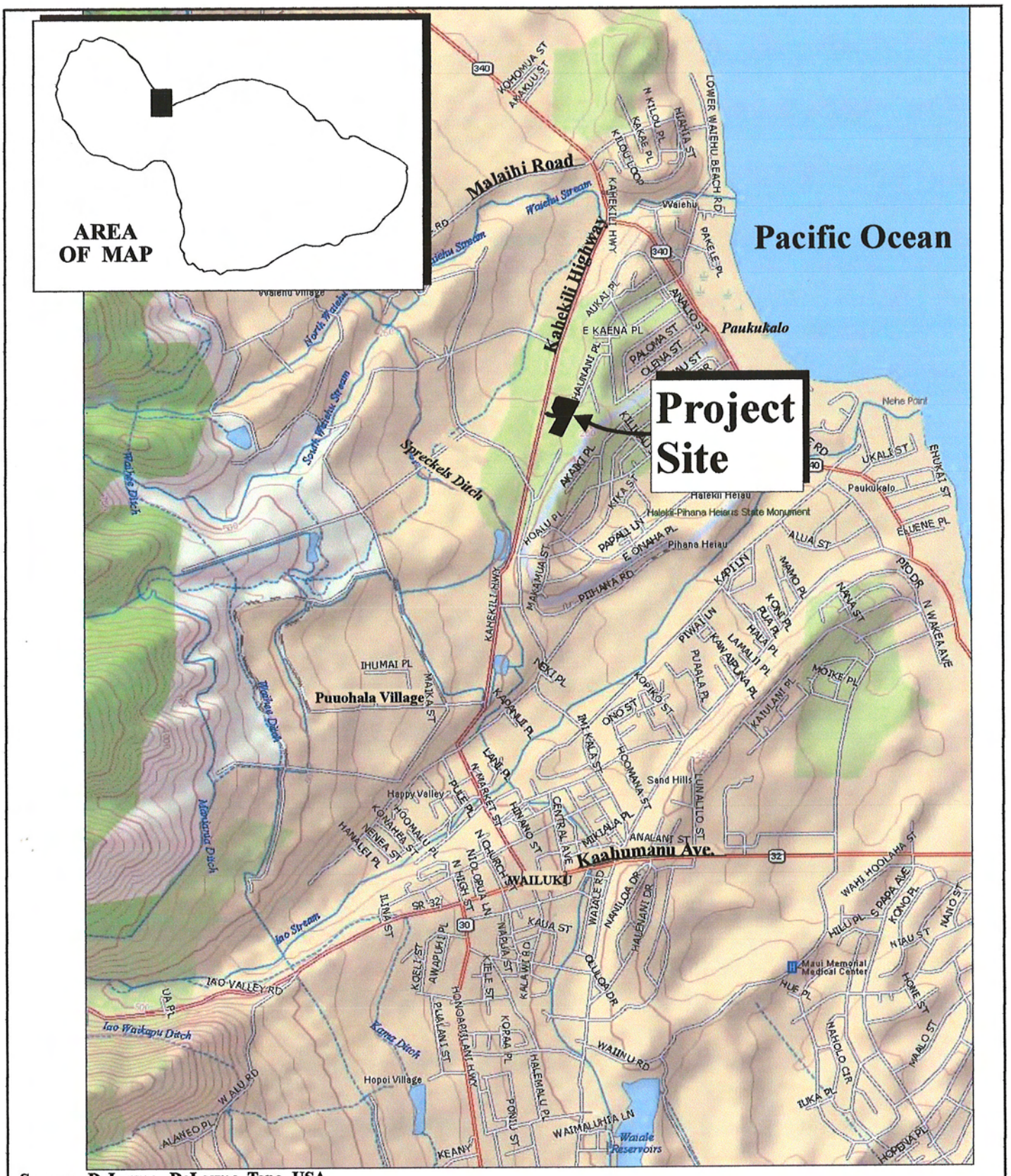
## A. PROJECT LOCATION, CURRENT LAND USE, AND OWNERSHIP

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

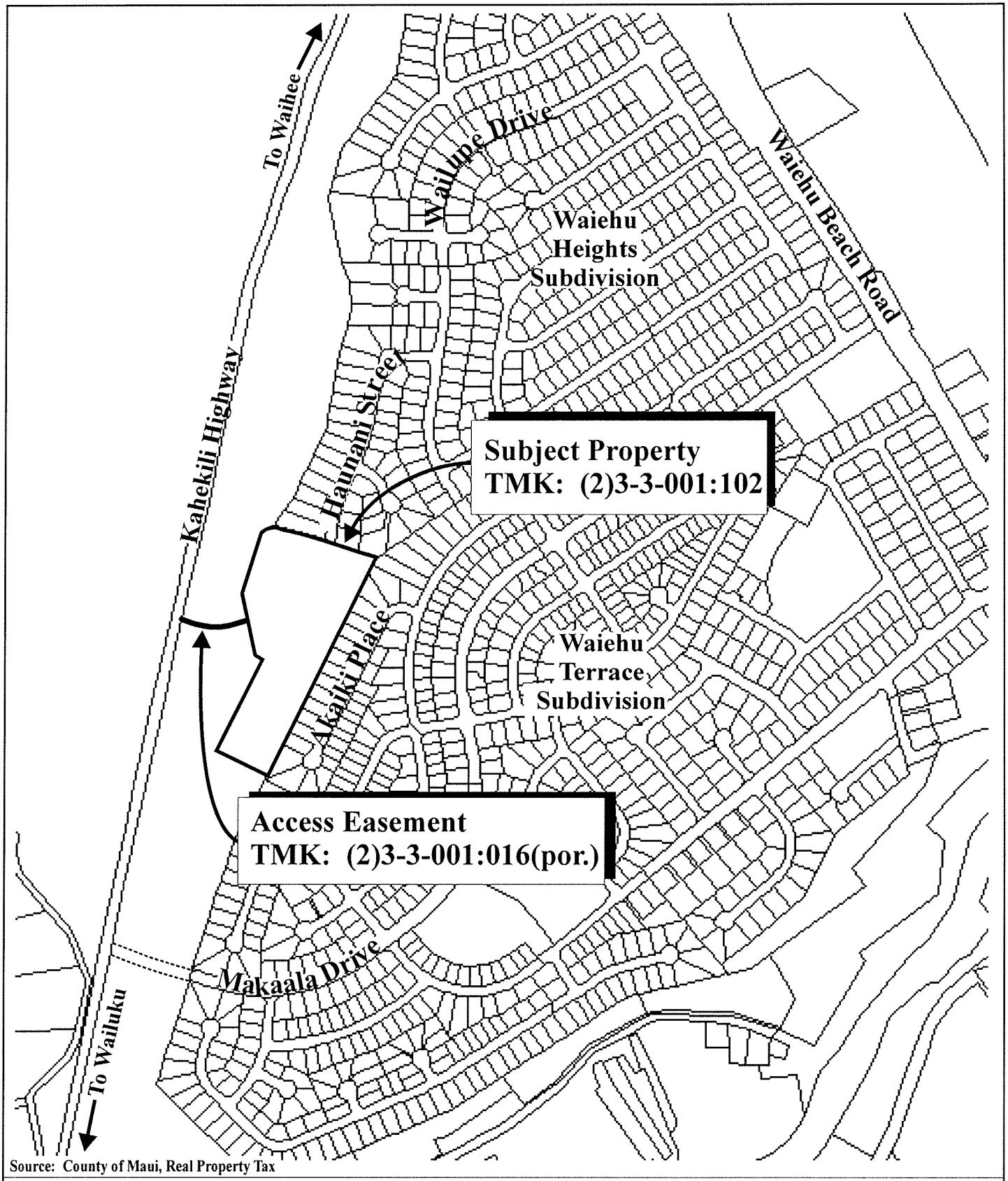
# Proposed Waiehu Mauka Affordable Housing Project

## Regional Location Map

NOT TO SCALE

Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.




Source: County of Maui, Real Property Tax

Figure 2

# Proposed Waiehu Mauka Affordable Housing Project

## Site Location Map

NOT TO SCALE

Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

LokahiPac\Waiehu EA\Site Location Map.DEA

an access easement on Parcel 016.

## B. PROPOSED ACTION

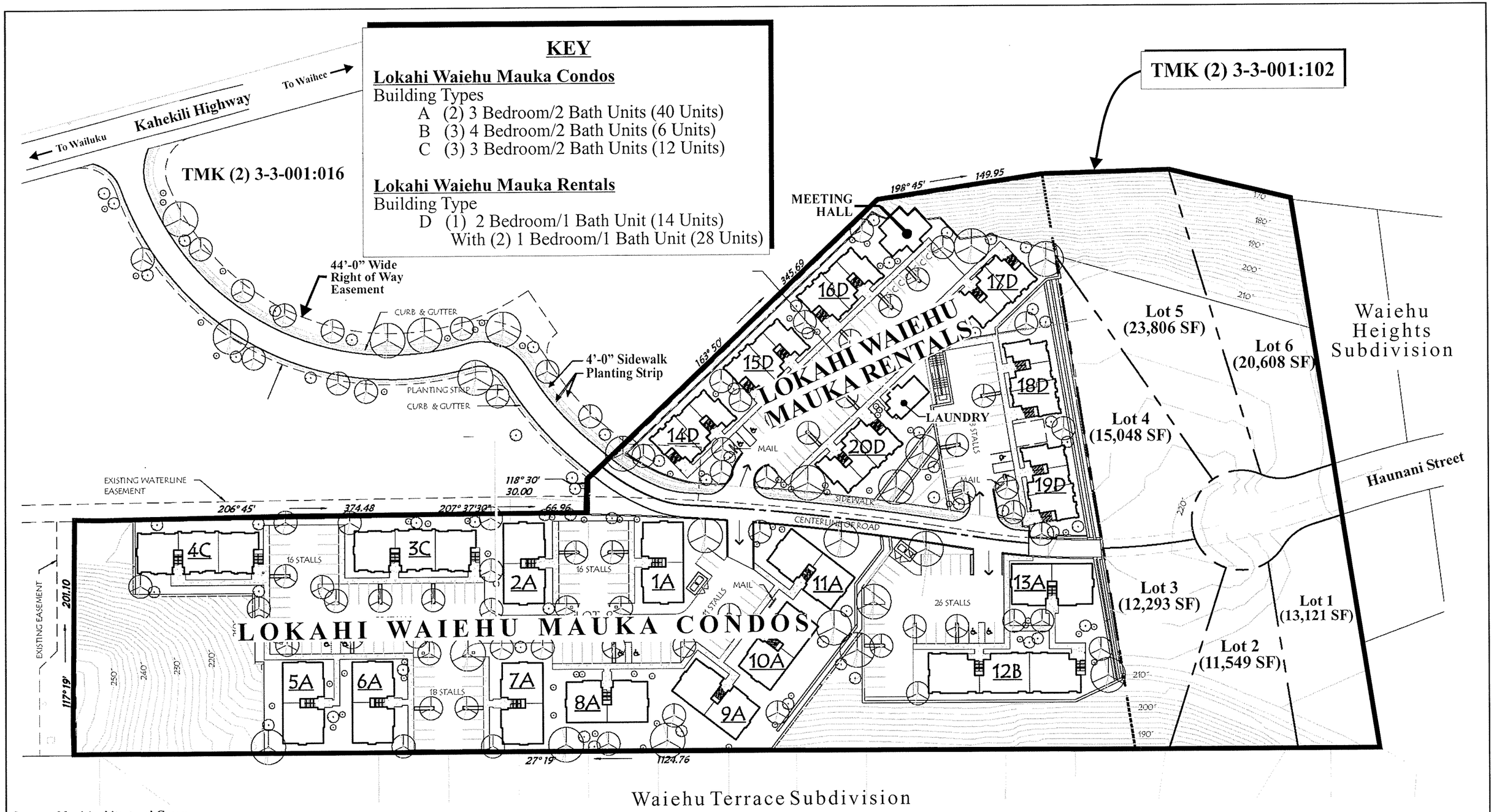
The proposed Waiehu Mauka project includes 100 affordable multi-family units and six (6) market price single-family lots. The affordable housing component involves the development of 42 multi-family rental units housed in seven (7) apartment buildings and 58 townhouse units for sale housed in thirteen (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. Refer to **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.




Source: Maui Architectural Group

Figure 3

Proposed Waiehu Mauka Affordable Housing Project
Site Plan

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: Lokahi Pacific

LokahiPac\Waiehu EA\Site Plan

**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 |
| | | | |
| 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 |

| 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 | $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 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 Section 201H-38, HRS application underwent agency review concurrently with review of the Draft EA.

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 Final Environmental Assessment (FEA) is being prepared in accordance with Chapter 200 of Title 11, Department of Health Administrative Rules, Environmental Impact Statement Rules. This Final EA 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**. There is also a drainageway which crosses Kahekili Highway approximately 30 to 40 feet from the project entrance.

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

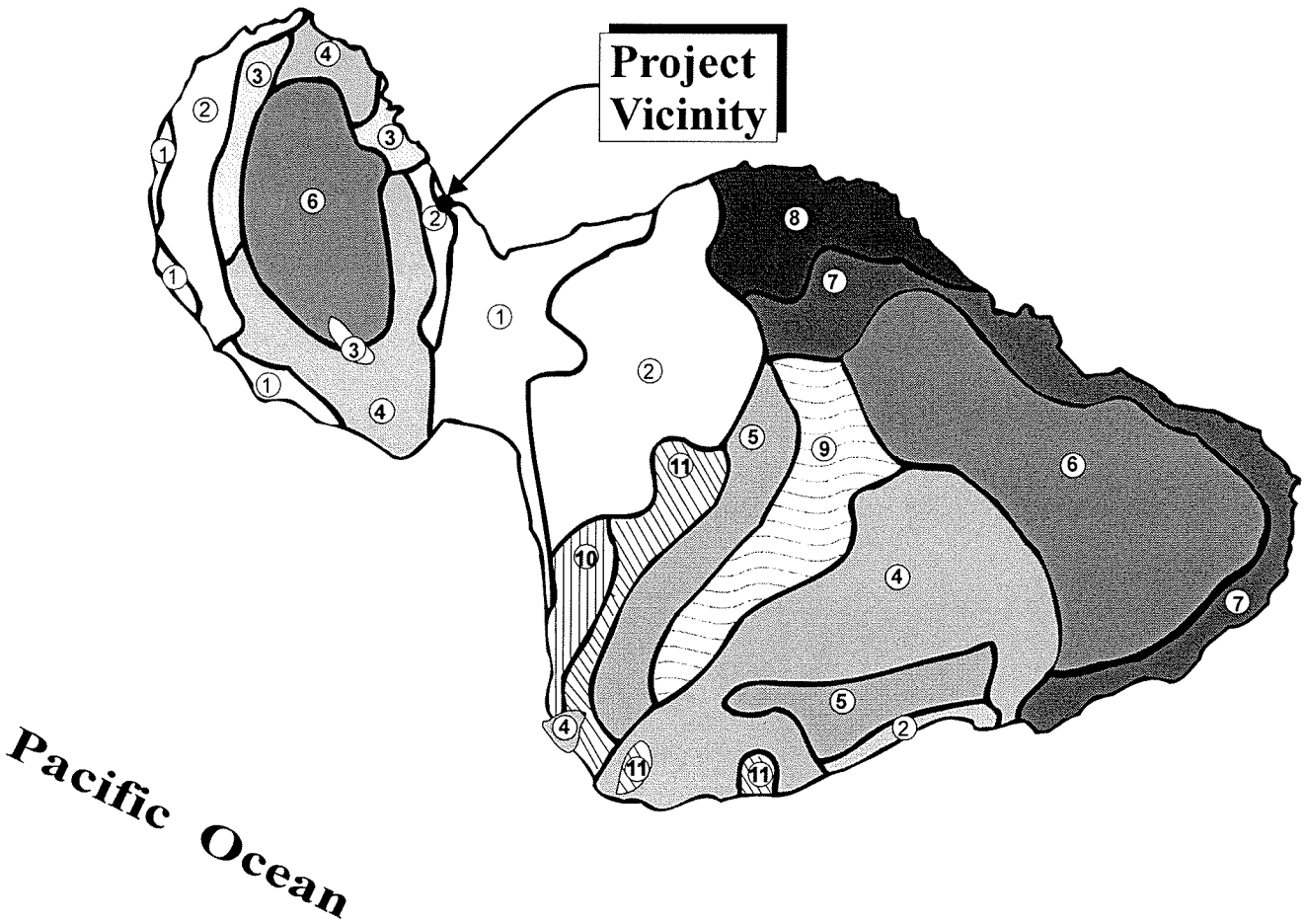
### a. Existing Conditions

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.

# LEGEND

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




Map Source: USDA Soil Conservation Service

Figure 4

# Proposed Waiehu Mauka Affordable Housing Project

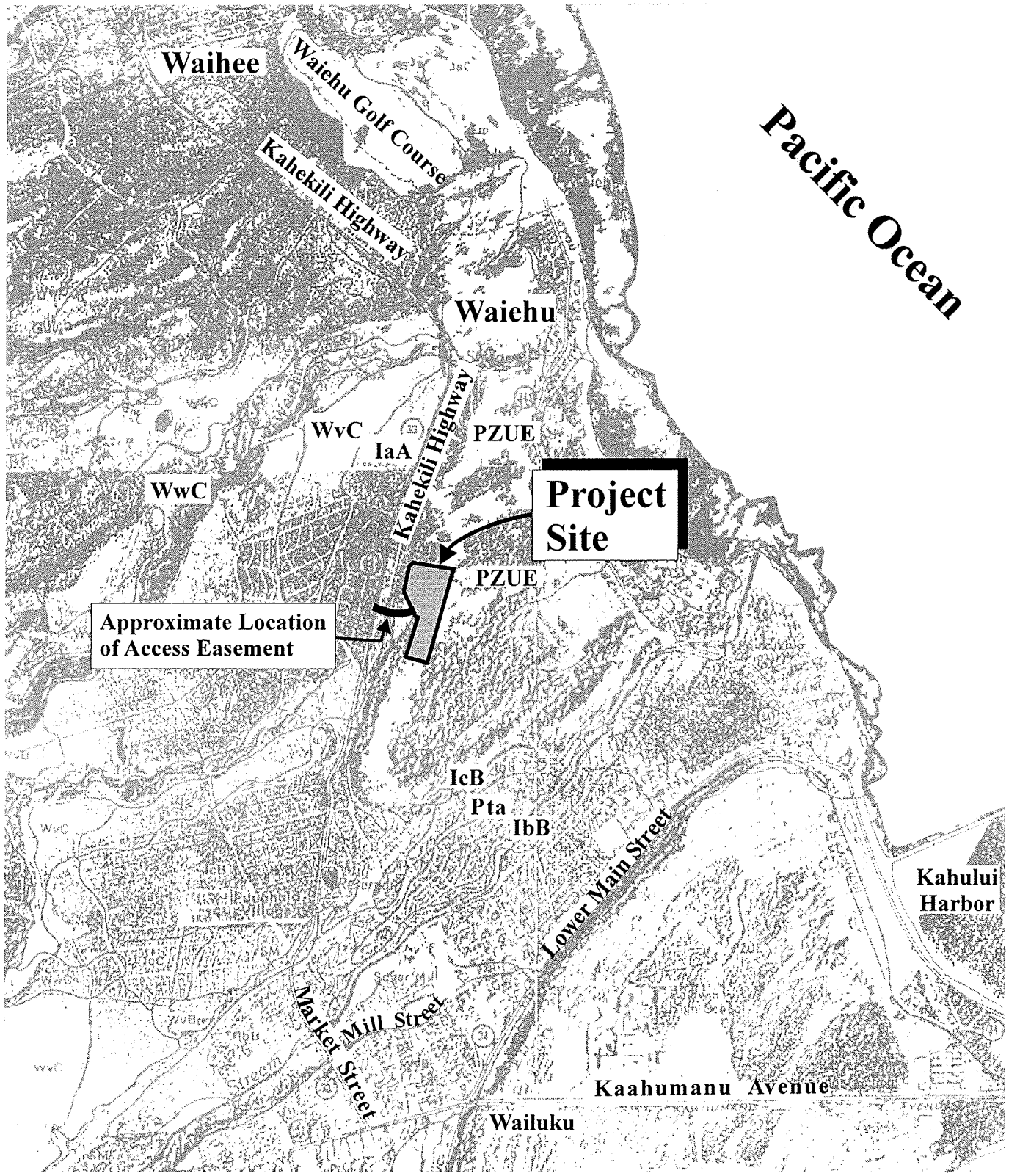
## Soil Association Map

NOT TO SCALE

Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

LokahiPac\Waiehu EA\SOILS




Source: USDA, Soil Conservation Service

Figure 5

# Proposed Waiehu Mauka Affordable Housing Project

## Soil Classification Map

NOT TO SCALE

Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

LokahiPac\Waiehu EA\soilclass

**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 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

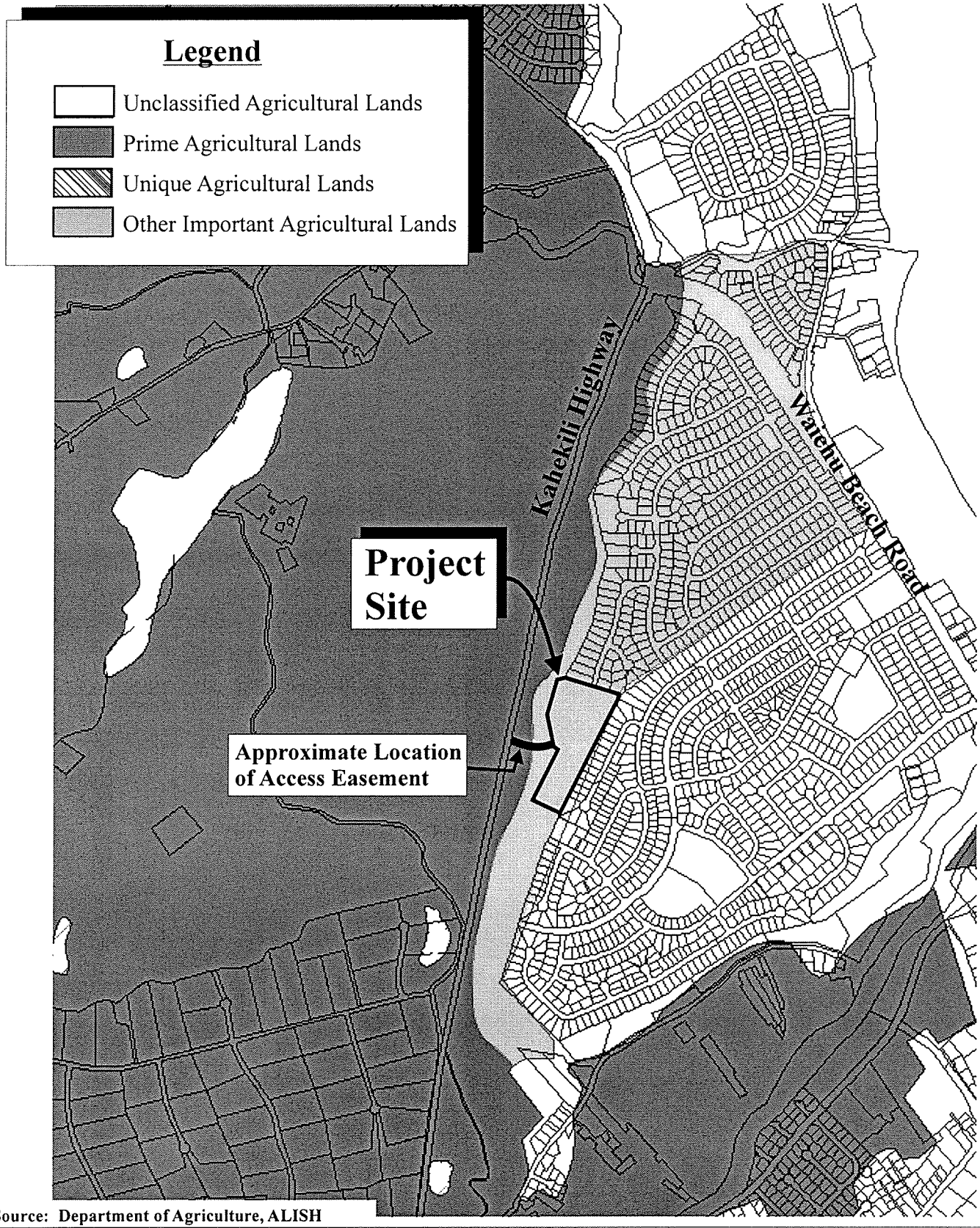
The 1972 Land Capability Grouping by the U.S. Department of Agriculture NRCS rates soils according to eight (8) levels, ranging from the highest classification level "I" to the lowest "VIII".

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**.




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

Prepared for: Lokahi Pacific

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LokahiPac\Waiehu EA\ALISH

### (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.

### b. Potential Impacts and Proposed Mitigation Measures

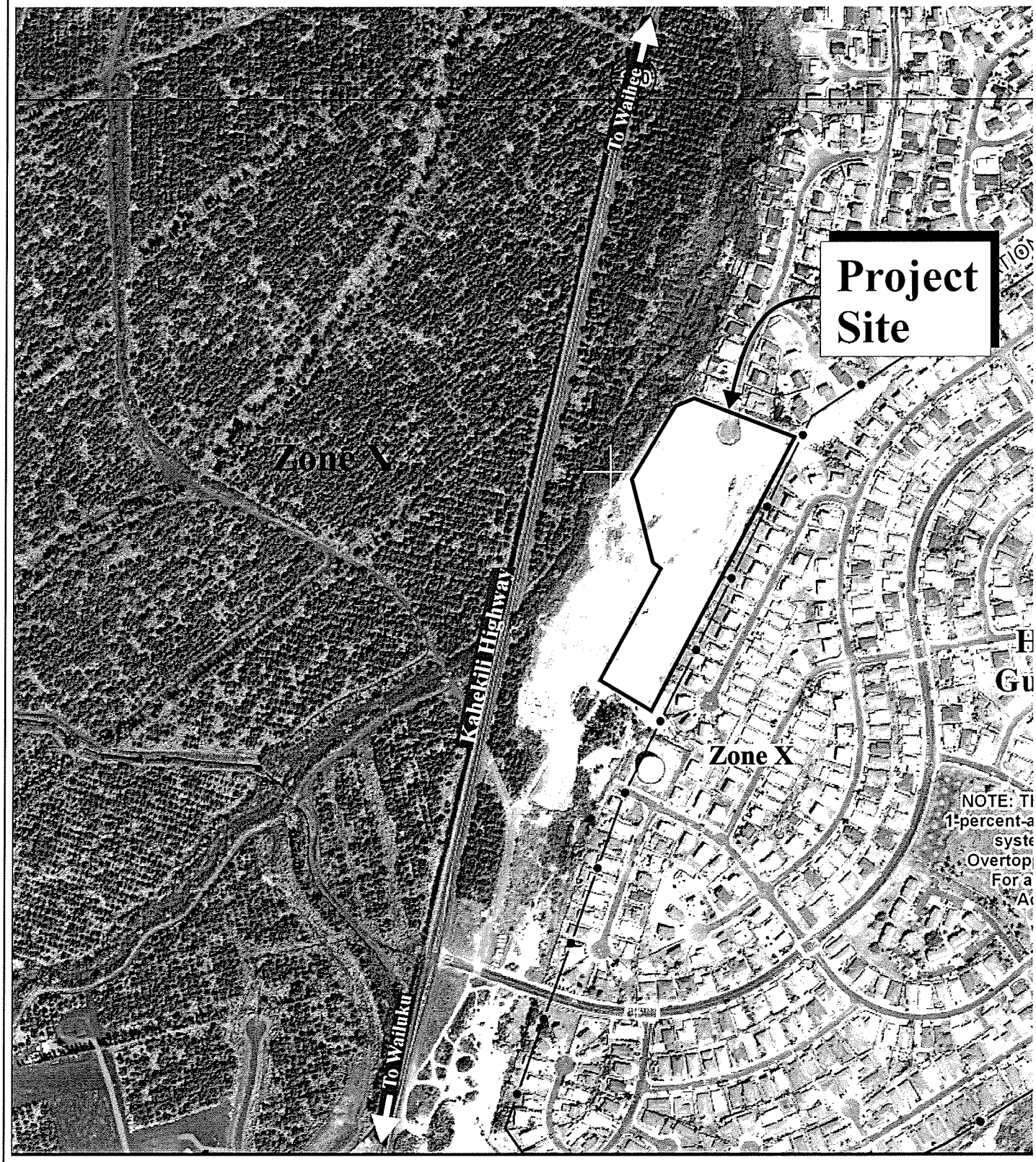
The project site is vacant, undeveloped and covered primarily with non-native plant species. There are no agricultural activities occurring on the property, nor are there any active agricultural crop production activities on the immediate adjacent lands. The property was once vegetated with a variety 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 X, 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 X (unshaded) as areas determined to be outside the 0.2% annual chance floodplain.

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




Source: Federal Emergency Management Agency, Map No. 1500030383E

NOT TO SCALE

Figure 7

# Proposed Waiehu Mauka Affordable Housing Project

## Flood Insurance Rate Map

Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

LokahiPac\Waiehu EA\firm2

### 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 20$^{th}$ 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. <u>Potential Impacts and Proposed Mitigation Measures</u>**

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, Coodinator 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. <u>Potential Impacts and Proposed Mitigation Measures</u>**

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 October 2009, the unemployment rate for Maui Island was 9.0 percent. This represents an increase from the October 2008 unemployment rate of 5.2 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 November 2009, the year-to-date median sales price for a single-family home in Central Maui was $473,000. The median year-to-date sales price of a multi-family unit in Central Maui was approximately $187,500 (Realtors Association of Maui, December 2009). However, the median price for a multi-family unit in Maui County was $464,500. 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.

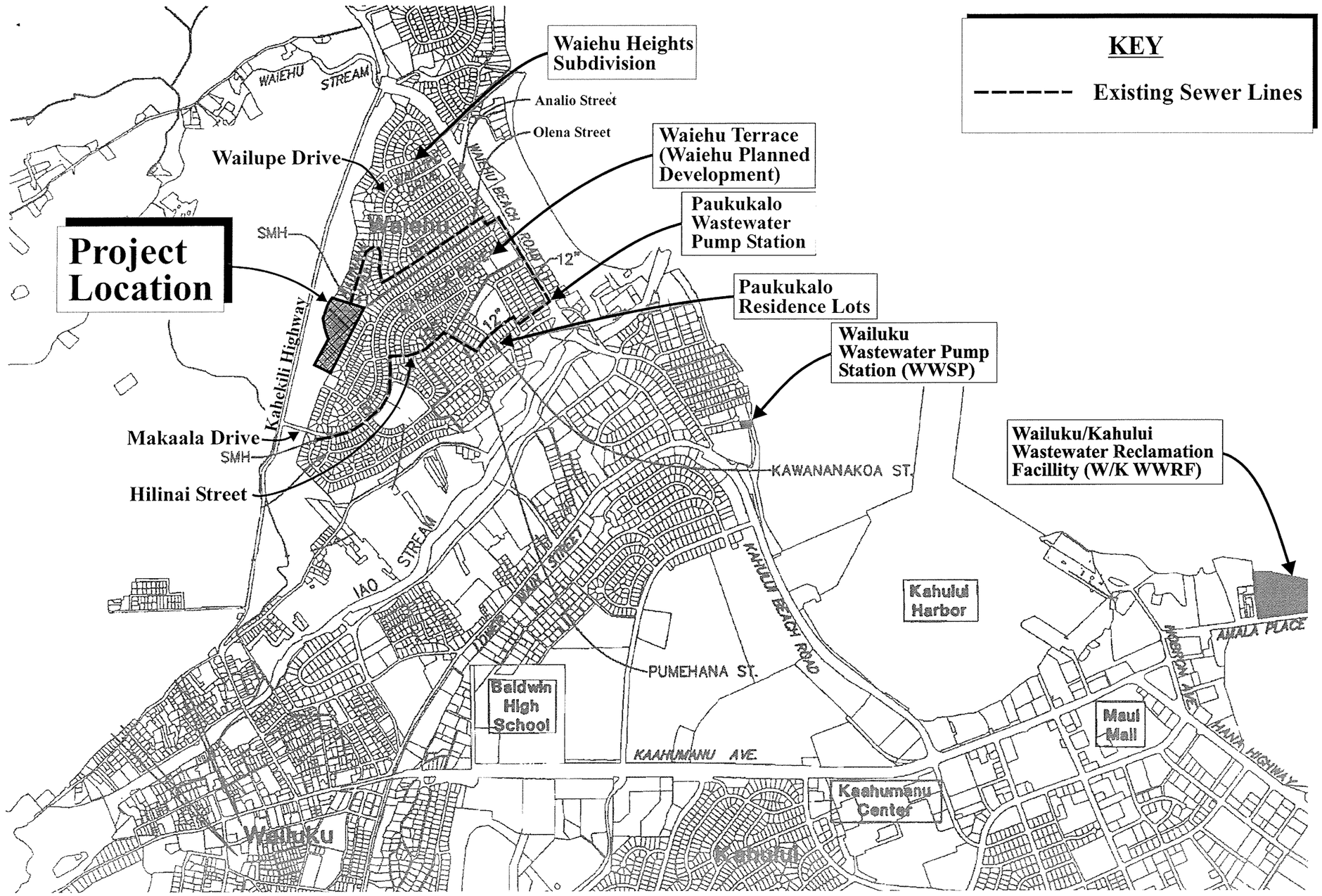
It is noted that the applicant is seeking an exemption to Chapter 14.76, MCC, to exempt the affordable component of the project from traffic impact fees. Given the affordable nature of the project, an exemption from regional roadway improvements is also being sought. Refer to **Appendix "B"**.

Additionally, coordination with the Maui County Department of Transportation will be undertaken to explore mass transit options for future residents. Lokahi Pacific also utilizes transportation provided by Maui Economic Opportunity (MEO) at the majority of its projects. Waiehu Mauka residents will utilize this service.

## 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 eventually pumped to the Wailuku-Kahului Wastewater Reclamation




Source: R.T. Tanaka Engineers, Inc.

Figure 8

# Proposed Waiehu Mauka Affordable Housing Project

## Existing Offsite Wastewater Disposal System

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: Lokahi Pacific

LokahiPac Waiehu EA ExistingOffsiteWWDS

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.

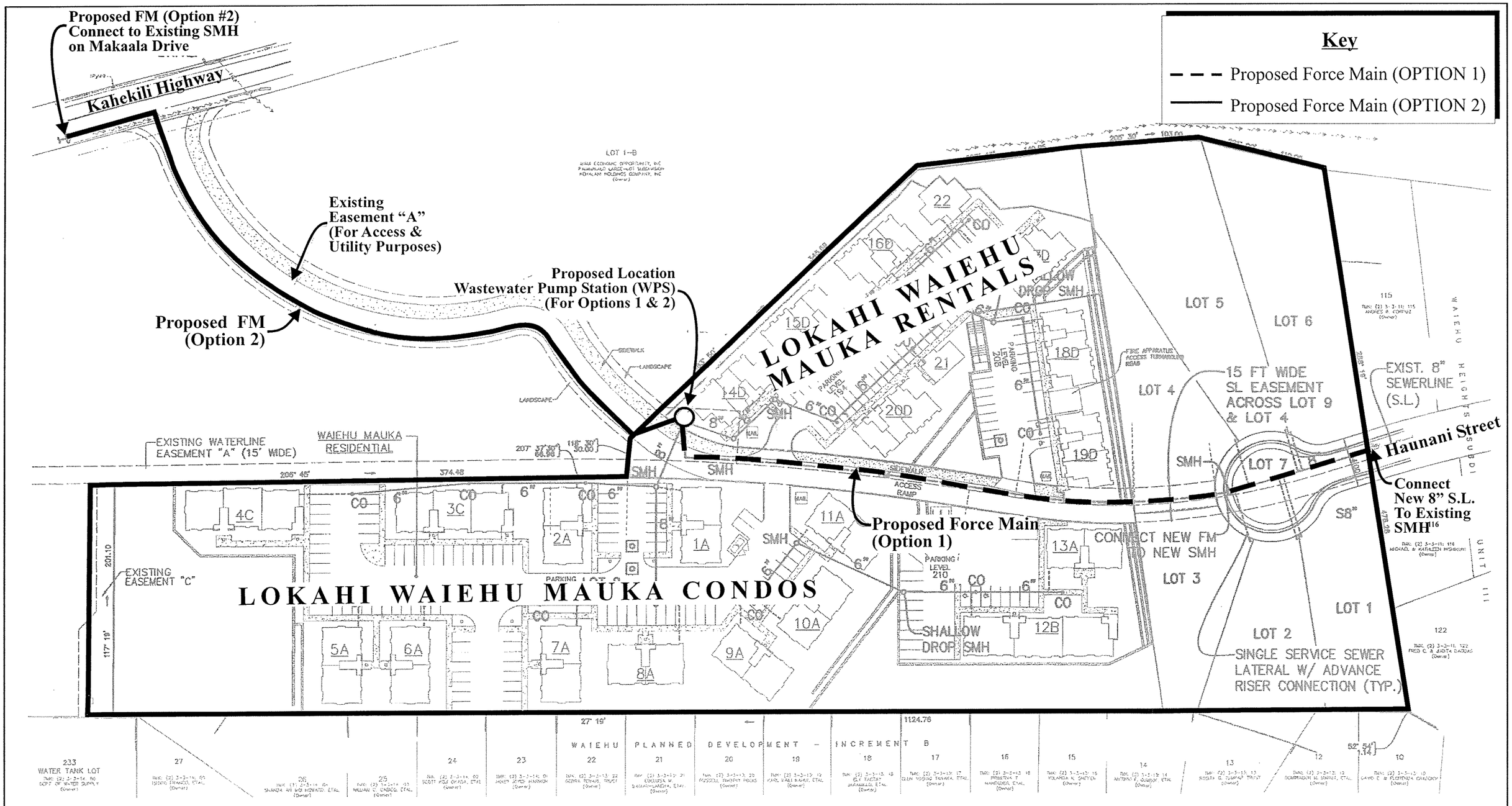
Wastewater flow from the multi-family housing units will be collected by gravity sewer lines to discharge into a wastewater pump station (WPS) located at a low portion of the project site. Options for offsite wastewater disposal have been identified and are described in **Appendix "G"**. The options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

**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**.




Source: R.T. Tanaka Engineers, Inc.

Figure 9

# Proposed Waiehu Mauka Affordable Housing Project

## Options for Offsite Wastewater Disposal System

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: Lokahi Pacific

LokahiPac\Waiehu EA\OptionsforOffsiteWastewaterDisposal

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 Mokuhau 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. <u>Potential Impacts and Proposed Mitigation Measures</u>**

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.

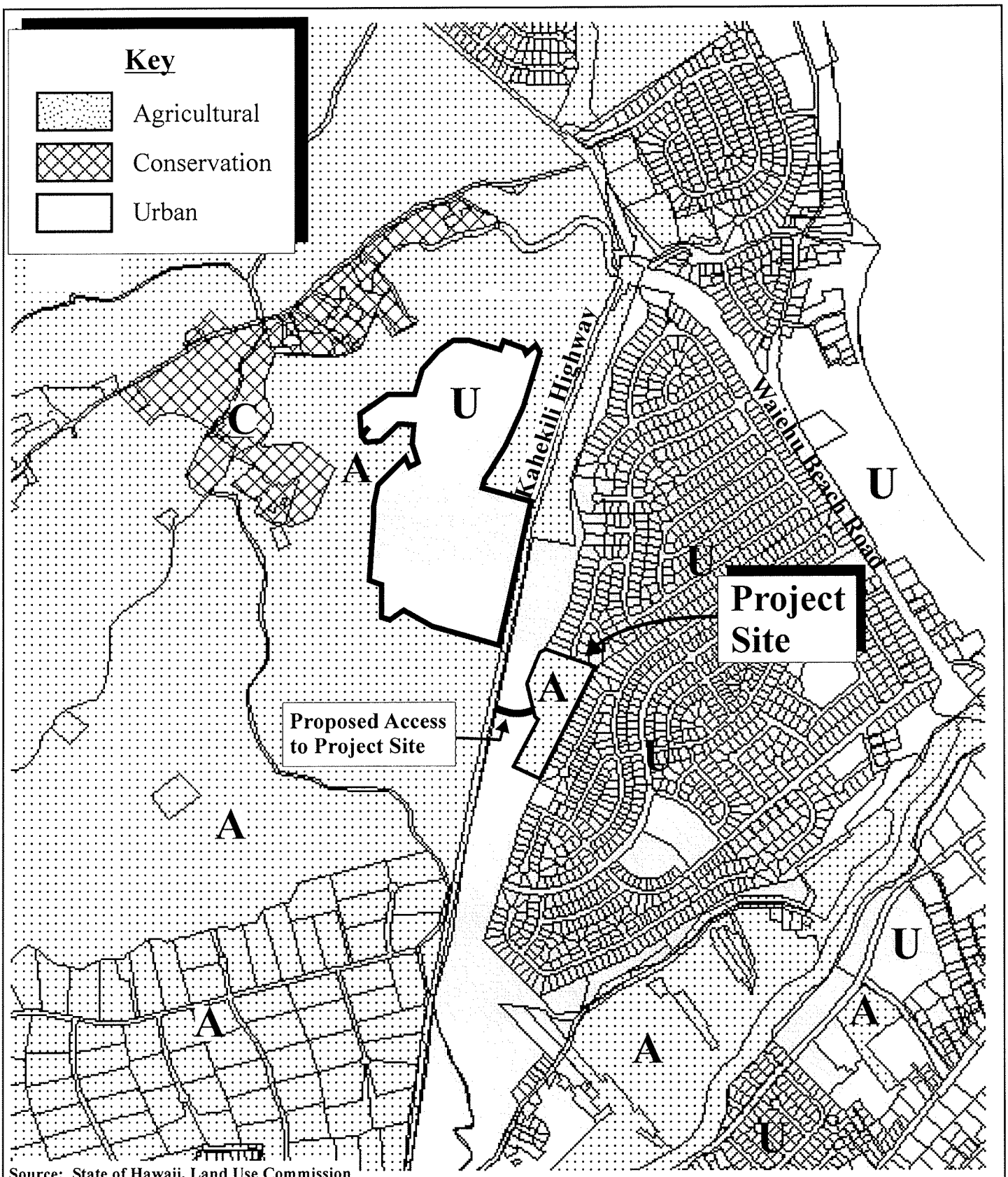
## A. STATE LAND USE DISTRICTS

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

Prepared for: Lokahi Pacific

MUNEKIYO & HIRAGA, INC.

LokahiPac\Waiehu EA\StateLandUseDistrict

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 from 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 X, 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 lots 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...*

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.

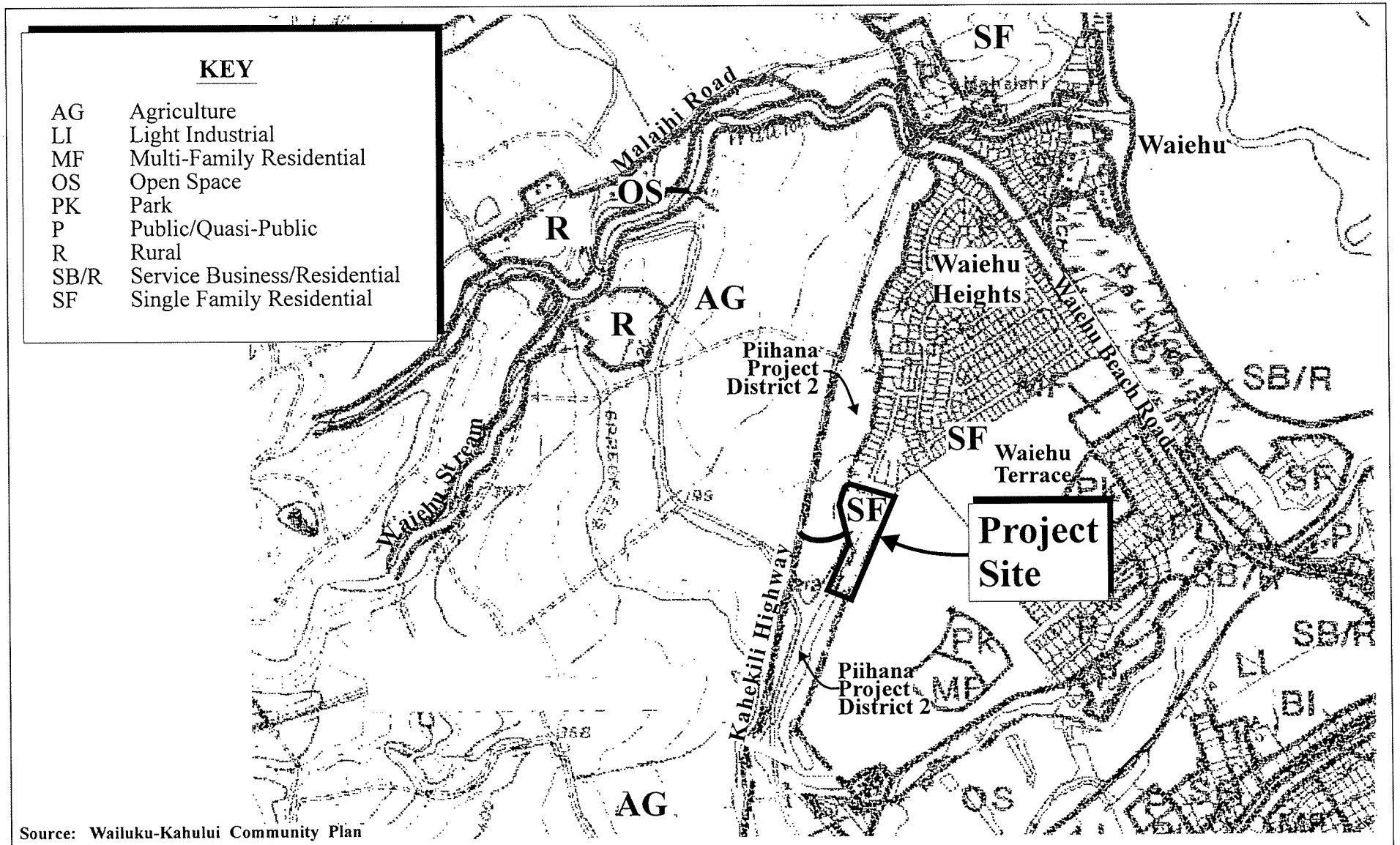
The proposed action is in keeping with the following Wailuku-Kahului Community Plan goals, objectives, policies, and implementing actions:

**Goal - Housing**

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

**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.




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

MUNEKIYO & HIRAGA, INC.

LokahiPac\Waiehu EA\cplu

- 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 tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

**Policies**:

a. Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

b. Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;

c. Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

d. Prevent coastal flooding from inland projects.

**Response**: The project site falls within Zone X, 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. A meeting with residents of Waiehu Heights and Waiehu Terrace was held on November 17, 2009 to familiarize the community with the project and receive feedback. See **Appendix "H"**. 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 have been provided as part of the notification review and comment process required for the Environmental Assessment review process. A community meeting was held on November 17, 2009. Refer to **Appendix "H"**. 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 submitted to DHHC for review and transmittal to the Maui County Council. Agency review of the Preliminary Section 201H-38, HRS application was accomplished concurrently with review of the Draft EA. 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 Kawananakoa 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. **Detrimentally 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. A Finding of No Significant Impact has been issued 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

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

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

3. Gordon Furutani, Field Office Director
**U. S. Department of Housing and Urban Development**
500 Ala Moana Boulevard, Suite 3A
Honolulu, Hawaii 96813-4918

4. Patrick Leonard
Field Supervisor
**U. S. Fish and Wildlife Service**
300 Ala Moana Blvd., Rm. 3-122
Box 50088
Honolulu, Hawaii 96813

5. Russ K. Saito, State Comptroller
**Department of Accounting and General Services**
1151 Punchbowl Street, #426
Honolulu, Hawaii 96813

6. Sandra Lee Kunimoto, Chair
**Department of Agriculture**
1428 South King Street
Honolulu, Hawaii 96814-2512

7. Dan Davidson, Executive Director
**Hawaii Housing Finance and Development Corporation**
677 Queen Street
Honolulu, Hawaii 96813

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

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

10. Heidi Meeker
Planning Section
Office of Business Services
**Department of Education**
809 Eighth Avenue
Honolulu, Hawaii 96816

cc: Bruce Anderson, Complex Area Superintendent (Central/Upcountry Maui)

11. Micah Kane, Chairman
**Department of Hawaiian Home Lands**
P. O. Box 1879
Honolulu, Hawaii 96805

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
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cc: Fred Cajigal

19. Katherine Kealoha, Director
**Office Of Environmental Quality Control**
235 S. Beretania Street, Suite 702
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20. Clyde Namu'o
**Office of Hawaiian Affairs**
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21. Mary Lou Kobayashi, Administrator
State of Hawaii
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Honolulu, Hawaii 96804

22. Rodney Maile, Interim Executive Officer
State of Hawaii
**State Land Use Commission**
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23. Neal Bal, Deputy Chief
County of Maui
**Department of Fire and Public Safety**
200 Dairy Road
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24. Vanessa A. Medeiros, Director
County of Maui
**Department of Housing and Human Concerns**
200 South High Street
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25. Tamara Horcajo, Director
County of Maui
**Department of Parks and Recreation**
700 Halia Nakoa Street, Unit 2
Wailuku, Hawaii 96793

26. Jeffrey Hunt, Director
County of Maui
**Department of Planning**
250 South High Street
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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**
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30. Donald Medeiros, Director
County of Maui
**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**
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Wailuku, Hawaii 96793

35. Councilmember Gladys Baisa
**Maui County Council**
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36. Councilmember Jo Anne Johnson
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Wailuku, Hawaii 96793

37. Councilmember Bill Medeiros
**Maui County Council**
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Wailuku, Hawaii 96793

38. Councilmember Michael J. Molina
**Maui County Council**
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Wailuku, Hawaii 96793

39. Councilmember Joseph Pontanilla
**Maui County Council**
200 South High Street
Wailuku, Hawaii 96793

40. Councilmember Mike Victorino
**Maui County Council**
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Wailuku, Hawaii 96793

41. **Hawaiian Telcom**
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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

MAY 2 9 2008

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

REPLY TO
ATTENTION OF:

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

MUNEKIYO & HIRAGA, INC.

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.

environment planning government

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



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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

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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JUN 0 6 2008

# 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.

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- 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.).

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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 Hobdy 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

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

(P)1144.8

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

JUN - 6 2008

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

4

MAY 0 8 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 Waiehu 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

MUNEKIYO & HIRAGA, INC.

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.

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

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

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
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MAY 1 9 2008

LINDA LINGLE
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

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

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

MUNEKIYO & HIRAGA, INC.

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.

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government

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**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.

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

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group
F:\DATA\LokahiPac\Waiehu EA\DOE.ecres.wpd

AUG 0 6 2008

PHONE (808) 594-1888

FAX (808) 594-1865

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

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 'oia'i'o,

Clyde W. Nāmu'o
Administrator

C: OHA – Maui Community Resources Coordinator

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Mike Dega, Scientific Consulting Services, Inc.
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MAY 1 4 2008

LINDA LINGLE
GOVERNOR OF HAWAII

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

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

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

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.

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,

Herbert S. Matsubayashi
District Environmental Health Program Chief

c: EPO

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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.

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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.
David Lundquist, Maui Architectural Group
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MAY 2 2 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 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,

Charlene E. Unoki
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

RECEIVED
LAND DIVISION
2008 MAY -6 P 3:33

May 1, 2008

MEMORANDUM

RECEIVED
'08 MAY -5 A10:43
FORESTRY & W.
STATE OF HAWAII

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

FROM: Morris M. Atta
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

(X) We have no objections.
(X) 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

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

RECEIVED
MAUI DISTRICT
LAND DIVISION

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

RECEIVED
LAND DIVISION
2008 MAY -8 A 11:31

MEMORANDUM

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
_x_Engineering Division
_x_Div. of Forestry & Wildlife
__Div. of State Parks
_x_Div. of Water Resource Management
_x_Office of Conservation & Coastal Lands
_x_Land Division – (~~Hawaii~~ Maui District office)

FROM: Morris M. Atta
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: 5/6/08

cc: Central Files

26

MAY 2 3 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 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 Engineering Division on the subject matter. Should you have any questions, please feel free to call my office at 587-0433. Thank you.

Sincerely,

Charlene Ellerbe

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

'08 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

RECEIVED
LAND DIVISION
2008 MAY 20 P 2: 07

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

FROM: Morris M. Atta
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.
(X) Comments are attached.

Signed: _____
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 3 0 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 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,

Charlene E. Unoki

for Morris M. Atta
Administrator

Enclosures

3C

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
08 MAY 5 A10:10

MEMORANDUM

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
_x_Engineering Division
_x_Div. of Forestry & Wildlife
__Div. of State Parks
_x_Div. of Water Resource Management
_x_Office of Conservation & Coastal Lands
_x_Land Division – (~~Hawaii~~ Maui District office)

FROM: Morris M. Atta
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

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 MIIKE, 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: WiaehuMauka.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.

☐ 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.

Cl:ss

MUNEKIYO & HIRAGA, INC.

MICHAEL T. MUNEKIYO
GWEN OHASHI 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.

environment planning government

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



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Should you have any questions, please do not hesitate to contact me at (808) 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.
F:\DATA\LokahiPac\Waiehu EA\DLNR.ecres.wpd

MAY 2 8 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 2 3 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,

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

26

LINDA LINGLE
GOVERNOR

JUN 13 2008

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D FORMBY
FRANCIS PAUL KEENO
BRIAN H SEKIGUCHI

IN REPLY REFER TO

STP 8.2874

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

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,

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

MUNEKIYO & HIRAGA, INC.

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.

environment planning management

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



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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

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
Phillip Rowell, Phillip Rowell and Associates
F:\DATA\LokahiPac\Waiehu EA\SDOT.ecres.wpd

MAY 2 1 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

MUNEKIYO & HIRAGA, INC.

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.

planning environment government

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



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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

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

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 CONSULATATION 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,

for Cheryl Okuma, Director

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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

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

MAY 1 5 2008

CHARMAINE TAVARES
MAYOR

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

Dear Ms. Dagdag,

I have received your request concerning the Waiehu 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

47

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

VANESSA A. MEDEIROS
Director of Housing and Human Concerns

xc: Housing Division

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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

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

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

MAY 2 3 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

MUNEKIYO & HIRAGA, INC.

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.

environment planning

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

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific, Inc.
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group
F:\DATA\LokahiPac\Waiehu EA\DPR.ecres.wpd

CHARMAINE TAVARES
Mayor

JEFFREY S. HUNT
Director

COLLEEN M. SUYAMA
Deputy Director

MAY 3 0 2008

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;

250 SOUTH HIGH STREET, WAILUKU, MAUI, HAWAII 96793
MAIN LINE (808) 270-7735; FACSIMILE (808) 270-7634
CURRENT DIVISION (808) 270-8205; LONG RANGE DIVISION (808) 270-7214; ZONING DIVISION (808) 270-7253

5C

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,

for 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

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MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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.

environment
planning
government

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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

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 1 2 2008

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.

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
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MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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.

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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
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Lokani Pacific/Wa
MAY 1 2 2008 N
#13.

# POLICE DEPARTMENT

COUNTY OF MAUI


CHARMAINE TAVARES
MAYOR

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

GARY A. YABUTA
DEPUTY CHIEF OF POLICE


OUR REFERENCE
YOUR REFERENCE

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,

AC Wayne T. Ribao

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

c: Jeffrey Hunt, Maui County Planning Department

12

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 Wayne Pate 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.
GARY [illegible]
05/01/08 @ 1140

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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

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

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

MAY 1 4 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.

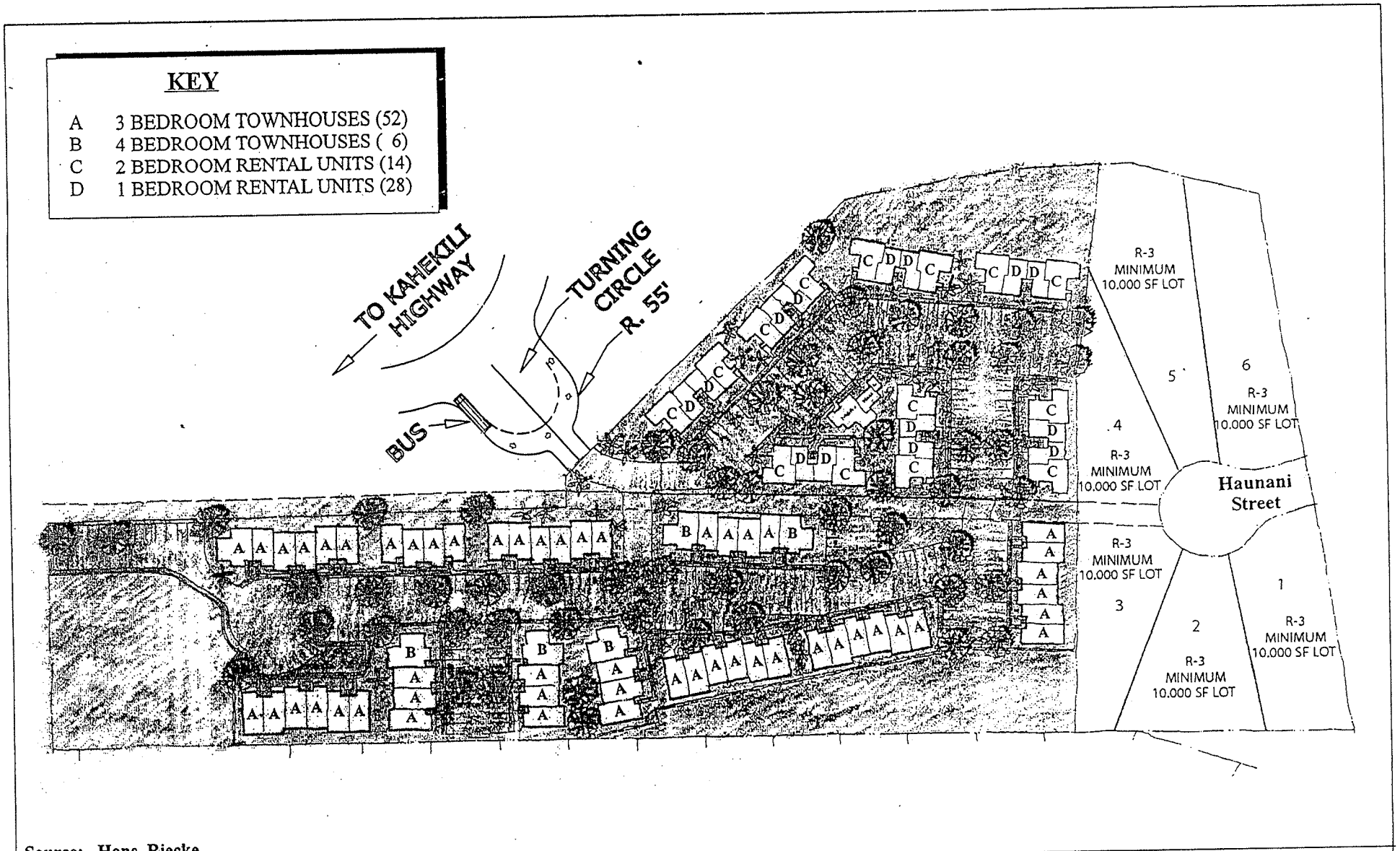
We believe that the clientele at this development will need transit services. Therefore, we would like the development to include on the parcel TMK (2)3-3-001:016(por), a driveway access to include a bus turning circle prior to the entrance (see attached figure 3). This minor additional expenditure in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

Don Medeiros
Director




Source: Hans Riecke

Figure 3

# Proposed Waiehu Mauka Residential Workforce Housing Project

## Conceptual Site Plan

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: Lokahi Pacific

LokahiPac\Waiehu EA\ECLConceptualSitePlan

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

October 9, 2009

Don Mederios, 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.

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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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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) 720-5964 (voice and TDD)

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**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"

MUNEKIYO & HIRAGA, INC.

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.

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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

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 0 5 2008

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

Director of Council Services
Ken Fukuoka

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,

JOSEPH PONTANILLA,
COUNCIL MEMBER

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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.

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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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**Maui Electric Company, Ltd.** • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-846

MAY 1 5 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,

Ray Okazaki
Staff Engineer

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

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

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. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT REVIEW PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS

# X. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT REVIEW PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS

A Draft Environmental Assessment for the subject project was filed and published in the Office of Environmental Quality Control's Environmental Notice on November 8, 2009.

A concurrent agency review of the Draft EA and 201H Application was conducted. Comments on the Draft EA and 201H Application were received during the 30-day public comment period. Comments, as well as responses to substantive comments, are included in this chapter.

DEC 0 8 2009

LINDA LINGLE
GOVERNOR

RUSS K. SAITO
COMPTROLLER

SANDRA L. YAHIRO
DEPUTY COMPTROLLER

**STATE OF HAWAII**
**DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES**
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1321.9

DEC - 7 2009

Ms. Carol Matasci
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Ms. Matasci:

Subject: Preliminary 201H Application and
Draft Environmental Assessment (EA) for the
Proposed Waiehu Mauka Affordable Housing Project
TMK: Nos. (2) 3-3-001:102 and 016 (por.)

Thank you for the opportunity to provide comments on the Preliminary 201H Application and Draft Environmental Assessment for the Proposed Waiehu Mauka Affordable Housing Project. This project does not impact any of the Department of Accounting and General Services' projects or existing facilities, and we have no comments to offer at this time.

If you have any question, please call me at 586-0400 of have your staff call Mr. Clarence Kubo of the Public Works Division at 586-0488.

Sincerely,

RUSS K. SAITO
State Comptroller

CKK:mo

LINDA LINGLE
GOVERNOR

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
FAX: (808) 587-0600

IN REPLY REFER TO:
09:PEO/127

December 15, 2009

Ms. Carol Matasci
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Matasci:

Re: Preliminary 201H Application and Draft Environmental Assessment for the Proposed Waiehu Mauka Affordable Housing Project, TMK Nos. (2)3-3-001:102 and por 016

The proposed Waiehu Mauka will provide affordable rental and for-sale housing opportunities for 100 households earning from less than 50 percent to 120 percent of the area median income. The project will also provide six market single-family lots.

The proposed single and multi-family development is compatible with existing residential land uses in the surrounding area and is in close proximity to Wailuku Town.
It is consistent with the affordable housing policy set forth in the Hawaii State Plan of increasing homeownership opportunities and choices in terms of quality, location, cost densities, style and size of housing. The targeted income groups, affordability, and resale provisions are consistent with the Chapter 201H, Hawaii Revised Statutes, requirements.

Thank you for the opportunity to comment.

Sincerely,

Karen Seddon
Executive Director

c: Department of Housing and Human Concerns

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 23, 2009

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

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Ms. Seddon:

Thank you for your letter of December 15, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments.

The applicant acknowledges your determination that the proposed Waiehu Mauka development is compatible with existing residential land uses in the surrounding area and is in close proximity to Wailuku Town. The applicant also acknowledges your determination that the proposed project is consistent with the affordable housing policy set forth in the Hawaii State Plan of increasing homeownership opportunities and choices in terms of quality, location, cost, densities, style and size of housing. Additionally, the targeted income groups, affordability, and resale provisions are consistent with the Chapter 201H, Hawaii Revised Statutes, requirements.

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Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
Enclosure
cc: Kamaile Sombelon, Lokahi Pacific (w/enclosure)
John Maloney, Pacific Rim Land, Inc. (w/enclosure)
Lori Tsuhako, Department of Housing and Human Concerns (w/enclosure)
F:\DATA\LokahiPac\WaiehuEA\201HDraftEAHHFDCresltr.doc

DEC 10 2009 LINDA LINGLE
GOVERNOR
THEODORE E. LIU
DIRECTOR
MARK K. ANDERSON
DEPUTY DIRECTOR
ABBEY SETH MAYER
DIRECTOR
OFFICE OF PLANNING

# DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

## OFFICE OF PLANNING

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

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

Ref. No. P-12864

December 8, 2009

Ms. Carol Matasci
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Matasci:

Subject: Proposed Waiehu Mauka Affordable Housing Project
Draft Environmental Assessment
TMK: (2) 3-3-001:102 and 016 (por.)
Wailuku, Maui

Thank you for sending the Office of Planning (OP) a Draft Environmental Assessment (DEA) and Preliminary 201H Application, for the above referenced proposal to reclassify approximately 8 acres of land from the State Agricultural District to the State Urban District. The current proposal is to develop 100 affordable multi-family units and six (6) single-family residential lots. Of the affordable units, 42 multi-family units will be rentals in seven (7) apartment buildings. The remaining 58 affordable units will be townhouse units for sale in thirteen (13) buildings. The six (6) single-family residential lots will be sold at market prices.

OP will be coordinating the State's position on areas of State concern. I am writing to request that the Final Environmental Assessment (FEA) consider the impacts of the proposed project on the following issues:

1. **Water Resources** – Water resource protection and water quality are critical State issues. Please identify whether the proposed project is within a designated Water Management Area, the impact of the project on the sustainable yield of affected aquifers, and the impact of the project on projected water use and system improvements contained in the County's water use and development plan.

2. **Public Health** – Please quantify the volume of solid waste likely to be generated by the project, and describe the impact the project will have on the County's existing and planned capacity for managing solid waste as represented in the County's solid waste management plan. The FEA should discuss any mitigation measures to be incorporated in the project to reduce solid waste generation. If the project will have a potential to generate hazardous materials or result in the possible contamination of the air, soil, or water, please discuss how public health and safety will be protected. Please identify and discuss any potential health and environmental threats that may be present due to contamination from past or current use of the site, including findings from Phase I or Phase II environmental site assessments conducted at the site.

3. **Flora and Fauna** –The FEA should discuss measures to be taken to protect rare, threatened or endangered bird species, or ecosystems of concern such as shielding outdoor lights associated with the project.

4. **Energy Use and Impacts** – The FEA should quantify the projected energy requirements of the project by type of use, and discuss measures to be taken to reduce energy demand, promote energy efficiency, and to promote use of alternative, renewable energy sources. OP recommends the project's projected energy use and performance be discussed in relation to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating systems for new construction and neighborhood development, the Hawaii Built Green, and Zero-Net Energy Green Homes programs for energy efficiency. Please identify any generating or transmission capacity constraints that may arise as a result of the proposed project and other projects planned for the region. The FEA should also discuss the degree to which the project promotes transportation energy savings for project residents and users.

5. **Impact on State Facilities** – The FEA should include a discussion on the impacts on State-funded facilities, including schools, highways, harbors, and airports. The FEA should cite the mitigation measures proposed to be used in the development of the project. The cumulative impacts of other projects mauka and makai of Kahekili Highway should also be discussed.

6. **Conformance with County Plan Designations and Urban Growth or Rural Community Boundaries** – Act 26, Session Laws of Hawaii 2008, reaffirmed the Land Use Commission's duty to consider any proposed reclassification with respect to the Counties' adopted general, community, or development plans. Thus, the FEA should discuss the proposed project's consistency with the County land use plans. If the proposed project is not consistent with the County plans, would require a County plan amendment, or lies outside a County urban growth or rural community boundary, then the FEA should provide an analysis and discussion of the following:

   a. **Alternative Sites Considered** – The FEA should describe and discuss alternative sites that were considered for the project, and discuss why the project could not be accommodated on lands within the urban growth or rural community boundary, if the County plan delineates such boundaries, or on land already designated by the County for similar uses.

   b. **Impact on Surrounding Lands** – The FEA should discuss what the impacts of changing the County plan designation or extending the urban growth or rural community boundary would have on the surrounding lands.

   c. **Significant Public Benefit** – The FEA should discuss what, if any, public benefits are provided by the proposed project above that already required under existing approval and permitting requirements.

The Office recommends that the EA/EIS process be used as a means to identify and incorporate sustainable design and development practices, including green building practices in the proposed project. The adoption of sustainable building and development practices has long-term environmental, social, and economic benefits to Hawaii's residents and communities. The Office of Environmental Quality Control's, *Guidelines for Sustainable Building Design in Hawai'i*, and the U.S. Green Building Council's (U.S. GBC) LEED programs for new construction and its pilot program for neighborhood development (LEED-ND) offer guidelines and checklists for this purpose.

The LEED-ND rating system is especially useful in profiling how a project protects and enhances the overall health, natural environment, and quality of life of communities. The rating system provides a range of development features and strategies that promote efficient water, energy, and resource use, including waste reduction, as well as location and design elements to reduce transportation impacts. OP recommends that the FEA include an overview of LEED features that could be incorporated into the project, based on the U.S. GBC LEED checklists available. This information would greatly aid agencies, decision-makers, and the public in reviewing the project application.

The Office of Planning looks forward to receiving the FEA with the potential impacts and mitigation measures for the above issues addressed. If you have any questions, please call Debra Mendes in the Land Use Division at (808) 587-2840.

Sincerely,

Abbey Seth Mayer
Director

c: Orlando Davidson, LUC

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 23, 2009

Abbey Seth Mayer, Director
**Department of Business, Economic Development & Tourism**
**Office of Planning**
235 South Beretania Street, 6th Floor
Honolulu, Hawaii 96804

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Mayer:

Thank you for your letter of December 8, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments, in the order in which they were presented.

***1. Water Resources***

The Waiehu Mauka project site is located within the boundaries of the Iao aquifer. The Iao aquifer is in the Groundwater Management Area. The Waiehu Mauka project will utilize water from the County of Maui water system, Central Maui service area. The water from the Central Maui Water System comes from both surface and ground water sources.

The Maui County Water Use and Development Plan, Central Maui Final Candidate Strategies are currently being reviewed. The Water Use and Development Plan Recommendations are as follows:

Short-Term Resources

- Acquire Committed and Near-Term Supply Resources
  - Maui Lani Wells

- Kupaa Well
- Shaft 33 Replacement Wells (including Iao Tank and Waikapu Tank wells)
- Waikapu South Wells 1 and 2

- Optimize Production from Existing Resources
- Continue and Accelerate Leak Detection and Repair Program
- Explore Demand Response Options

Long-Term Resources

- Monitor Na Wai Eha Surface Water Proceedings
- Proceed with Waiale WTF Negotiations and Approvals to the Extent Possible, Pending Determination of Assurance of Long Term Water Availability and Price
- Consider Alternate WTF Site
- Water Conservation Measures
- Recycling R-1 Wastewater Plan Effluent
- Monitor Feasibility and Preserve Other Long Term Options

These recommendations are intended to facilitate the provision of water for planned projects, such as Waiehu Mauka.
Lokahi Pacific is working with the County of Maui, Department of Water Supply to secure water for the Waiehu Mauka project in a manner which is in keeping with the Water Use and Development Plan.

## 2. ***Public Health***

The amount of solid waste generated by the project was estimated using the Waste District Generation Rate of 2.3 tons/household/year for Maui Island (excluding Hana), which is the rate used in the County of Maui, Integrated Solid Waste Management Plan of February 2009. The 100 multi-family units and six

(6) single-family lots are anticipated to generate approximately 243.8 tons of solid waste per year, or 1,336 pounds per day.

As may be required, a solid waste management plan will be developed in coordination with the Solid Waste Division of the County of Maui, 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 of at an appropriate 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 EA document contains a discussion of any potential health and environmental threats due to construction of the project or current or past use of the site. A Phase I Environmental Site Assessment conducted in February 2009 by Malama Environmental stated that there were no underground storage tanks found within one (1) mile of the project site, nor is there evidence of any historic or recent misuse of hazardous or regulated substances in the vicinity of the project area.

### 3. *Flora and Fauna*

There are no known rare, endangered, or threatened species of flora or fauna located within or in the vicinity of the project site. A special effort was made to look for any occurrence of the Native Hawaiian Hoary Bat, but no indication of the bat was found. Best Management Practices, such as shielding of outdoor lighting will be implemented to address potential impact to avifauna.

### 4. *Energy Use and Impacts*

The projected energy demand for the project is dependant on the equipment to be used, occupancy, and demand factors. The Waiehu Mauka design has not yet advanced to the point where the energy demand can be estimated. However, Hawaiian Electric Company's published average annual kilowatt-hour (kWh) use per residential customer for MECO was used to provide a general

estimate. In 2008, the average use was approximately 7,700 kWh per year per household. With 106 households, the Waiehu Mauka project is estimated to use approximately 816,200 kWh per year, or 816.2 Megawatt-hours (MWh) per year. The foregoing figures represent order of magnitude estimates only and may not be representative of demand characteristics of the project. With this in mind, the project architect is aware of the need to conserve energy and implement energy efficient practices, especially with regard to the goal of keeping utilities and maintenance affordable for Waiehu Mauka residents.

The proposed Waiehu Mauka project is designed with the following measures intended to reduce residential home energy and utility use:

- 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.
- 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.

A copy of your letter has been forwarded to the project architect for consideration of the Leadership in Energy and Environmental Design (LEED) rating systems in the design of the Waiehu Mauka project.

Consultation with Maui Electric Company, Ltd. (MECO) has been a part of the Environmental Assessment process. As the project plans develop, particularly for the onsite electrical infrastructure, the Waiehu Mauka project team will work with MECO to ensure that the capacity and transmission needs of the project are met.

Waiehu Mauka residents will use public transportation, saving energy and reducing traffic. Coordination with the County of Maui, Department of Transportation will be undertaken to consider possible routes and arrangements to facilitate the use of the Maui Bus by residents. Lokahi Pacific utilizes bus

transportation provided by Maui Economic Opportunity (MEO) at the majority of its projects. Waiehu Mauka residents will also utilize this form of transportation.

5. ***Impact on State Facilities***

A community consultation process has been initiated with neighboring residents. Issues relating to state facilities which may be impacted by the proposed action include the possible enrollment effects on Waihee School and possible effects on traffic congestion on the State's Waiehu Beach Road. The Traffic Impact Assessment Report (TIAR), included in the Final EA, addresses traffic impacts of the Waiehu Mauka project both with and without the proposed Hale Mua project nearby. With respect to traffic on Waiehu Beach Road, Lokahi Pacific proposes to form an ad hoc committee with neighboring owner representatives to initiate dialogue with State and County agencies and elected officials to determine appropriate strategies for addressing the existing traffic congestion issues affecting not only Waiehu Beach Road, but also the County's Kahekili Highway. Coordination with the State of Hawaii, Department of Education (DOE) is ongoing. We note that as an affordable housing project, Lokahi Pacific has not received funding set-asides for school facilities upgrades. Lokahi Pacific recognizes the importance of quality education for all children, and looks forward to working with DOE and Maui's State legislative representatives in seeking solutions to improve conditions at schools in the Baldwin High School complex.

6. ***Conformance with County Plan Designations and Urban Growth or Rural Community Boundaries***

The EA document discusses the proposed project's consistency with the County of Maui's land use plans, including the Maui County General Plan, Wailuku-Kahului Community Plan, Maui County zoning, and the Hawaii Coastal Zone Management Program, which is administered by Maui County. Through the Section 201H-38, HRS application, Lokahi Pacific will seek an exemption to allow the proposed multi-family use in the County's "Interim" district. An exemption will also be sought from the requirements of a Community Plan Amendment to allow the proposed multi-family use in an area designated "Single-Family" in the Wailuku-Kahului Community Plan.

The County of Maui, Department of Planning has provided comments on the Section 201H-38, HRS Application for the Waiehu Mauka project. See **Exhibit "A"**. The letter states that the project appears consistent with the 1990 update of the Maui County General Plan, particularly the policies supporting the provision of affordable housing in the region. The project is also within the urban growth

area of the draft Maui Island Plan, as recommended by the General Plan Advisory Committee, the Maui Planning Commission, and the Department of Planning. The proposed multi-family use is not consistent with the Wailuku-Kahului Community Plan designation of "Single-Family", but the project is targeted to address the lack of affordable housing, which is identified as an important concern in the community plan.

The Final EA will include an analysis and discussion of the alternative sites considered, impact on surrounding lands, and the significant public benefit provided by the project.

7. ***Sustainable Design and Development Practices***

A copy of your letter has been forwarded to the project architect for consideration of sustainable design and development practices, especially those included in the Office of Environmental Quality Control's publication, *Guidelines for Sustainable Building Design in Hawai`i*, and the U.S. Green Building Council's LEED programs.

Lokahi Pacific looks forward to working with the Department of Business, Economic Development & Tourism, Office of Planning during the State Land Use District Boundary Amendment process for projects subject to Section 201H-38, HRS. Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
Enclosure
cc: Kamaile Sombelon, Lokahi Pacific (w/enclosure)
John Maloney, Pacific Rim Land, Inc. (w/enclosure)
David Lundquist, Maui Architectural Group (w/enclosure)
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LINDA LINGLE
GOVERNOR
STATE OF HAWAI'I

KAULANA H. R. PARK
CHAIRMAN
HAWAIIAN HOMES COMMISSION

ANITA S. WONG
DEPUTY TO THE CHAIRMAN

ROBERT J. HALL
EXECUTIVE ASSISTANT

**STATE OF HAWAI'I**
**DEPARTMENT OF HAWAIIAN HOME LANDS**
P.O. BOX 1879
HONOLULU, HAWAI'I 96805

November 24, 2009

Ms. Carol Matasci
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Matasci:

Subject: Preliminary 201H Application and Draft Environmental Assessment for the Proposed Waiehu Mauka Affordable Housing Project

Thank you for the opportunity to provide comments on the subject project.

The department is a builder of affordable housing and is very much aware of the need and demand for affordable housing among our residents. We support the Waiehu Mauka Housing Project and commend Lokahi Pacific and its partners for taking this initiative.

The department notes that in past discussions with our homesteaders at Waiehu Kou and Paukukalo, the desire for a pedestrian walkway and bikepath connecting these communities along Kahekili Highway was expressed. This would connect Wailuku to the Maui Conservancy coastal property. Such a facility would benefit Waiehu Mauka as well. We request that Lopkahi Pacific consider this amenity in their plans.

If you have any questions, please call our Planning Office at 620-9519.

Aloha and mahalo,

Kaulana H.R. Park
Hawaiian Homes Commission

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Kaulana H.R. Park
Hawaiian Homes Commission
**Department of Hawaiian Home Lands**
P.O. Box 1879
Honolulu, Hawaii 96805

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Park:

Thank you for your letter of November 24, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments.

We appreciate your support for the Waiehu Mauka Affordable Housing Project. Lokahi Pacific's mission is to improve the quality of life, both economically and socially, for residents of the County of Maui. The proposed project is intended to further this mission in the provision of affordable housing for local residents.

We acknowledge your suggestion for a pedestrian walkway and bikepath connecting the Waiehu Kou and Paukukalo communities. However, we note that given the affordable nature of the Waiehu Mauka project, off-site improvements of a regional scale would not be covered by the project's limited funding sources.

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environment planning government

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Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
F:\DATA\LokahiPac\WaiehuEA\201HDraftEADHHLresltr.doc

NOV 3 0 2009

LINDA LINGLE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
EMD / CWB

11045PJF.09

November 19, 2009

Ms. Carol Matasci
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Matasci:

**SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (DEA) for the Proposed Waiehu Mauka Affordable Housing Project TMK Nos. (2) 3-3-001:102 and 016 (por.) Island of Maui, Hawaii**

The Department of Health, Clean Water Branch (CWB), has reviewed the subject document and offers these comments on your project.

Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://www.hawaii.gov/health/environmental/env-planning/landuse/CWB-standardcomment.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for an NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

   a. Storm water associated with construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the start of the construction activities.

   b. Hydrotesting water.

   c. Construction dewatering effluent.

   You must submit a separate NOI form for each type of discharge at least 30 calendar days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 calendar days before to the start of construction activities. The NOI forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html.

3. For types of wastewater not listed in Item No. 2 above or wastewater discharging into Class 1 or Class AA waters, you may need an NPDES individual permit. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. The NPDES application forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage is required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

If you have any questions, please visit our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/index.html, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

JF:rg

c: Ms. Lori Tsuhako, Department of Housing and Human Concerns, County of Maui

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Alec Wong, P.E., Chief
Clean Water Branch
State of Hawaii
**Department of Health**
P.O. Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Wong:

Thank you for your letter of November 19, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments, in the order in which they were presented.

1. The applicant acknowledges that the proposed Waiehu Mauka Affordable Housing project must meet the criteria of the antidegradation policy, designated uses, and water quality criteria.

2. The applicant confirms that a National Pollutant Discharge Elimination System (NPDES) general permit will be filed, if required. This includes separate Notice of Intent (NOI) forms for storm water associated with construction activities resulting in the disturbance of one (1) acre or more of land area, as well as construction activity dewatering, as applicable.

3. The applicant understands that an NPDES individual permit will need to be filed, as applicable, for types of wastewater not listed in Item 2 above.

4. The applicant notes that the project will comply with the Water Quality Standards.

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Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
Lori Tsuhako, Department of Housing and Human Concerns
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LINDA LINGLE
GOVERNOR OF HAWAII

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

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

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

December 8, 2009

Ms. Carol Matasci
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai`i 96793

Dear Ms. Matasci:

**Subject: Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project TMK: (2) 3-3-001:102 and 016 (por.)**

Thank you for the opportunity to comment on the early consultation. The following comments are offered:

1. National Pollutant Discharge Elimination System (NPDES) permit coverage may be 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, Chapter 11-46 "Community Noise Control". A noise permit may be required and should be obtained before the commencement of this project.

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 or e-mail me at patricia.kitkowski@doh.hawaii.gov.

Sincerely,

Patti Kitkowski

Patti Kitkowski
Acting District Environmental Health Program Chief

c Lori Tsuhako, Director of Housing & Human Concerns

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Patti Kitkowski
Acting District Environmental Health Program Chief
**Department of Health**
Maui District Health Office
54 High Street
Wailuku, Hawaii 96793

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Ms. Kitkowski:

Thank you for your letter of December 8, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments, in the order in which they were presented.

1. The applicant acknowledges that a National Pollutant Discharge Elimination System (NPDES) permit will need to be obtained for the project, as required.

2. The applicant acknowledges that a noise permit may be required, and will be obtained before the commencement of the project, as applicable.

3. The Department's standard comments will be reviewed and adhered to, as applicable.

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Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
Lori Tsuhako, Department of Housing and Human Concerns
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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

December 7, 2009

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

Attention: Ms. Carol Matasci

Ladies and Gentlemen:

Subject: Draft Environmental Assessment for Proposed Waiehu Mauka Affordable Housing Project

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 comment.

Other than the comments from Commission on Water Resource Management, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Historic Preservation will be submitting comments through a separate letter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Charlene E. Unoki
for Morris M. Atta
Administrator

Cc: Department of Housing & Human Concerns

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
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DONNA FAY K. KIYOSAKI, P.E.
LAWRENCE H. MIIKE, 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

December 1, 2009

RECEIVED
LAND DIVISION
2009 DEC -2 P 3 16
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

TO: Morris Atta, Administrator
Land Division

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

SUBJECT: Waiehu Mauka (Maui) Affordable Housing Draft EA

FILE NO.: N/A
TMK NO.: (2) 3-3-001:102

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. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

☒ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EPA as having high water efficiency can be found at http://www.epa.gov/watersense/pp/index.htm.

☐ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://hawaii.gov/dbedt/czm/initiative/lid.php.

☒ 6. We recommend the use of alternative water sources, wherever practicable.

☐ 7. 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 http://hawaii.gov/dlnr/cwrm/resources_permits.htm.

☐ 8. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water.

☐ 9. A Well Construction Permit(s) is (are) required any well construction work begins.

☐ 10. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 11. 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.

☐ 12. Ground water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☐ 13. A Stream Channel Alteration Permit(s) is (are) required before any alteration(s) can be made to the bed and/or banks of a stream channel.

☐ 14. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is (are) constructed or altered.

☐ 15. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☐ 16. 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.

☒ OTHER:
The primary water sources for this project are the Maui Department of Water Supply wells serving the Central Maui Service Area. These sources are already at their allocation limits under State designation as a water management area. New demand projects need to be supplied by a combination of sources, including treatment of surface water, which may also face restrictions as a consequence of a contested case hearing to restore stream flow. Other sources include recovery of supply through conservation and augmentation through wastewater reclamation.

If there are any questions, please contact Charley Ice at 587-0218.

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Morris M. Atta, Administrator
State of Hawaii
**Department of Land and Natural Resources**
Land Division
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Atta:

Thank you for your letter of December 7, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments, in the order in which they were presented.

1. Lokahi Pacific will coordinate with the County of Maui to incorporate the Waiehu Mauka project into the County's Water Use and Development Plan.

2. Lokahi Pacific acknowledges your recommendation to use water efficient devices and practices. A copy of your letter has been forwarded to the project architect for consideration in the Waiehu Mauka design.

3. Lokahi Pacific is open to discussing with the County of Maui, Department of Water Supply, the use of alternative water sources, where they are available and practicable.

4. Lokahi Pacific recognizes the current concerns regarding water supply for the County of Maui. Coordination with the County of Maui, Department of Water Supply is ongoing to secure a water source for the project in keeping with allocation limits.

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environment planning government

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Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group
Lori Tsuhako, Department of Housing and Human Concerns
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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

December 8, 2009

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

Dear Ms. Matasci:

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK: Nos. (2) 3-3-001:102 and 016 (por.))

Thank you for the opportunity to review and comment on the Preliminary 201H Application of the subject project.

As indicated in our preliminary consultation comments, the exemption from Section 18.16.320, Maui County Code, will be provided once the Maui County Council has approved the 201H-38 application. However, our Department does feel that the planned community of Waiehu Mauka would greatly benefit from a neighborhood park.

Please feel free to contact Karla Peters, Parks Project Manager, at 270-7981 should you have any questions.

Sincerely,

TAMARA HORCAJO
Director

TH:PTM:kp

c: Lori Tsuhako, Director of Housing and Human Concerns
Patrick Matsui, Chief of Parks Planning and Development
Project Files

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 23, 2009

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

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Ms. Horcajo:

Thank you for your letter of December 8, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments.

We acknowledge your comments regarding the proposed exemption from Section 18.16.320, Maui County Code. A copy of your letter has been forwarded to the project architect for consideration. Open areas within the project site will be used by residents to the extent possible for passive recreational purposes.

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group
Lori Tsuhako, Department of Housing and Human Concerns
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CHARMAINE TAVARES
Mayor

JEFFREY S. HUNT
Director

KATHLEEN ROSS AOKI
Deputy Director

COUNTY OF MAUI
# DEPARTMENT OF PLANNING

December 7, 2009

Ms. Lori Tsuhako, LSW, ACSW, Director
Department of Housing and Human Concerns
200 South High Street, Suite 400
Wailuku, Hawaii 96793

Dear Ms. Tsuhako:

**SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT PREPARED FOR THE WAIEHU MAUKA AFFORDABLE HOUSING PROJECT, AT WAILUKU, ISLAND OF MAUI, HAWAII; TMK: (2) 3-3-001:110 AND 016 (PORTION) (RFC 2009/0269)**

The Department of Planning (Department) has received a Draft Environmental Assessment (DEA) prepared in support of the Waiehu Mauka Affordable Housing Project. We appreciate the opportunity to provide the comments below. The Department is separately providing comments on a "Preliminary Application for Affordable Housing Development Pursuant to Section 201H-38, Hawaii Revised Statutes". Please refer to that separate letter during your review of the comments submitted on the DEA below:

1. The Sheet A4 rendering in Appendix 4. to the DEA depicts substantial retaining walls, which could pose some level of aesthetic impact, at least internally to the project. We appreciate the challenging nature of the site topography, particularly on the edges of the development area and that the site design will most likely undergo further iterations before final engineered designs are completed. During this process, please attempt to work with the site to minimize the use of retaining walls relative to those depicted on the rendering;

2. As best we can interpret the proposed site plan, the preferred access off of Kahekili Highway would add 100 Multi-Family residential units with only one access driveway. This could become a safety issue if an event were to close off this driveway access from vehicular or pedestrian traffic. To mitigate this potential impact, please add a permanent emergency vehicle access between the affordable project and Lots 3 and 4 to connect with the new Haunani Street cul-de-sac, as well as a permanent bicycle and pedestrian access in this same location;

3. The Department prefers to advance positions regarding the proposed State Land Use District Boundary Amendment (DBA) which are consistent with determinations made by the Maui County Council (Council) relative to the project. Therefore, the Department hopes to be able to reserve further comments upon the DBA and the more qualitative aspects of the DEA's "Comments" on the project's relationship to

standards for the State Urban Land Use District to such time after the Council has made their key determinations regarding the overall proposed project. However, if a DBA petition is filed and requires comment before action by the Council, the Department will at that time provide its independent comments upon such a petition and the basic subject matter of the DEA's Section III. B.;

4. For reasons similar to those in the comment immediately above, the Department prefers to reserve comment upon the consistency of the proposed project with the Hawaii State Plan and state functional plans cited in the DEA until after local determinations have first been made regarding the project by the Council; and

5. For comments upon the proposed project's relationship to the Maui County General and Community Plans please see the accompanying letter commenting upon the Preliminary Application for Affordable Housing Development Pursuant to Section 201H-38.

Thank you for the opportunity to comment. Should you need additional clarification of these comments or the DEA process, please contact Current Planning Supervisor Jeffrey Dack at jeffrey.dack@mauicounty.gov or at (808) 270-6275.

Sincerely,

JEFFREY S. HUNT, AICP
Planning Director

xc: Clayton I. Yoshida, AICP, Planning Program Administrator
John F. Summers, Planning Program Administrator
Jeffrey P. Dack, AICP, Current Planning Supervisor
Milton Arakawa, Director, Department of Public Works
Gary Yabuta, Chief of Police
Jeffrey A. Murray, Fire Chief
Brian Moto, Corporation Counsel
Michael Hopper, Deputy Corporation Counsel
Office of State Planning
State Land Use Commission
Carol Matasci, Munekiyo & Hiraga, Inc.
State Land Use Commission
Project File
General File

JSH:JPD:vb
K:\WP_DOCS\PLANNING\RFC\2009\0269_WAIEHUMAUKA201HAPP&DEA\DEA_COMMENTS.DOC

CHARMAINE TAVARES
Mayor

JEFFREY S. HUNT
Director

KATHLEEN ROSS AOKI
Deputy Director

COUNTY OF MAUI
# DEPARTMENT OF PLANNING

December 7, 2009

Ms. Lori Tsuhako, LSW, ACSW, Director
Department of Housing and Human Concerns
200 South High Street, Suite 400
Wailuku, Hawaii 96793

Dear Ms. Tsuhako:

**SUBJECT: 201H-38, HAWAII REVISED STATUTES (HRS) PRELIMINARY APPLICATION FOR WAIEHU MAUKA AFFORDABLE HOUSING PROJECT, AT WAILUKU, MAUI, HAWAII; TMK(S): (2) 3-3-001:110 AND 016 (PORTION) (RFC 2009/0269)**

The Department of Planning (Department) has received a "Preliminary Application for Affordable Housing Development Pursuant to Section 201H-38, Hawaii Revised Statutes" (application), which includes as its Section 3. a "Draft Environmental Assessment (DEA)". The Department is separately providing comments on the DEA. Please refer to that separate letter during your review of the comments submitted below on the application itself. The Department appreciates the opportunity to provide the following comments on the application:

1. The project appears consistent with the 1990 update of the Maui County General Plan, particularly the policies supporting the provision of affordable housing in the region;

2. The area proposed for development is identified on the Wailuku-Kahului Community Plan map as Single-Family Residential. Given that the affordable component of the project is composed of Multi-Family residential housing, it is not consistent with this designation. The Section 201-H application would not change any Community Plan land use boundaries and instead would request a waiver from the limitations of the Community Plan. However, the project is targeted to address one of the major problems of the region as identified in the Community Plan, "Lack Of Affordable Housing". The project is also supportive of the following related Community Plan goal, objectives, policies, and implementing actions:

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

Objectives and Policies

2. 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; and

3. 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.

Implementing Actions

1. 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; and

2. 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.

3. Section 3.F. of the DEA states that the project is in keeping with the following Objective and Policy of the Community Plan:

   "Promote efficient housing designs in order to reduce residential home energy and water consumption."

   Please identify provisions of the housing design which demonstrate fulfillment of this provision.

4. The project is within the urban growth area of the draft Maui Island Plan, as recommended by the General Plan Advisory Committee, the Maui Planning Commission and the Department.

5. The project will most likely include a substantial number of families with young children. No playground facilities are apparent on the site plan. Please provide such facilities, particularly to meet the needs of children who may not be able to take easy

advantage of play facilities at the schools nearby. A good candidate site for such facilities would be in the open area nearby the laundry and building 20D.

Thank you for the opportunity to comment on this project, which the Department generally supports as a valuable contribution to meeting the affordable housing needs of the Wailuku-Kahului region. If additional clarification is required, please contact me at any time or contact Current Planning Supervisor Jeffrey Dack at jeffrey.dack@mauicounty.gov or at (808) 270-6275.

Sincerely,

JEFFREY S. HUNT, AICP
Planning Director

xc: Mayor Charmaine Tavares, County of Maui
Clayton I. Yoshida, AICP, Planning Program Administrator
John F. Summers, Planning Program Administrator
Jeffrey P. Dack, AICP, Current Planning Supervisor
Milton Arakawa, Director, Department of Public Works
Brian Moto, Corporation Counsel
Michael Hopper, Deputy Corporation Counsel
Office of State Planning
State Land Use Commission
Carol Matasci, Munekiyo & Hiraga, Inc.
Project File
General File

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MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Jeffrey S. Hunt, AICP, Director
**Department of Planning**
County of Maui
250 South High Street
Wailuku, Hawai'i 96793

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Hunt:

Thank you for your two (2) letters of December 7, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments on the Draft EA, followed by your comments on the 201H Application.

We would like to clarify that the project is located on TMK Nos. (2) 3-3-001:102 and 016 (por.). The project does not include any lands identified by TMK No. (2) 3-3-001:110.

## ***RESPONSE TO DRAFT EA COMMENTS***

### *1. Retaining Walls*

Your comments on the aesthetic impacts of onsite retaining walls have been forwarded to the project architect. The retaining walls will be reviewed with the grading requirements and restrictions of the project site to ensure that they are appropriately designed.

### *2. Access to Multi-Family Portion*

Due to an existing grade differential between the multi-family portion and the single-family portion of the Waiehu Mauka project, an accessway between the two sections is not feasible. We note that Lokahi Pacific held a community meeting with Waiehu Heights and Waiehu Terrace residents to receive their

feedback on the project. These neighbors to the project expressed their preference that the 100 multi-family units not have an accessway through Waiehu Heights. Lokahi Pacific believes that neighborhood concerns regarding added pedestrian traffic through local residential areas is worthy of respect.

3. ***State Land Use District Boundary Amendment (DBA)***

The applicant acknowledges that the Department of Planning (Department) will reserve further comments relevant to the State Urban Land Use District until the Maui County Council (Council) has acted on the proposed Waiehu Mauka project.

4. ***Hawaii State Plan and State Functional Plans***

The applicant acknowledges that the Department will reserve further comments relevant to the Hawaii State Plan and state functional plans until the Council has acted on the proposed Waiehu Mauka project.

5. ***Maui County General Plan, 1990 Update***

The applicant acknowledges that the Waiehu Mauka project is consistent with the 1990 update of the Maui County General Plan, especially with policies regarding affordable housing.

***RESPONSES TO SECTION 201H APPLICATION***

1. ***Maui County General Plan***

Lokahi Pacific acknowledges the Planning Department's analysis of the project's consistency with the Maui County General Plan.

2. ***Wailuku-Kahului Community Plan***

The applicant acknowledges your comments regarding the Wailuku-Kahului Community Plan that the project is requesting a waiver from obtaining a Community Plan Amendment and that the project is consistent with housing goals, objectives, policies, and implementing actions of the plan.

### 3. *Efficient Housing Design*

The proposed Waiehu Mauka project is designed with the following measures intended to reduce residential home energy and utility use:

- 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.
- 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.

### 4. *Draft Maui Island Plan*

The applicant acknowledges that the proposed project is within the urban growth area of the draft Maui Island Plan, as recommended by the General Plan Advisory Committee, the Maui Planning Commission, and the Department.

### 5. *Playground Facilities*

Lokahi Pacific is seeking an exemption from Section 18.16.320, Maui County Code, to exempt the project from the payment of park and playground fees. The area suggested which is nearby the laundry and building 20D may be unsuitable for a playground facility due to the topographical conditions of the site. A copy of your letter has been forwarded to the project architect for consideration and evaluation of that possibility. However, open areas within the project site will be used by residents to the extent possible for passive recreational purposes.

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group
Lori Tsuhako, Department of Housing and Human Concerns
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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

October 23, 2009

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

Dear Ms. Matasci:

**SUBJECT: ENVIRONMENTAL ASSESSMENT FOR PROPOSED WAIEHU MAUKA RESIDENTIAL PROJECT; TMK: (2) 3-3-001:102 AND 016 (POR.)**

We reviewed your responses to the comment letter dated May 8, 2008 and have the following to add at this time:

1. In regards to Comment No. 2, it was not the Spreckels Ditch that we made reference to, but a drainage way that is approximately 1,000 feet north of Makaala Drive that flows towards Waiehu Beach Road. Where this drainage way is in relation to their driveway/project is what we would like to ascertain.

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:jc
xc: Highways Division
Engineering Division
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MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Milton M. Arakawa, AICP, Director
**Department of Public Works**
County of Maui
200 South High Street, #434
Wailuku, Hawai`i 96793

SUBJECT: Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Arakawa:

Thank you for your letter dated October 23, 2009, providing comments on the Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments.

In consultation with the project engineer, we believe that the drainageway in question is approximately 30 to 40 feet north of the proposed project driveway and the existing access easement. The ED 48" pipe crossing Kahekili Highway and the approximate location of the existing drainageway are delineated on the attached Exhibit "A".

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineers, Inc.
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305 High Street, Suite 104 •Wailuku, Hawaii 96793 •ph: (808)244-2015 •fax: (808)244-8729 •planning@mhplanning.com www.mhplanning.com

planning environment government

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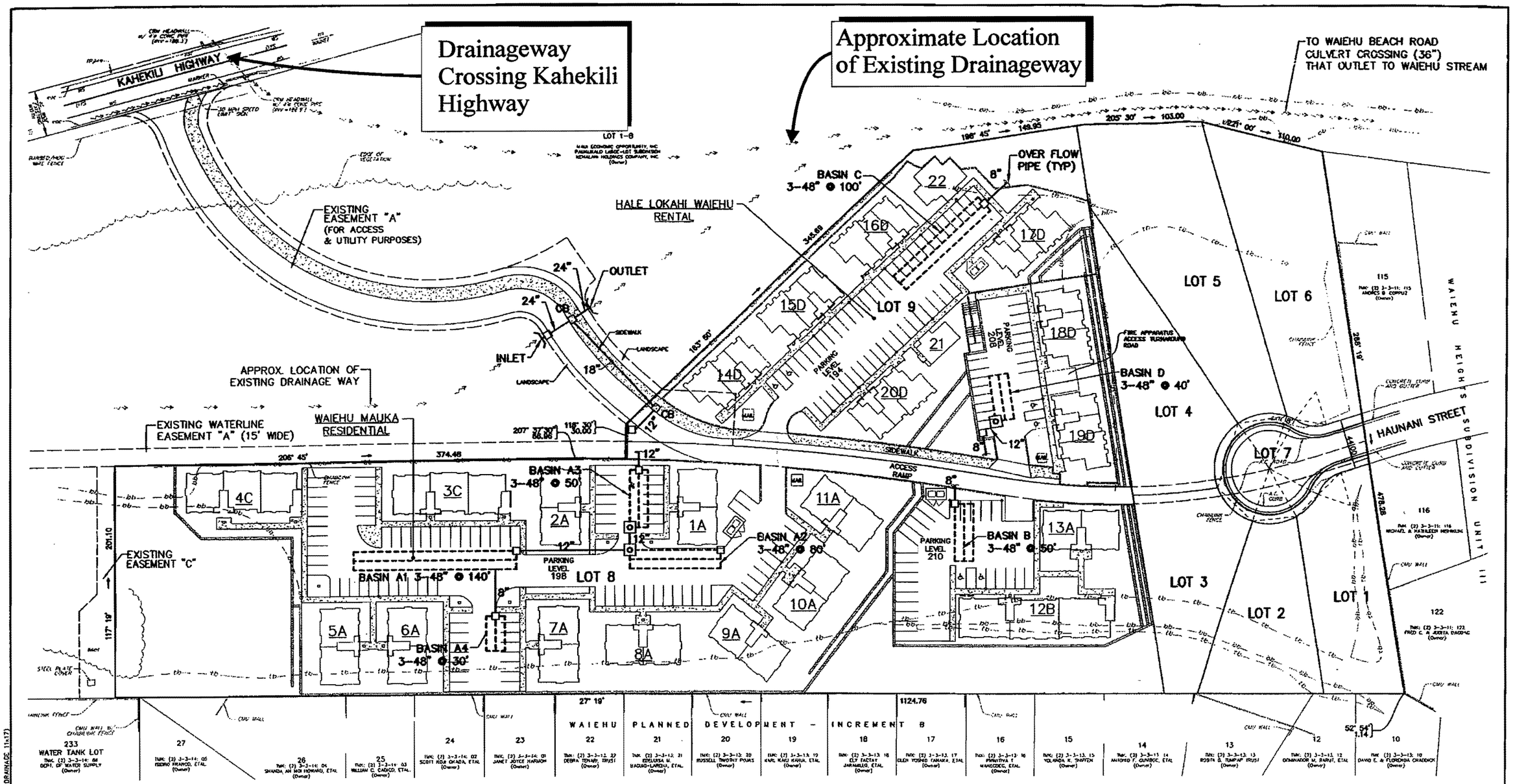


## LEGEND AND ABBREVIATIONS:

- EXISTING DRAIN MANHOLE
- EXISTING DRAINLINE
- PROPOSED DRAIN MANHOLE
- PROPOSED DRAIN INLET UNLESS NOTED (CB-CATCH BASIN)
- 8" PROPOSED DRAINLINE
- PROPOSED SUBSURFACE PERFORATED PIPE

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

# CONCEPTUAL DRAINAGE SYSTEM LAYOUT

## FOR

# WAIEHU MAUKA

## AT WAIEHU, MAUI, HAWAII

**NOTE:**

SEE FIGURE 16 FOR TYPICAL SECTION OF SUBSURFACE RETENSION BASIN.

FIGURE 15

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS
871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

JANUARY 07, 2009
JOB NO. 08-040

Drawn by: J.C. FB4897/25-40 "PACRIM.CRO" (DRAINAGE 11x17)

# EXHIBIT "A"

CHARMAINE TAVARES
Mayor

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

MICHAEL M. MIYAMOTO
Deputy Director

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

DEC 0 7 2009

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

December 2, 2009

Ms. Carol Matasci
MUNEKIYO & HIRAGA, INC.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Matasci:

**SUBJECT: PRELIMINARY 201H APPLICATION AND DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED WAIEHU MAUKA AFFORDABLE HOUSING PROJECT; TMK (2) 3-3-001:102 AND 016 (POR.)**

We reviewed the subject application and have the following comments:

1. The applicant shall be responsible for all required improvements as required by Hawaii Revised Statutes, Maui County Code and rules and regulations.

2. As applicable, construction plans shall be designed in conformance with Hawaii Standard Specifications for Road and Bridge Construction dated 2005 and Standard Details for Public Works Construction, 1984, as amended.

3. As applicable, worksite traffic-control plans/devices shall conform to Manual on Uniform Traffic Control Devices for Streets and Highways, 2003.

4. Improvements such as acceleration/deceleration and left turn storage lanes should be considered at driveway entrance with Kahekili Highway. Also, regional impacts must be evaluated in the event Imi Kala bridge and roadway extension are not constructed.

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: Lori Tsuhako, LSW, ACSW, Director of Housing and Human Concerns
Highways Division
Engineering Division
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MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Milton M. Arakawa, AICP, Director
**Department of Public Works**
County of Maui
200 South High Street, #434
Wailuku, Hawai`i 96793

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Arakawa:

Thank you for your letter of December 2, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments.

1. Through the 201H process, the applicant is seeking exemptions from certain development-related rules, regulations, standards, and ordinances which do not negatively affect health and safety. These proposed exemptions are subject to approval by the Maui County Council. The applicant acknowledges that they will be responsible for all required improvements that are required by Hawaii Revised Statutes, Maui County Code, and rules and regulations, and as approved by the Maui County Council.

2. The applicant acknowledges that construction plans will be prepared as applicable in conformance with Hawaii Standard Specifications for Road and Bridge Construction, Standard Details for Public Works Construction, and as approved by the Maui County Council.

3. The applicant confirms that worksite traffic-control plans/devices will conform to Manual on Uniform Traffic Control Devices for Streets and Highways, dated 2003.

4. Your comment regarding consideration of acceleration/deceleration and left-turn storage lanes at the driveway entrance with Kahekili Highway has been forwarded to the project's traffic engineer. Coordination with the Department of Public Works will be undertaken prior to and during the engineering design phase of work to ensure that intersection upgrade requirements are appropriately addressed.

   Lokahi Pacific recognizes that there are significant regional traffic concerns. Lokahi Pacific seeks to work with Waiehu Mauka neighbors and area residents as well as agencies, such as the Department of Public Works, to discuss and pursue solutions to regional traffic and pedestrian safety issues.

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineers, Inc.
David Lundquist, Maui Architectural Group
Phil Rowell, Phillip Rowell & Associates
Lori Tsuhako, Department of Housing and Human Concerns
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COPY

# POLICE DEPARTMENT
COUNTY OF MAUI

CHARMAINE TAVARES
MAYOR

OUR REFERENCE

YOUR REFERENCE

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

GARY A. YABUTA
CHIEF OF POLICE

CLAYTON N.Y.W. TOM
DEPUTY CHIEF OF POLICE

November 25, 2009

Ms. Lori Tsuhako, LSW, ACSW
Director
Department of Housing and Human Concerns
County of Maui
2200 Main Street, Suite 546
Wailuku, HI 96793

Dear Ms. Tsuhako:

SUBJECT: Preliminary 201H Application and DEA for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.)

This is in response to your memo dated November 4, 2009, requesting comments on the above subject.

We have reviewed the information submitted for this project. Please refer to a copy of the to/from submitted by Sergeant Stephen Orikasa of our Wailuku Patrol Division.

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

Sincerely,

Assistant Chief Danny J. Matsuura
for: Gary A. Yabuta
Chief of Police

c: Mr. Jeffrey Hunt, Planning Dept.
Ms. Carol Matasci, Munekiyo & Hiraga, Inc.

Enclosure

COPY

TO : GARY YABUTA, CHIEF OF POLICE, COUNTY OF MAUI

VIA : CHANNELS Concur Ac D. Matsuura 11/29/09

FROM : STEPHEN ORIKASA, ADMINISTRATIVE SERGEANT, WAILUKU PATROL DIVISION

SUBJECT : RESPONSE TO A REQUEST FOR COMMENTS REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED WAIEHU MAUKA AFFORDABLE HOUSING PROJECT

This communication is submitted as a response to a request for comments by County of Maui, Department of Housing and Human Concerns, Director, Lori Tsuhako in regards to the following subject;

SUBJECT : Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

**RESPONSE:**

In review of the submitted documents, the focus from the police perspective would be upon the safety of vehicular and pedestrian movement.

I concur with the findings of the prepared Traffic Impact Assessment Report (TIAR), which indicates the inundation of vehicular movement in the Waiehu area during peak hours. Not included in this report is the increased pedestrian movement from the increase in residential projects in the Waiehu/Waihee area. Much of this pedestrian movement is upon roadways which do not have improved shoulders, curbing or sidewalks. The combined increases only jeopardize the public safety.

To this I refer back to my response to a request for Early Consultation Comments by Munekiyo & Hiraga Inc., Planner, Rowena Dagdag, (attached) dated 05/01/08. In paragraph 3 of my response I indicated and immediate need for a coordinated effort to address the traffic congestion and pedestrian safety.

Respectfully submitted for your review and approval.

Stephen T. Orikasa E#716
Administrative Sergeant/Wailuku Patrol Division
11/25/09 @ 0800 Hours

Concur with Sgt. Orikasa's recommendations noted in his memo (dated 5/1/08). Pedestrian safety and roadway improvements need to be reviewed and addressed. Recommend approval at this time to proceed

Capt. J. Arip 8947
11/25/09 0900 Hrs.

**TO : THOMAS PHILLIPS, CHIEF OF POLICE, COUNTY OF MAUI**

**VIA : CHANNELS**

COPY

**FROM : STEPHEN ORIKASA, ADMINISTRATIVE SERGEANT, WAILUKU PATROL DIVISION**

**SUBJECT : RESPONSE TO REQUEST FOR EARLY CONSULTATION COMMENTS REGARDING THE PROPOSED WAIEHU MAUKA RESIDENTIAL PROJECT**

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** : (2) 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.

COPY

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

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Gary A. Yabuta, Chief
**Maui Police Department**
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Chief Yabuta:

Thank you for your letter of November 25, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments.

Lokahi Pacific recognizes that regional traffic and pedestrian safety issues are a significant concern. We understand that traffic congestion along Waiehu Beach Road and Kahekili Highway is particularly problematic during the morning peak travel hours. Lokahi Pacific's objective of providing needed affordable housing creates both challenges and opportunities to bring affordable housing needs and regional traffic concerns to the forefront of dialogue with County and State decision-makers. In this regard, Lokahi Pacific will work with Waiehu Mauka neighbors and area residents to discuss and pursue solutions to regional traffic and pedestrian safety issues. The formation of an Ad Hoc Committee to address these issues may be one option for establishing a coordinated basis for solution identification. Lokahi Pacific will explore this opportunity with community members and agencies.

We note that within the purview of Lokahi Pacific's project and programmatic responsibilities are the proposed use of Maui Economic Opportunity (MEO) transportation services and the provision of a sidewalk on the project access road. Lokahi Pacific utilizes MEO transportation in the majority of its projects, and this service will also reduce the pedestrian and traffic impacts of the Waiehu Mauka project. A sidewalk along the roadway connecting the 100 affordable housing units to Kahekili Highway is incorporated into the Waiehu Mauka project design for pedestrian safety.

environment planning government

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

Printed on Recycled Paper

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

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

December 7, 2009

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

Re: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project
TMK: 3-3-001:102 and 016 (por)

Dear Ms. Matasci:

Thank you for the opportunity to comment on this Draft Environmental Assessment (EA) and 201H Application. Please find attached our comment letter to this project dated March 16, 2009. We have the following additional comments:

**Source Availability and Consumption**
Demand for the proposed development would range between 35,590 gpd based on per acre standards to 62,600 gpd based on per unit system standards with potential for development of ohanas on lots larger than 12,000 square feet. The subdivision will be subject to the County's availability policy, codified in Title 14 of the Maui County Code. Chapter 14.12 does currently not exempt affordable housing projects from providing verification of a long term reliable source of water.

**System Infrastructure**
The project site is served by a 12-inch waterline and one fire hydrant at about 70 feet distance to the North. A 16-inch waterline traverses the property South to North. System improvements will be determined in the subdivision process.

**Conservation**
We note that exploration of non potable water for irrigation and use of native plants for landscaping as

applicable are proposed the Draft EA. We recommend that the additional conservation measures included in our March 16, 2009 letter be incorporated in the EA and implemented as well.

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

Sincerely,

Jeffrey K. Eng, Director
emb

c: engineering division
Lori Tsuhako, Department of Housing and Human Concerns

Attachment
DWS letter dated March 19, 2009

C:\EA EIS SLUD\Waiehu Mauka Affordable housing_201H App_DEA.wpd

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.

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 23, 2009

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

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. Eng:

Thank you for your letter of December 7, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments, in the order in which they were presented.

1. ***Source Availability and Consumption***

Through the 201H-38, HRS application process, Lokahi Pacific intends to seek an exemption from Chapter 14.12, Maui County Code, relating to water availability, subject to approval by the Maui County Council. Waiehu Mauka is a 94 percent affordable project, providing both for-sale condominiums and apartment rentals to those earning 120 percent and below of the area median income (AMI). The condominiums will be priced to be affordable to those earning 51 to 120 percent of the AMI; the apartments will be affordable to those earning 50 percent of the AMI and below. Given the affordable nature of the project, Lokahi Pacific does not have the resources to develop its own water source for the project. Lokahi Pacific would like to continue coordination with the Department of Water Supply regarding the provision of water for Waiehu Mauka.

2. ***System Infrastructure***

The applicant acknowledges that system improvements will be determined in the subdivision process.

3. ***Conservation***

Lokahi Pacific recognizes the importance of water conservation measures, and the value of water resources. Low-flow fixtures and devices will be incorporated into the project design. Other measures to be incorporated include regular repair and maintenance of water fixtures, automated irrigation systems, the use of non-potable water where available, the use of climate-adapted plants, and the elimination of single-pass cooling appliances, as appropriate.

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group
Lori Tsuhako, Department of Housing and Human Concerns
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NOV 13 2009

**Network Engineering and Planning**
**OSP Engineering - Maui**

November 10, 2009

**Hawaiian Telcom**

**60 South Church St.**
**Wailuku, HI 96793**
**Phone 808 242-5102**
**Fax 808 242-8899**

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

Attention: Carol Matasci

Subject: Proposed Waiehu Mauka Affordable Housing Project
TMK Nos. (2)3-3-001:102 and 016 (por.)

Dear Carol,

Thank you for allowing us to review and comment on the Preliminary 201H Application and Draft EA for the proposed subject project. Your plans have been received and put on file.

Hawaiian Telcom, Inc. has no comment, nor do we require any additional information at this time.

Should you require further assistance, please call me at 242-5107.

Sincerely,

Tom Hutchison
OSP Engineer

CC: Lynette Yoshida, Network Engineering Senior Manager
BICS File # 0804-041 (3080)

**Maui Electric Company, Ltd.** • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

NOV 13 2009

November 12, 2009

Ms. Carol Matasci
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Preliminary Application for Affordable Housing Development Pursuant to Section 201H-38, Hawai'i Revised Statues and Draft Environmental Assessment - Proposed Waiehu Mauka Affordable Housing Project
Kahekili Highway, Wailuku, Maui, Hawaii
Tax Map Key: (2) 3-3-001:016(por.) and 102

Dear Ms. Matasci,

Thank you for allowing us to comment on the Preliminary Application for Affordable Housing Development Pursuant to Section 201H-38, Hawai'i Revised Statues and the Draft Environmental Assessment for the subject project.

In reviewing our records and the information received, Maui Electric Company (MECO) has no additional comments to the subject project at this time.

Should you have any questions or concerns, please call me at 871-2340.

Sincerely,

Ray Okazaki

Ray Okazaki
Staff Engineer

c: Department of Housing and Human Concerns - Ms. Lori Tsuhako

# COMMENT FORM

## Proposed Waiehu Mauka Affordable Housing Project
## November 17, 2009 Community Meeting

Resident Name Shinyama Neal/Melanie Phone No. 2444821
Address 845 Kekoa Pl Alternate No. _____
Wailuku HI

Please write any comments you wish to share on the proposed project below. Comments received prior to December 8, 2009 will be included in the Final Environmental Assessment currently being prepared.

(1) Traffic is a tremendous problem - the only way for people to exit Waiehu Heights, Waiehu Terrace & Hawaiian Homes during peak traffic times is through the consideration of our neighbors allowing us to exit.
(2) Waihee School is extremely crowded.
(3) Density of this project will only add to the above 2 items.
(4) If measures are taken to remedy the above then the project will address some of our affordable housing problems & provide homes to deserving families. This is to be commended.
(5) However, can perhaps density be lowered? - Kamaole estimated 300 people - can this be reduced?

Please submit your comments by the end of the meeting or, if you wish, you may mail your comments to:

Carol Matasci, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Should you have any questions, please feel free to contact Carol by phone at (808) 244-2015, or by email at carol@mhplanning.com.

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## Carol Matasci

**From:** Shinyamafamily [shinyaman001@hawaii.rr.com]
**Sent:** Tuesday, November 17, 2009 8:17 PM
**To:** Carol Matasci
**Subject:** Comments-Waiehu Mauka AHP

Hi,

One more comment in addition to the written ones that I turned in at tonight's meeting:

Kirk Tanaka mentioned that there would be about 180 parking stalls-not quite 2 stalls per unit. Will this be enough parking? Where will the cars that do not have a stall go?

Again, can the density of this project be reduced?

Thank you,
Melanie Shinyama
845 Kekoa Place
Wailuku HI 96793

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Neal and Melanie Shinyama
845 Kekoa Place
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. and Mrs. Shinyama:

Thank you for your letter and separate email, both of November 17, 2009, providing comments on the Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments, in the order they were presented.

1. As you and other members of nearby neighborhoods have explained, regional traffic issues are a significant concern. We understand that traffic congestion along Waiehu Beach Road and Kahekili Highway is particularly problematic during the morning peak travel hours. Lokahi Pacific's objective of providing needed affordable housing creates both challenges and opportunities to bring affordable housing needs and regional traffic concerns to the forefront of dialogue with County and State decision-makers.

   As you can appreciate, the proposed Waiehu Mauka project is not in a position to fund mitigation measures addressing existing roadway congestion conditions affecting the Waihee, Waiehu, Waiehu Heights, and Waiehu Terrace communities. Nonetheless, Lokahi Pacific recognizes that long-standing traffic issues affecting neighborhoods such as yours also require timely attention. In pursuing the Waiehu Mauka project, Lokahi Pacific seeks to work with its neighbors and, to the extent possible, jointly call attention to the need to prioritize roadway projects which will bring relief to residents affected by traffic congestion. Towards this end, through the Chapter 343, HRS Environmental Assessment and Section 201H application processes, Lokahi Pacific is willing to join with representatives of your communities in helping to raise awareness of regional traffic issues, with a goal of securing State

and County cooperation in identifying and implementing workable region-wide traffic solutions.

In summary, Lokahi Pacific does not view separate efforts and possible conflicting objectives to be productive in the context of meeting affordable housing needs and achieving regional traffic solutions. With this in mind, we would like to suggest the creation of an Ad Hoc Committee consisting of residents and Lokahi Pacific representatives be formed to discuss ways in which both objectives can be positively pursued.

We hope that a collaborative initiative such as this will ultimately lead to action steps which can be favorably considered by State and County officials who seek to bring about the best for those needing shelter and those experiencing difficult traffic conditions.

A representative of Lokahi Pacific will contact you to further discuss this opportunity.

2. Consultation with the State of Hawaii, Department of Education (DOE) is ongoing regarding the proposed Waiehu Mauka project. The DOE has received a copy of the Draft Environmental Assessment. We note that as an affordable housing project, Lokahi Pacific has not received funding set-asides for school facilities upgrades. Lokahi Pacific recognizes the importance of quality education for all children, and looks forward to working with DOE and Maui's State legislative representatives in seeking solutions to improve conditions at schools in the Baldwin High School complex.

3. The project's plan to provide a total of 100 affordable units is based on Lokahi Pacific's desire to provide much needed housing to those families who most need shelter; that is those families earning 50 percent or less of the area median income (for rental units) and 51 percent to 120 percent of the area median income for the for-sale condominium units. The 100 units have been programmatically established through the various project funding mechanisms. However, as noted above, Lokahi Pacific seeks to work with its neighbors to ensure that affordable housing needs can be met while recognizing that opportunities for collaboration can be directed towards addressing regional traffic concerns, which will benefit current residents.

4. We appreciate your comments regarding the need for addressing affordable housing for Maui families. In this context, we look forward to working with you and other residents towards a common objective of identifying action steps needed to solve regional traffic issues.

5. 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. Based on vehicle ownership patterns for the target group of families, Lokahi Pacific believes that parking provided by the project will be adequate. Lokahi Pacific utilizes transportation provided by Maui Economic Opportunity (MEO) for the majority of its projects. Waiehu Mauka residents will utilize MEO transportation as well.

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
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**Carol Matasci**

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**From:** Joan Tsuji [jmtsuji@yahoo.com]
**Sent:** Sunday, December 06, 2009 3:07 PM
**To:** Carol Matasci
**Subject:** Waiehu Mauka Proposal - Concerns

Aloha Carol:

The Munekiyo-Hiraga company is well-respected in the community and we're glad to hear that there is a good chance for a new development to help in this depressed economy. For the most part, the proposed Waiehu Mauka Project sounds good, with good intentions. However, we do have some concerns about traffic, school/resources and its property managment. Here are our concerns about the proposed Waiehu Mauka Affordable Housing Project.

1) Access to project: Despite current plans to have current market priced homes only accessible via Haunani Street, we'd like the assurance that plans won't change and somehow connect to the affordable housing. Haunani would not be able to handle thorough-fare traffic.

2) What impact would six new homes have on Haunani? Should parking be only on one side of that street? It is alread congested - need to see it at various times of the day.

3) How do you control how many vehicles per home? (I don't know how you could enforce that, but other areas of the heights have this problem of 3-4 households per property with 5-8 cars jamming their driveway & spilling out to the street.)

4) How would added housing affect traffic? Traffic signal needed at intersection of Kahekili Hwy & Waiehu Beach Road? If so, also need warning lights & those round rumble bumps (or whatever you call it) so people slow down in anticipation of the light...people often speed down the highway.

5) Affect on Waihe'e School? Is developer assisting school for added classrooms?

6) Ensure kids don't climb over to Haunani to access public bus routes in Waiehu Heights - fence/walls? And vice versa?

7) Be sure the affordable housing complex have a large enough turnaround section for school bus to circle through to pick up students and/or passengers. A hundred units would mean up to 400 more people in the area?

8) How can the developer assure community that the affordable housing complex has a quality management company to monitor the property? Include Security Patrol?

Thank you for giving the community the opportunity to comment about the project. Best wishes.

Mahalo,
Keith & Joan Tsuji
918 Anohea Way
Wailuku, HI 96793
(808) 242-4128

MUNEKIYO & HIRAGA, INC.

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

MARK ALEXANDER ROY

December 10, 2009

Keith and Joan Tsuji
918 Anohea Way
Wailuku, Hawaii 96793

SUBJECT: Preliminary 201H Application and Draft Environmental Assessment (EA) for the Proposed Waiehu Mauka Affordable Housing Project (TMK Nos. (2) 3-3-001:102 and 016 (por.))

Dear Mr. and Mrs. Tsuji:

Thank you for your email of December 6, 2009, providing comments on the Preliminary 201H Application and Draft Environmental Assessment (EA) for the proposed Waiehu Mauka Affordable Housing Project. On behalf of the applicant, Lokahi Pacific, we offer the following information in response to your comments.

***Project Access***

The affordable housing units will not be connected in the future to Haunani Street. The topography between the six (6) single-family lots on Haunani Street and the affordable housing units is very steep, and roadway access between the two (2) sections is not physically feasible. We understand that Haunani Street would not be able to handle the traffic from the whole project.

***Impacts to Haunani Street***

We understand that excessive parking on the street is a concern in the vicinity of Haunani Street. Pacific Rim Land, Inc. anticipates that there will be covenants, conditions, and restrictions (CC&Rs) associated with the six (6) single-family lots at the end of Haunani Street. Your comments regarding street parking and the number of vehicles per home will be taken into consideration during the process of developing those CC&Rs.

There will be fencing between the affordable housing units and the six (6) single-family lots to discourage trespassing onto private property in Waiehu Heights. There will be no improved accessway for either vehicles or pedestrians from the multi-family units to Haunani Street.

***Traffic***

As you and other members of nearby neighborhoods have explained, regional traffic issues are a significant concern. We understand that traffic congestion along Waiehu Beach Road and Kahekili Highway is particularly problematic during the morning peak travel hours. Lokahi Pacific's objective of providing needed affordable housing creates both challenges and opportunities to bring affordable housing needs and regional traffic concerns to the forefront of dialogue with County and State decision-makers.

As you can appreciate, the proposed Waiehu Mauka project is not in a position to fund mitigation measures addressing existing roadway congestion conditions affecting the Waihee, Waiehu, Waiehu Heights, and Waiehu Terrace communities. Nonetheless, Lokahi Pacific recognizes that long-standing traffic issues affecting neighborhoods such as yours also require timely attention. In pursuing the Waiehu Mauka project, Lokahi Pacific seeks to work with its neighbors and, to the extent possible, jointly call attention to the need to prioritize roadway projects which will bring relief to residents affected by traffic congestion. Towards this end, through the Chapter 343, HRS Environmental Assessment and Section 201H application processes, Lokahi Pacific is willing to join with representatives of your communities in helping to raise awareness of regional traffic issues, with a goal of securing State and County cooperation in identifying and implementing workable region-wide traffic solutions.

In summary, Lokahi Pacific does not view separate efforts and possible conflicting objectives to be productive in the context of meeting affordable housing needs and achieving regional traffic solutions. With this in mind, we would like to suggest the creation of an Ad Hoc Committee consisting of residents and Lokahi Pacific representatives be formed to discuss ways in which both objectives can be positively pursued.

We hope that a collaborative initiative such as this will ultimately lead to action steps which can be favorably considered by State and County officials who seek to bring about the best for those needing shelter and those experiencing difficult traffic conditions.

A representative of Lokahi Pacific will contact you to further discuss this opportunity.

***Waihee School***

Consultation with the State of Hawaii, Department of Education (DOE) is ongoing regarding the proposed Waiehu Mauka project. The DOE has received a copy of the Draft Environmental Assessment. We note that as an affordable housing project, Lokahi Pacific has not received funding set-asides for school facilities upgrades. Lokahi Pacific recognizes the importance of quality education for all children, and looks forward to working with DOE and Maui's State legislative representatives in seeking solutions to improve conditions at schools in the Baldwin High School complex.

***Bus Turnaround***

Lokahi Pacific supports the use of public transportation to decrease traffic congestion and provide multiple transportation opportunities for its residents. Lokahi Pacific is provided with a 44-foot wide access easement from Kahekili Highway to the multi-family units. The land on which the easement is located in is owned by Kehalani Holdings Company, Inc. This easement is not large enough to fit a bus turning circle at the Waiehu Mauka driveway entrance. Placing the turning circle onsite would require a reduction in the number of affordable units built. However, access by smaller school bus vehicles may be feasible. Lokahi Pacific will work with the DOE to ensure that the school bus needs of Waiehu Mauka residents will be met.

***Property Management***

Lokahi Pacific will manage the Waiehu Mauka affordable housing units. There will be a residential manager living onsite. You are invited to visit Lokahi Pacific's other projects to see how this system works. For more information, please contact Lokahi Pacific at 242-5761.

Thank you again for your input on the Waiehu Mauka Affordable Housing Project.

Very truly yours,

Carol Matasci

Carol Matasci, Planner

CM:lh
cc: Kamaile Sombelon, Lokahi Pacific
John Maloney, Pacific Rim Land, Inc.
Kirk Tanaka, R.T. Tanaka Engineers, Inc.
David Lundquist, Maui Architectural Group
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# XI. REFERENCES

# XI. REFERENCES


Chinen, Jon, The Great Mahele: Hawaii's Land Division of 1848, Honolulu: University of Hawaii P, 1958.

County of Maui, The General Plan of the County of Maui, September 1990 Update.

County of Maui, Department of Planning, Socio-Economic Forecast, June 2006.

County of Maui, Wailuku-Kahului Community Plan, 2002.

County of Maui, Office of Economic Development, Maui County Data Book 2006, December 2006.

Federal Emergency Management Agency, Flood Insurance Rate Map, Community Panel No. 150003 0383E.

Handy, E.S. Craighill and Elizabeth Green Handy, with collaboration of Mary Kawena Pukui, Native Planters in Old Hawaii, Their Life, Lore, and Environment, Bernice P. Bishop Museum Bulletin 233, 1972.

Hawaii Cooperative Park Service Unit, Hawaii Stream Assessment, December 1990.

Hawaii Workforce Informer, Unemployment Rates and Charts, December 2009.

Labor and Occupational Information Hawaii, State Department of Labor and Industrial Relations, http://www.state.hi.us/dlir/rs/loihi/

Mackenzie, Melody Kapiliaoloha, ed., Native Hawaiian Rights Handbook, Honolulu: Native Hawaiian Legal Corporation, 1991.

Minerbi, Luciano et. al., Native Hawaiian and Local Cultural Assessment Project, Honolulu: University of Hawaii at Manoa, 1993.

Realtors Association of Maui, Inc., http://www.mauiboard.com, 2009.

R.M. Towill Corporation, Public Facilities Assessment Update, March 2007.

Titchenal, Paul, Archeological Inventory Survey of the Proposed Retention Basin and Adjoining Lands Waikapu and Wailuku Ahupua'a, Wailuku District, Maui Island, Aki Sinoto Consulting, 1996.

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

University of Hawaii at Hilo, Department of Geography, Atlas of Hawaii, Third Edition, 1998.

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

## DRAWING INDEX


T1 TITLE SHEET
A0 SITE PLAN
A0.1 SITE SECTIONS
A0.2 SITE SECTIONS
A0.3 SITE SECTIONS

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


## PARKING SUMMARY

**LOKAHI WAIEHU MAUKA CONDOS**

TOTAL NO. OF UNITS = 58 x 2 = **116 STALLS REQUIRED**

| | |
|---|---|
| ACCESSIBLE STALLS | 4 |
| VAN STALLS | 2 |
| STANDARD STALLS | 118 |
| **TOTAL PARKING PROVIDED** | **124** |

**LOKAHI WAIEHU MAUKA RENTALS**

TOTAL NO. OF 1 BEDROOM UNITS = 28 x 1 = 28
TOTAL NO. OF 2 BEDROOM UNITS = 14 x 2 = 28
28 STALLS + 28 STALLS = **56 STALLS REQUIRED**

| | |
|---|---|
| VAN STALLS | 4 |
| COMPACT STALLS | 8 |
| STANDARD STALLS | 52 |
| **TOTAL PARKING PROVIDED** | **64** |

## LOKAHI WAIEHU MAUKA CONDOS

**LOT COVERAGE SUMMARY**

| BLDG. TYPE | GROUND FLOOR | NO. OF BLDGS. | BLDG. SQ. FTG. |
|---|---|---|---|
| A | 2,184 SF | 10 | 21,840 SF |
| B | 4,068 SF | 1 | 4,068 SF |
| C | 3,276 SF | 2 | 6,522 SF |
| | | | 32,460 SF |

LOT AREA 181,842

MAX. LOT COVERAGE (not to exceed 25% of lot area) **45,461 SF**
ACTUAL LOT COVERAGE (18% of lot area) **32,460 SF**

**UNIT & BLDG. SQ. FOOTAGE SUMMARY**

| BLDG. NO. | UNIT COUNT | BLDG. SQ. FTG. |
|---|---|---|
| 1A | 4 | 4,592 SF |
| 2A | 4 | 4,592 SF |
| 3C | 6 | 6,902 SF |
| 4C | 6 | 6,902 SF |
| 5A | 4 | 4,592 SF |
| 6A | 4 | 4,592 SF |
| 7A | 4 | 4,592 SF |
| 8A | 4 | 4,592 SF |
| 9A | 4 | 4,592 SF |
| 10A | 4 | 4,592 SF |
| 11A | 4 | 4,592 SF |
| 12B | 6 | 8,466 SF |
| 13A | 4 | 4,592 SF |
| **13** | **58** | **68,190 SF** |

MAX. LOT COVERAGE (not to exceed 40% of lot area) **72,737 SF**
GROSS BUILDING FLOOR AREA (37% of lot area) **68,190 SF**

## LOKAHI WAIEHU MAUKA RENTALS

**LOT COVERAGE SUMMARY**

| BLDG. TYPE | GROUND FLOOR | NO. OF BLDGS. | BLDG. SQ. FTG. |
|---|---|---|---|
| D | 2,081 SF | 7 | 14,567 SF |
| LAUNDRY | 740 SF | 1 | 740 SF |
| MEETING | 1,143 SF | 1 | 1,143 SF |
| | | | 16,450 SF |

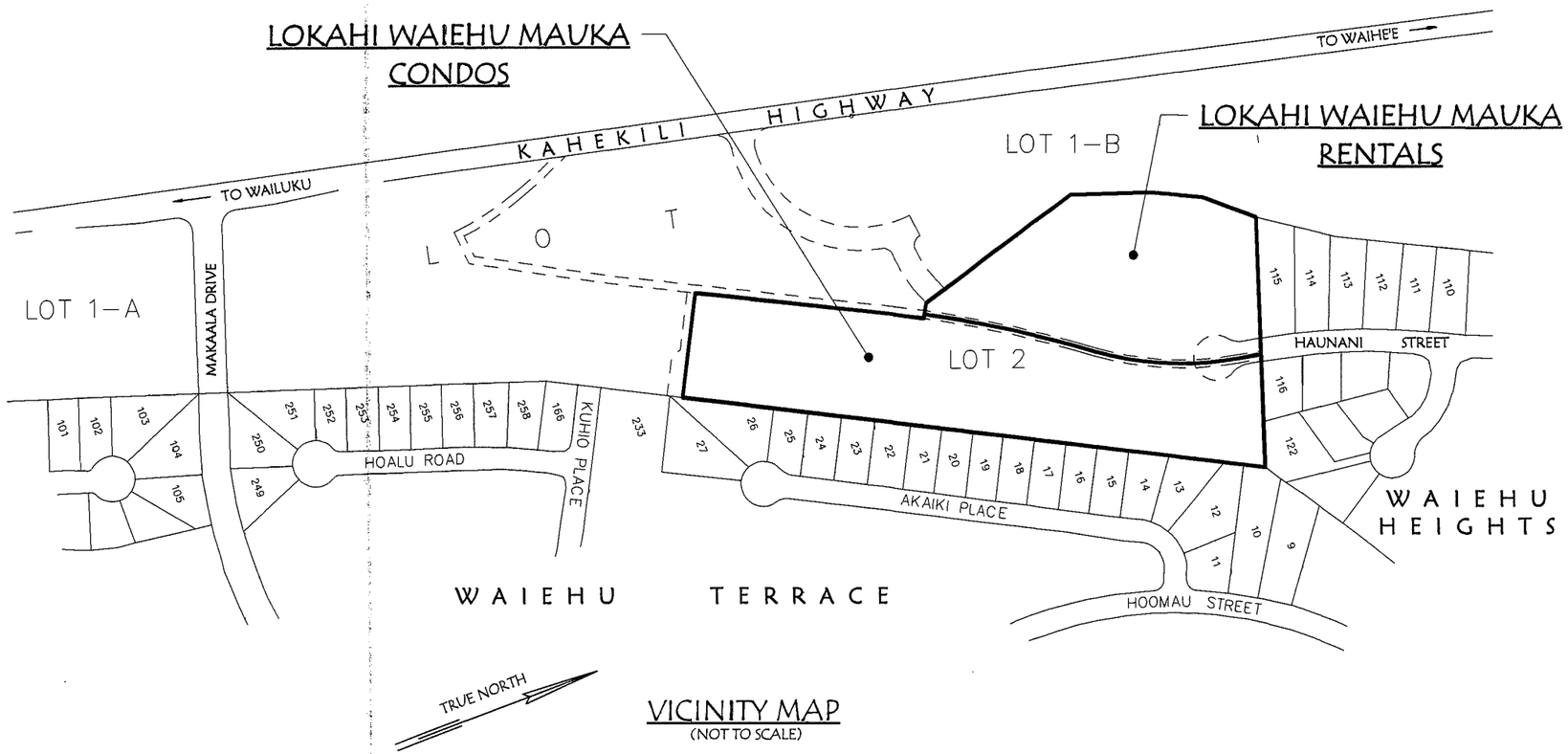
LOT AREA 84,871 SF

MAX. LOT COVERAGE (not to exceed 25% of lot area) **21,218 SF**
ACTUAL LOT COVERAGE ( 21% of lot area) **16,450 SF**

**UNIT & BLDG. SQ. FOOTAGE SUMMARY**

| BLDG. NO. | UNIT COUNT | BLDG. SQ. FTG. |
|---|---|---|
| 14D | 6 | 4,354 SF |
| 15D | 6 | 4,354 SF |
| 16D | 6 | 4,354 SF |
| 17D | 6 | 4,354 SF |
| 18D | 6 | 4,354 SF |
| 19D | 6 | 4,354 SF |
| 20D | 6 | 4,354 SF |
| LAUNDRY | - | 701 SF |
| MEETING | - | 1,140 SF |
| **9** | **42** | **32,319 SF** |

MAX. LOT COVERAGE (not to exceed 40% of lot area) **33,948 SF**
GROSS BUILDING FLOOR AREA ( 38% of lot area) **32,319 SF**




VICINITY MAP
(NOT TO SCALE)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LOKAHI PACIFIC
WAIEHU MAUKA
WAIEHU, MAUI, HAWAII
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LOKAHI WAIEHU MAUKA CONDOS
LOKAHI WAIEHU MAUKA RENTALS
TITLE SHEET

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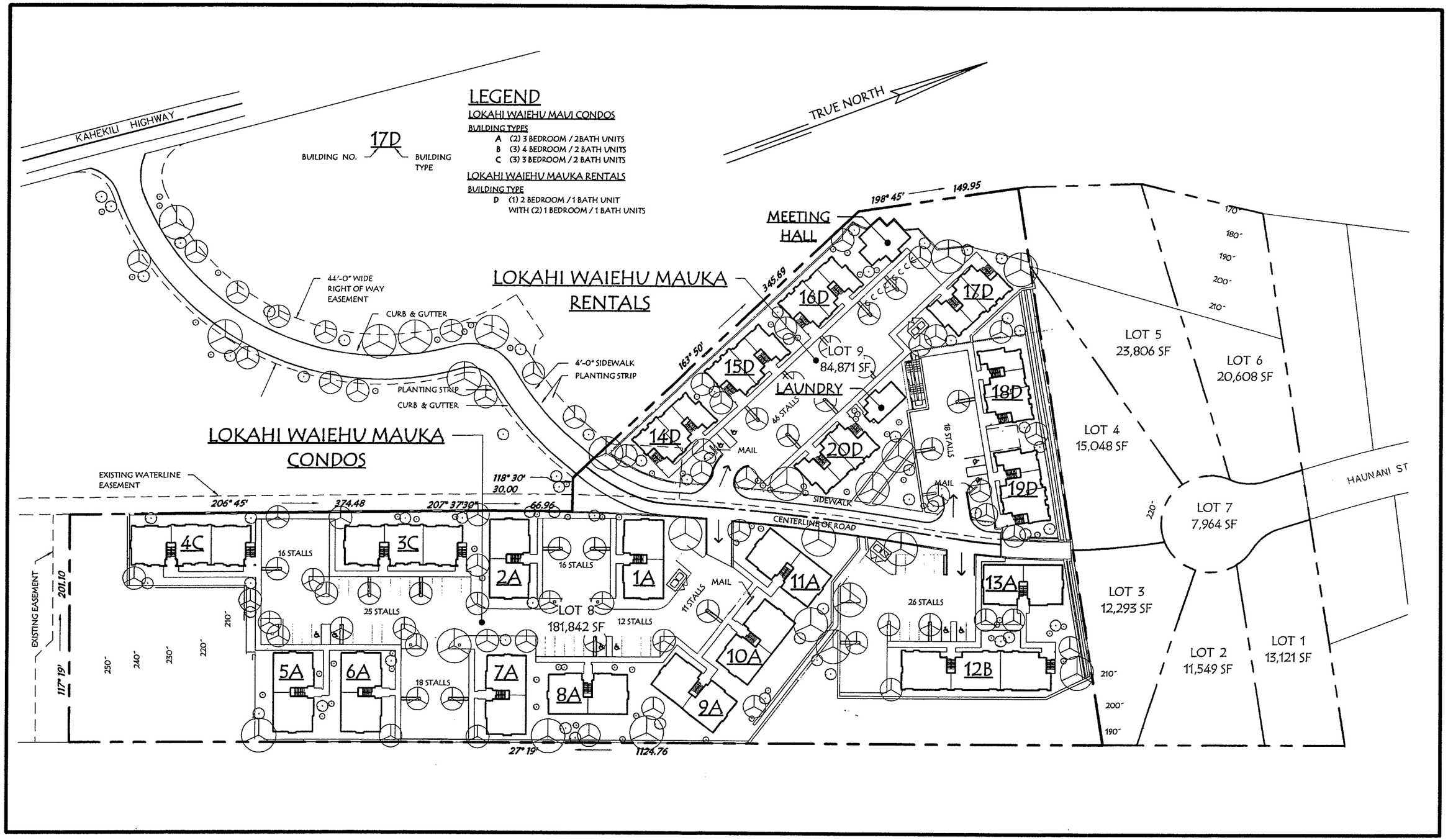


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LOKAHI PACIFIC

# WAIEHU MAUKA

WAIEHU, MAUI, HAWAII
TMK: (2) 3-3-01:102

## LOKAHI WAIEHU MAUKA CONDOS
## LOKAHI WAIEHU MAUKA RENTALS

SITE PLAN

0 40' 80' 160'
SCALE: 1" =80'-0"

07/28/09

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LOKAHI PACIFIC

WAIEHU MAUKA

WAIEHU, MAUI, HAWAII

TMK: (2) 3-3-01:102

LOKAHI WAIEHU MAUKA CONDOS

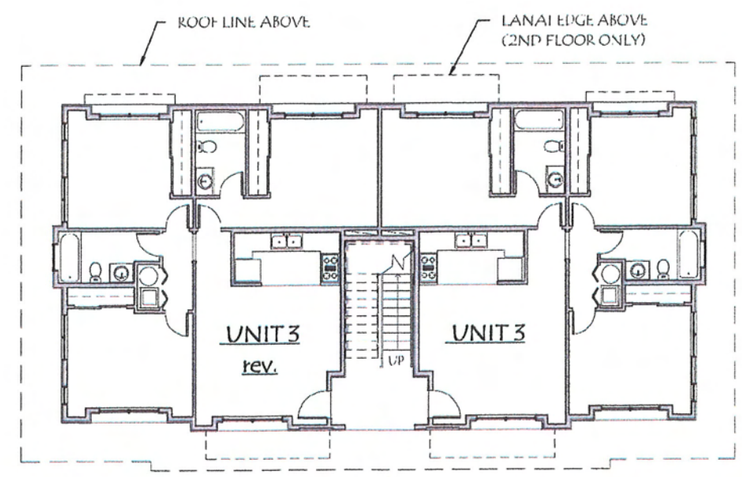
SITE RENDERINGS

02/18/09

A1

Sheet of

FRONT ELEVATION




FIRST FLOOR BUILDING PLAN
(SECOND FLOOR SIMILAR)

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LOKAHI PACIFIC

WAIEHU MAUKA

WAIEHU, MAUI, HAWAII

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LOKAHI WAIEHU MAUKA CONDOS

TYPICAL CONDO BUILDING

0' 4' 8' 16' 24'

SCALE: 1/16" = 1'-0"

02/17/09

A2

Sheet of

## 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 | TOTAL |
|---|---|---|---|
| UNIT 3 | 1096 SF | 117 SF | 1213 SF |
| UNIT 3 rev. | 1096 SF | 117 SF | 1213 SF |
| TOTAL | 2192 SF | 234 SF | 2426 SF |
| TOTAL BOTH FLOORS | | | 4618 SF |

## BUILDING TYPE 'B' - UNIT SQ. FOOTAGE

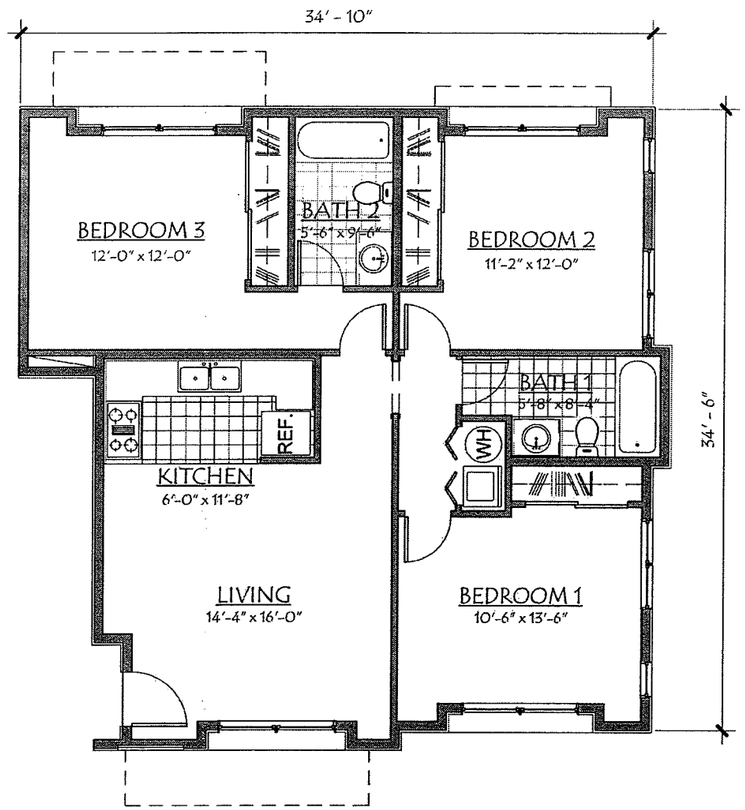
| FIRST FLOOR | LIVING |
|---|---|
| UNIT 4 | 1313 SF |
| UNIT 4 rev | 1313 SF |
| UNIT 4 | 1313 SF |
| TOTAL | 3939 SF |

| SECOND FLOOR | LIVING | LANAI | TOTAL |
|---|---|---|---|
| UNIT 4 | 1313 SF | 110 SF | 1423 SF |
| UNIT 4 rev | 1313 SF | 110 SF | 1423 SF |
| UNIT 4 | 1313 SF | 110 SF | 1423 SF |
| TOTAL | 3939 SF | 330 SF | 4269 SF |
| TOTAL BOTH FLOORS | | | 8208 SF |

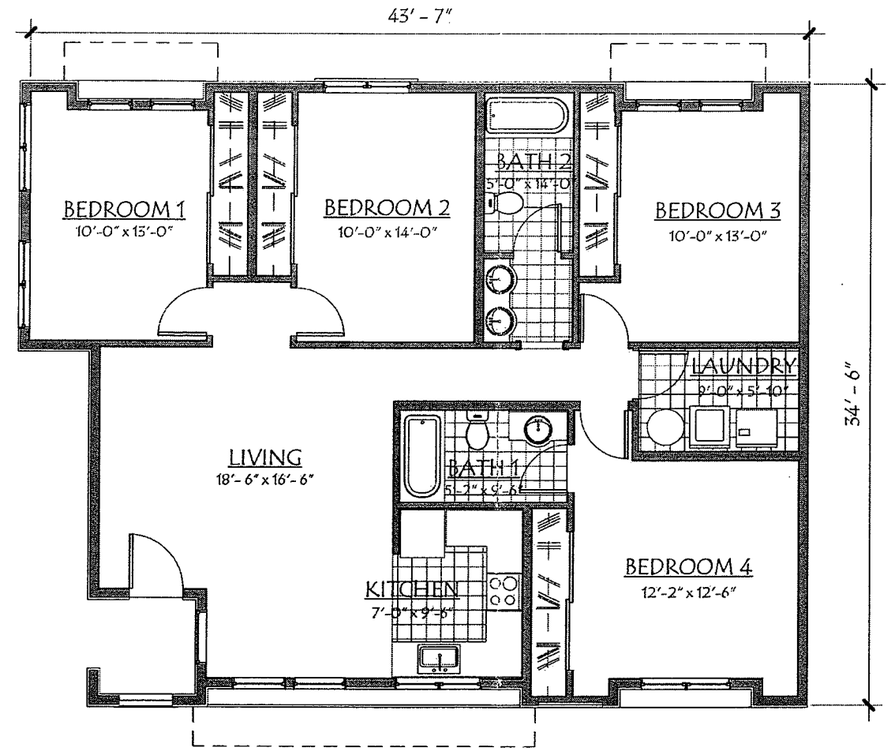
## BUILDING TYPE 'C' - UNIT SQ. FOOTAGE

| FIRST FLOOR | LIVING |
|---|---|
| UNIT 3 | 1097 SF |
| UNIT 3 rev | 1101 SF |
| UNIT 3 | 1097 SF |
| TOTAL | 3295 SF |

| SECOND FLOOR | LIVING | LANAI | TOTAL |
|---|---|---|---|
| UNIT 3 | 1097 SF | 115 SF | 1212 SF |
| UNIT 3 rev | 1101 SF | 126 SF | 1227 SF |
| UNIT 3 | 1097 SF | 115 SF | 1212 SF |
| TOTAL | 3295 SF | 356 SF | 3651 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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LOKAHI PACIFIC

# WAIEHU MAUKA

WAIEHU, MAUI, HAWAII
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## LOKAHI WAIEHU MAUKA CONDOS

UNIT TYPE '3' & '4'

0' 2' 4' 8' 12'
SCALE: 1/8" = 1'-0"

02/17/09

A3

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LOKAHI PACIFIC

WAIEHU MAUKA

WAIEHU, MAUI, HAWAII

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LOKAHI WAIEHU MAUKA RENTALS

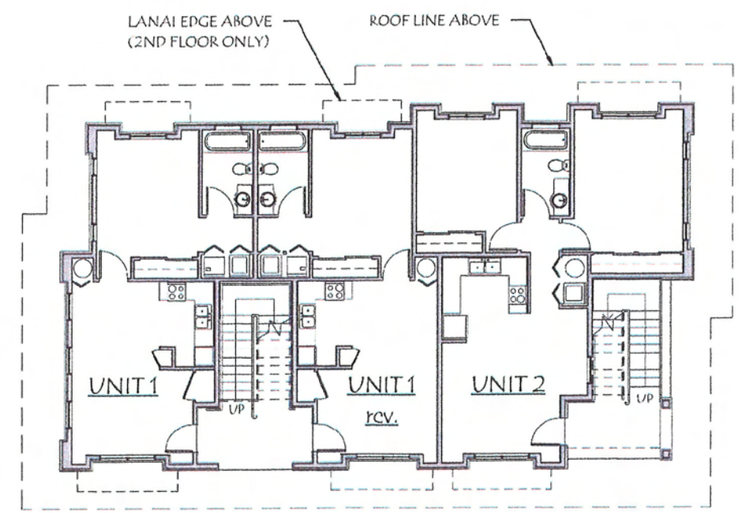
SITE RENDERINGS

02/18/09

A4

Sheet of

FRONT ELEVATION




FIRST FLOOR BUILDING PLAN
(SECOND FLOOR SIMILAR)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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"

02/17/09

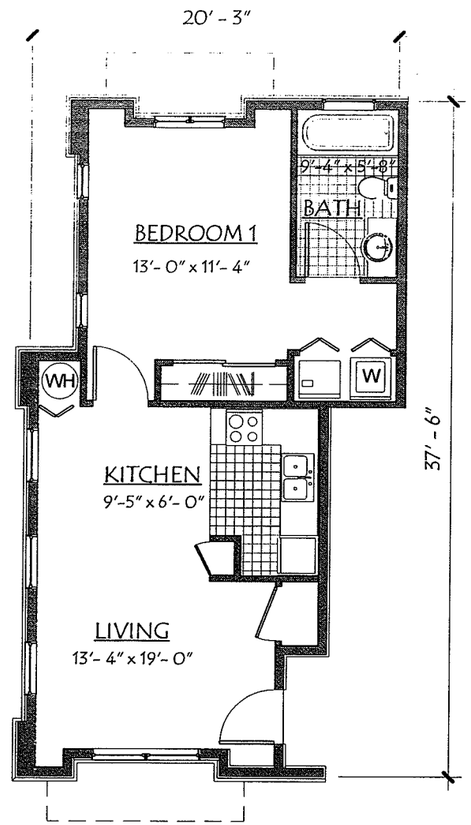
A5

Sheet of

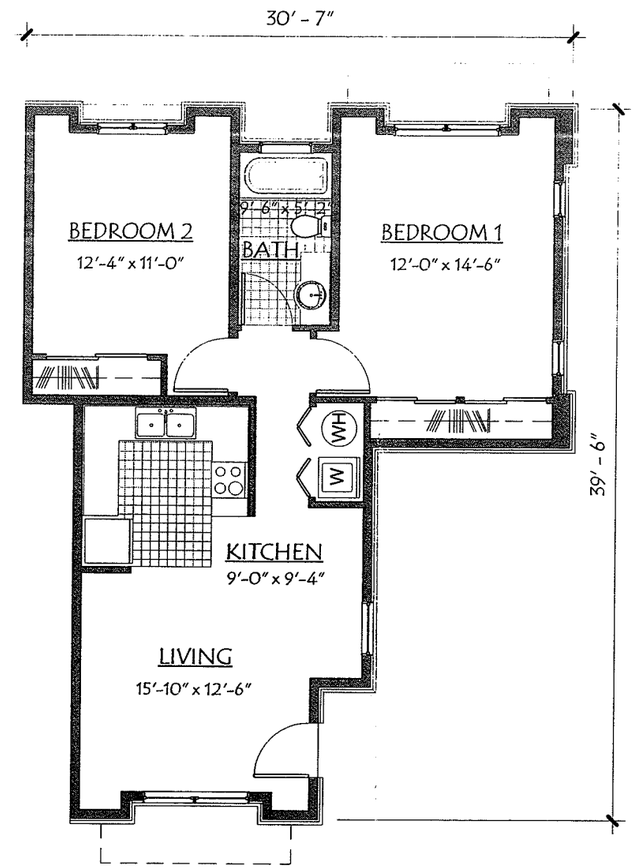
## BUILDING TYPE 'D' - UNIT SQ. FOOTAGE

| 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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TMK: (2) 3-3-01:102

LOKAHI WAIEHU MAUKA RENTALS
UNIT TYPE '1' & '2'

0' 2' 4' 8' 12'
SCALE: 1/8" = 1'-0"

02/17/09

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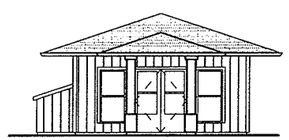
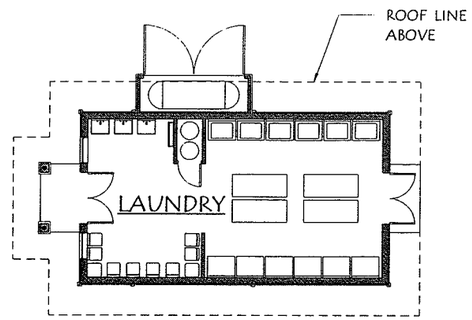
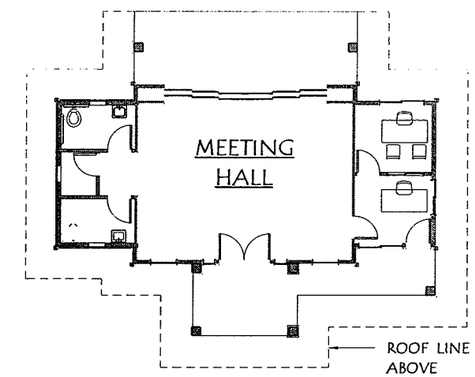


FRONT ELEVATION




FLOOR PLAN

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 |

OFFICE BUILDING - BLDG. SQ. FOOTAGE

| BUILDING | LIVING | LANAI | |
|---|---|---|---|
| MEETING | 778 SF | 362 SF | |
| TOTAL GROUND FLOOR | 778 SF | 362 SF | 1140 SF |

LAUNDRY BLDG.

MEETING HALL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LOKAHI PACIFIC

WAIEHU MAUKA

WAIEHU, MAUI, HAWAII

TMK: (2) 3-3-01:102

LOKAHI WAIEHU MAUKA RENTALS

MEETING HALL & LAUNDRY

0' 4' 8' 16' 24'

SCALE: 1/16" = 1'-0"

02/17/09

A7

Sheet of

# APPENDIX B.

# Proposed Section 201H-38 HRS Exemptions

**PROPOSED SECTION 201H-38 EXEMPTIONS FOR 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.

See Attachment "B" for a floor area and lot coverage summary for the proposed design.

**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.

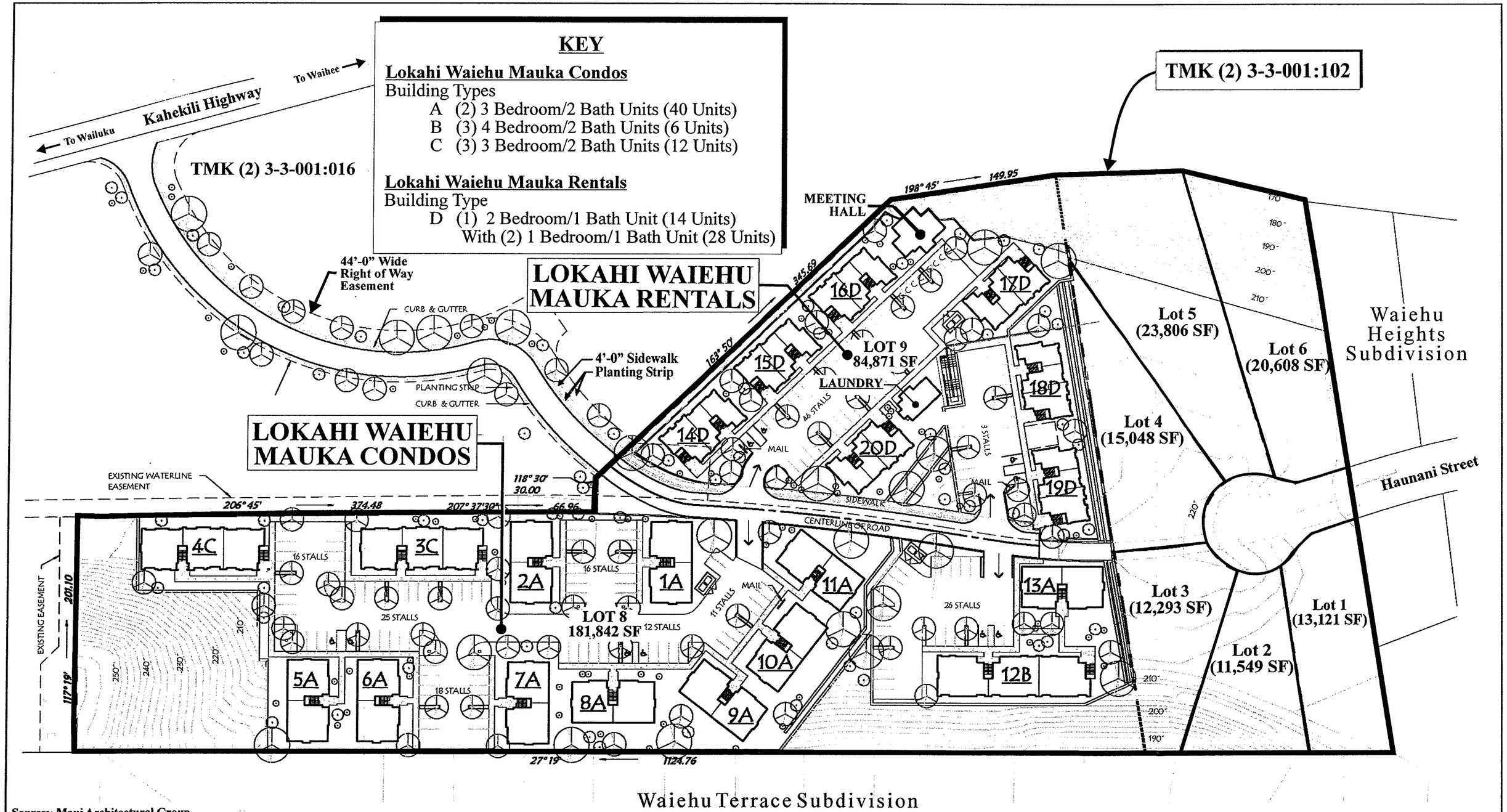
**Front Yard Definition**

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.




Source: Maui Architectural Group

Attachment "A"

# Proposed Waiehu Mauka Affordable Housing Project

## Subdivision Lot Configuration

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: Lokahi Pacific

LokahiPac\Waiehu EA\Subdivision Lot Configuration

# LOKAHI WAIEHU MAUKA CONDOS

11/11/2009

## LOT COVERAGE

| BLDG. TYPE | GROUND FLOOR | NO. OF BLDGS. | TOTAL BLDG. |
|---|---|---|---|
| A | 2,184 SF | 10 | 21,840 SF |
| B | 4,068 SF | 1 | 4,068 SF |
| C | 3,276 SF | 2 | 6,552 SF |
| | | | 32,460 SF |

| | |
|---|---|
| LOT AREA | 181,842 SF |
| MAX. LOT COVERAGE (not to exceed 25% of lot area) | 45,461 SF |
| ACTUAL LOT COVERAGE (18% of lot area) | 32,460 SF |

## UNIT & BLDG. FLOOR AREA SUMMARY

| | BLDG. NO. | UNIT COUNT | BLDG. SQ. FTG. |
|---|---|---|---|
| | 1 A | 4 | 4,592 SF |
| | 2 A | 4 | 4,592 SF |
| | 3 C | 6 | 6,902 SF |
| | 4 C | 6 | 6,902 SF |
| | 5 A | 4 | 4,592 SF |
| | 6 A | 4 | 4,592 SF |
| | 7 A | 4 | 4,592 SF |
| | 8 A | 4 | 4,592 SF |
| | 9 A | 4 | 4,592 SF |
| | 10 A | 4 | 4,592 SF |
| | 11 A | 4 | 4,592 SF |
| | 12 B | 6 | 8,466 SF |
| | 13 A | 4 | 4,592 SF |
| TOTALS | 13 | 58 | 68,190 SF |

| | |
|---|---|
| LOT AREA | 181,842 SF |
| MAX. LOT COVERAGE (not to exceed 40% of lot area) | 72,737 SF |
| GROSS BUILDING FLOOR AREA (37% of lot area) | 68,190 SF |

# HALE LOKAHI WAIEHU - RENTALS

## BUILDING TYPE & SQ. FOOTAGES - GROUND FLOOR

| BLDG. TYPE | GROUND FLOOR | NO. OF BLDGS. | TOTAL BLDG. |
|---|---|---|---|
| D | 2,081 SF | 7 | 14,567 SF |
| LAUNDRY | 740 SF | 1 | 740 SF |
| MEETING | 1,143 SF | 1 | 1,143 SF |
| | | | 16,450 SF |

| | |
|---|---|
| LOT AREA | 84,871 SF |
| MAX. LOT COVERAGE (not to exceed 25% of lot area) | 21,218 SF |
| ACTUAL LOT COVERAGE (21% of lot area) | 16,450 SF |

## BUILDING NO. & UNIT SUMMARY

| | BLDG. NO. | UNIT COUNT | BLDG. SQ. FTG. |
|---|---|---|---|
| | 14 D | 6 | 4,354 SF |
| | 15 D | 6 | 4,354 SF |
| | 16 D | 6 | 4,354 SF |
| | 17 D | 6 | 4,354 SF |
| | 18 D | 6 | 4,354 SF |
| | 19 D | 6 | 4,354 SF |
| | 20 D | 6 | 4,354 SF |
| | LAUNDRY | | 701 SF |
| | MEETING | | 1,140 SF |
| TOTALS | 7 | 42 | 32,319 SF |

| | |
|---|---|
| LOT AREA | 84,871 SF |

# APPENDIX C.

# Flora and Fauna Survey and Assessment Report

# FLORA AND FAUNA SURVEY AND ASSESSMENT

**for the**

# WAIEHU MAUKA RESIDENTIAL PROJECT

# WAIEHU, MAUI

**by**

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**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 gullys 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.

| SCIENTIFIC NAME | COMMON NAME | STATUS | ABUNDANCE |
|---|---|---|---|
| **MONOCOTS** | | | |
| POACEAE (Grass Family) | | | |
| *Cenchrus ciliaris* L. | buffelgrass | non-native | uncommon |
| *Cenchrus echinatus* L. | common sandbur | non-native | rare |
| *Chloris gayana* Kunth | Rhodes grass | non-native | rare |
| *Cynodon dactylon* (L.) Pers. | Bermuda grass | non-native | uncommon |
| *Eragrostis amabilis* (L.) Wight & Arnott Nees | Japanese lovegrass | non-native | uncommon |
| *Melinis repens* (Willd.) Zizka | Natal redtop | non-native | common |
| *Panicum maximum* Jacq. | Guinea grass | non-native | common |
| **DICOTS** | | | |
| ACANTHACEAE (Acanthus Family) | | | |
| *Asystasia gangetica* (L.) T. Anderson | Chinese violet | non-native | uncommon |
| ANACARDIACEAE (Mango Family) | | | |
| *Schinus terebinthifolius* Raddi | Christmas berry | non-native | rare |
| ARALIACEAE (Ginseng Family) | | | |
| *Schefflera actinophylla* (Endlicher) Harms | octopus tree | non-native | rare |
| APOCYNACEAE (Dogbane Family) | | | |
| *Calotropis gigantea* (L.) W.T. Aiton | giant crownflower | non-native | rare |
| *Calotropis procera* (Aiton) W.T. Aiton | small crownflower | non-native | rare |
| ASTERACEAE (Sunflower Family) | | | |
| *Dyssodia tenuiloba* (DC.) B.L. Rob. | Dahlberg daisy | non-native | rare |
| *Heterotheca grandiflora* Nutt. | telegraph weed | endemic | uncommon |
| *Pluchea carolinensis* (Jacq.) G. Don | sourbush | non-native | uncommon |
| *Sonchus oleraceus* L. | *pualele* | non-native | rare |
| *Tridax procumbens* L. | coat buttons | non-native | uncommon |

| SCIENTIFIC NAME | COMMON NAME | STATUS | ABUNDANCE |
|---|---|---|---|
| *Verbesina encelioides* (Cav.) Benth. & Hook. | golden crown-beard | non-native | uncommon |
| BRASSICACEAE (Mustard Family) | | | |
| *Lepidium virginicum* L. | pepperwort | non-native | rare |
| CASUARINACEAE (She-oak Family) | | | |
| *Casuarina equisetifolia* L. | common ironwood | non-native | uncommon |
| EUPHORBIACEAE (Spurge Family) | | | |
| *Aleurites moluccana* (L.) Willd. | *kukui* | Polynesian | rare |
| *Chamaesyce hirta* (L.) Millsp. | hairy spurge | non-native | rare |
| *Chamaesyce hypericifolia* (L.) Millsp. | graceful spurge | non-native | rare |
| *Chamaesyce prostrata* (Aiton) Small | prostrate spurge | non-native | rare |
| *Ricinus communis* L. | Castor bean | non-native | rare |
| FABACEAE (Pea Family) | | | |
| *Chamaecrista nictitans* (L.) Moench | partridge pea | non-native | uncommon |
| *Crotalaria incana* L. | fuzzy rattlepod | non-native | uncommon |
| *Crotalaria pallida* Aiton | smooth rattlepod | non-native | uncommon |
| *Desmanthus pernambucanus* (L.) Thellung | slender mimosa | non-native | uncommon |
| *Desmodium tortuosum* (Sw.) DC. | Florida beggarweed | non-native | common |
| *Falcataria moluccana* (Miq.) Barneby & Grimes | albizia | non-native | rare |
| *Indigofera suffruticosa* Mill. | *inikö* | non-native | common |
| *Macroptilium atropurpureum* (DC.) Urb. | ---------- | non-native | uncommon |
| *Neonotonia wightii* (Wight & Arnnott) Lackey | glycine | non-native | rare |
| *Pithecellobium dulce* (Roxb.) Benth. | *'öpiuma* | non-native | rare |
| *Prosopis pallida* (Humb. & Bonpl. ex Willd.) Kunth | *kiawe* | non-native | rare |
| MALVACEAE (Mallow Family) | | | |
| *Abutilon grandifolium* (Willd.) Sweet | hairy abutilon | non-native | uncommon |

| SCIENTIFIC NAME | COMMON NAME | STATUS | ABUNDANCE |
|---|---|---|---|
| *Gossypium hirsutum* L. | upland cotton | non-native | rare |
| *Sida fallax* Walp. | 'ilima | indigenous | rare |
| *Sida rhombifolia* L. | Cuban jute | non-native | rare |
| *Waltheria indica* L. | *'uhaloa* | indigenous | uncommon |
| MORACEAE (Mulberry Family) | | | |
| *Broussonetia luzonicus* (Blanco) Bureau | alokon | non-native | rare |
| MORINGACEAE (Drumstick Tree Family) | | | |
| *Moringa oleifera* Lamarck | horseradish tree | non-native | rare |
| MYRTACEAE (Myrtle Family) | | | |
| *Psidium guajava* L. | common guava | non-native | rare |
| *Syzygium cumini* (L.) Skeels | Java plum | non-native | rare |
| VERBENACEAE (Verbena Family) | | | |
| *Stachytarpheta jamaicensis* (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 auropunctatus*) 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.

| COMMON NAME | SCIENTIFIC NAME | STATUS | ABUNDANCE |
|---|---|---|---|
| **MAMMALS** | | | |
| Domestic cat | *Felis catus* | non-native | rare |
| Domestic dog | *Canis familiaris* | non-native | rare |
| **BIRDS** | | | |
| Barred dove | *Carpodacus mexicanus* | non-native | common |
| Common myna | *Acridotheres tristis* | non-native | common |
| Spotted dove | *Streptopelia chinensis* | non-native | common |
| Zebra dove | *Geopelia striata* | non-native | common |
| Northern cardinal | *Cardinalis cardinalis* | non-native | uncommon |
| Rock dove | *Columba livia* | non-native | rare |
| Chicken | *Gallus gallus* | non-native | rare |
| Red-crested cardinal | *Paroaria coronata* | non-native | rare |
| Cattle egret | *Bubulcis ibis* | non-native | rare |

## Literature Cited


American Ornithologists' Union 2005. Check-list of North American Birds. 7th edition. American Ornithologists' Union. Washington D.C.

Armstrong, R. W. (ed.) 1983. Atlas of Hawaii. (2nd. ed.) University of Hawaii Press.

Foote, D.E. , E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil survey of the islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Dept. of Agriculture, Soil Conservation Service. Washington, D.C.

Tomich, P.Q. 1986. Mammals in Hawaii. Bishop Museum Press, Honolulu.

U.S. Fish and Wildlife Service. 1999. Endangered and threatened wildlife and Plants. 50 CFR 17.11 & 17.12

U.S. Fish and Wildlife Service. 2000. Endangered and threatened wildlife and plants: determination of endangered status for Blackburn's sphinx moth from Hawaii. Federal Register 65(21): 4770-4779.

Wagner, W. L., D.R. Herbst, and S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawai'i. Univ. of Hawai'I Press and Bishop Museum Press. Honolulu.

# APPENDIX D.

# Archaeological Assessment Report

SCS Project Number 726-2

# 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, HAWAI`I [TMK (2) 3-3-001:102 AND 016 (POR.)]


Prepared by:
**Cathleen A. Dagher, B.A.**
and
**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.

## TABLE OF CONTENTS

ABSTRACT ..... ii

TABLE OF CONTENTS ..... iii

LIST OF FIGURES ..... iv

INTRODUCTION ..... 1

ENVIRONMENTAL SETTING ..... 4
- LOCATION ..... 4
- PROJECT AREA LANDFORM, SOIL, AND CLIMATE ..... 5
- VEGETATION ..... 5

TRADITIONAL AND HISTORIC SETTING ..... 7
- THE TRADITIONAL PERIOD ..... 7
- KNOWN HEIAU IN THE VICINITY ..... 8

HISTORIC SETTING OF THE PROJECT AREA AND ENVIRONS ..... 9
- LAND TENURE ..... 9
- HISTORIC ERA ..... 11

PREVIOUS ARCHAEOLOGY ..... 11
- OVERVIEW ..... 11

EXPECTED FINDINGS ..... 16

METHODOLGY ..... 16
- FIELD METHODOLOGY ..... 16
- LABORATORY METHODOLOGY ..... 18

FINDINGS ..... 18

BACKHOE TRENCH EXCAVATIONS SUMMARY ..... 18

RECOMMENDATIONS ..... 38

REFERENCES ..... 43

## LIST OF FIGURES

Figure 1: USGS Quadrangle (Wailuku) Showing Project Location. 2
Figure 2: Tax Map Key [TMK] Showing Project Area. 3
Figure 3: USDA Soil Survey Map Showing Soil Series within Project Area. 6
Figure 4: Selected State Site Locations in Vicinity of Project Area. Adapted from Fredericksen and Fredericksen 2002: Map 5. 12
Figure 5: Location of Backhoe Trenches 1 through 20. 17
Figure 6: Backhoe Trench 1 West Wall Profile. 19
Figure 7: Photograph of Backhoe Trench 1 West Wall Profile To West. 20
Figure 8: Backhoe Trench 2 South Wall Profile. 20
Figure 9: Photograph of Backhoe Trench 2 South Wall Profile To South. 21
Figure 10: Backhoe Trench 3 South Wall Profile. 21
Figure 11: Photograph of Backhoe Trench 3 South Wall Profile To South. 22
Figure 12: Backhoe Trench 4 South Wall Profile. 23
Figure 13: Photograph of Backhoe Trench 4 South Wall Profile To South. 23
Figure 14: Backhoe Trench 5 West Wall Profile. 24
Figure 15: Photograph of Backhoe Trench 5 West Wall Profile To West. 24
Figure 16: Backhoe Trench 6 North Wall Profile. 26
Figure 17: Photograph of Backhoe Trench 6 North Wall Profile To North. 26
Figure 18: Backhoe Trench 7 West Wall Profile. 27
Figure 19: Photograph of Backhoe Trench 7 West Wall Profile To West. 27
Figure 20: Backhoe Trench 8 Northeast Wall Profile. 28
Figure 21: Photograph of Backhoe Trench 8 Northeast Wall Profile To Northeast. 28
Figure 22: Backhoe Trench 9 Southeast Wall Profile. 29
Figure 23: Photograph of Backhoe Trench 9 Southeast Wall Profile To Southeast. 29
Figure 24: Backhoe Trench 10 Southeast Wall Profile. 30
Figure 25: Photograph of Backhoe Trench 10 Southeast Wall Profile To Southeast. 30
Figure 26: Backhoe Trench 11 East Wall Profile. 32
Figure 27: Photograph of Backhoe Trench 11 East Wall Profile To East. 32
Figure 28: Backhoe Trench 12 West Wall Profile. 33
Figure 29: Photograph of Backhoe Trench 12 West Wall Profile To West. 33
Figure 30: Backhoe Trench 13 West Wall Profile. 34
Figure 31: Photograph of Backhoe Trench 13 West Wall Profile To Southwest. 34
Figure 32: Backhoe Trench 14 West Wall Profile. 35
Figure 33: Photograph of Backhoe Trench 14 West Wall Profile To Southwest. 35
Figure 34: Backhoe Trench 15 Southwest Wall Profile. 36
Figure 35: Photograph of Backhoe Trench 15 Southwest Wall Profile To Southwest. 36
Figure 36: Backhoe Trench 16 Southwest Wall Profile. 37
Figure 37: Photograph of Backhoe Trench 16 Southwest Wall Profile To Southwest. 37
Figure 38: Backhoe Trench 17 Southwest Wall Profile. 39
Figure 39: Photograph of Backhoe Trench 17 Southwest Wall Profile To Southwest. 39

Figure 40: Backhoe Trench 18 Southwest Wall Profile. ..... 40
Figure 41: Photograph of Backhoe Trench 18 Southwest Profile To Southwest. ..... 40
Figure 42: Backhoe Trench 19 South Wall Profile..... 41
Figure 43: Photograph of Backhoe Trench 19 South Wall Profile To South. ..... 41
Figure 44: Backhoe Trench 20 South Wall Profile..... 42
Figure 45: Photograph of Backhoe Trench 20 South Wall Profile To South. ..... 42

# 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 0through 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 determined 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.

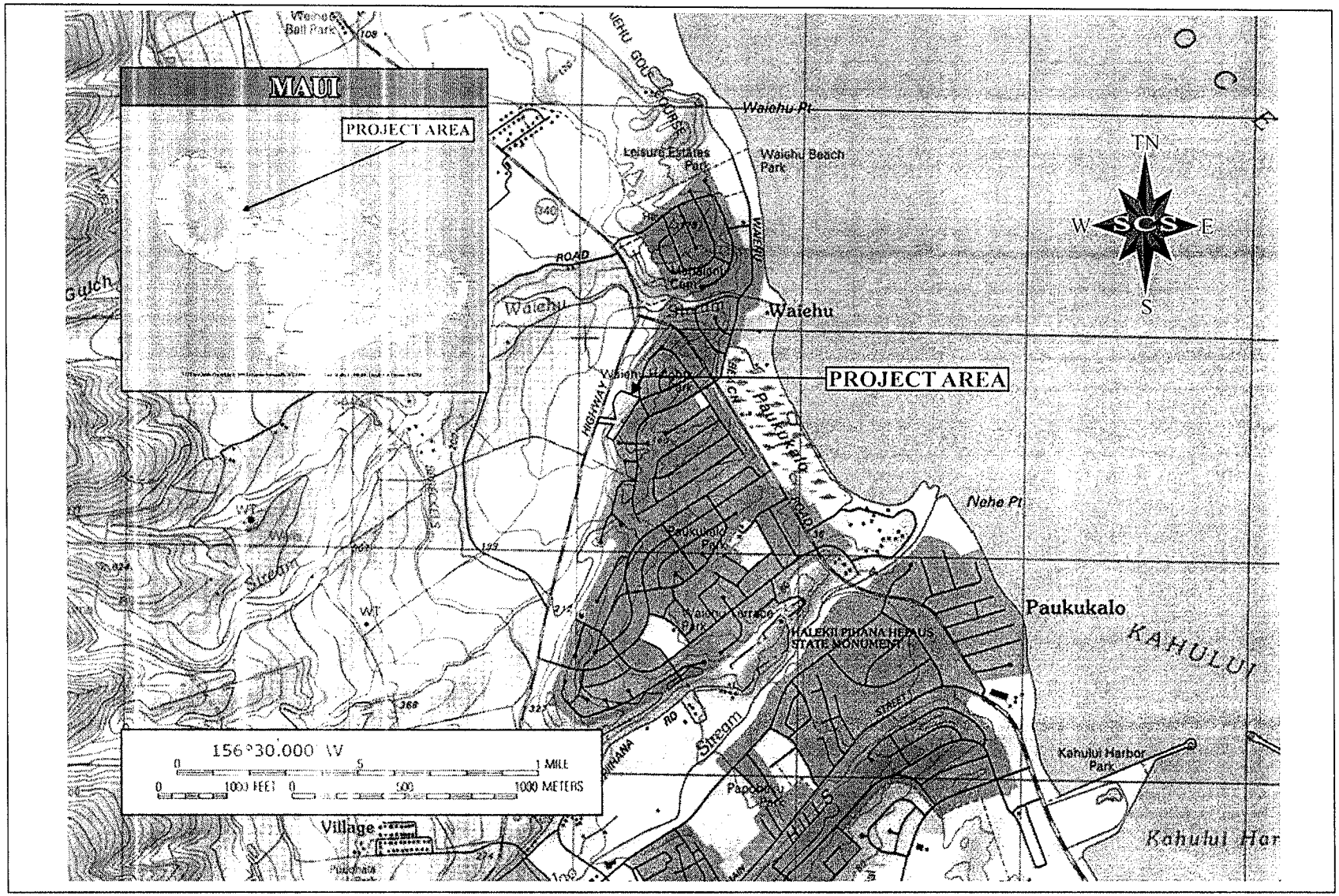


**Figure 1: USGS Quadrangle (Wailuku) Showing Project Location.**

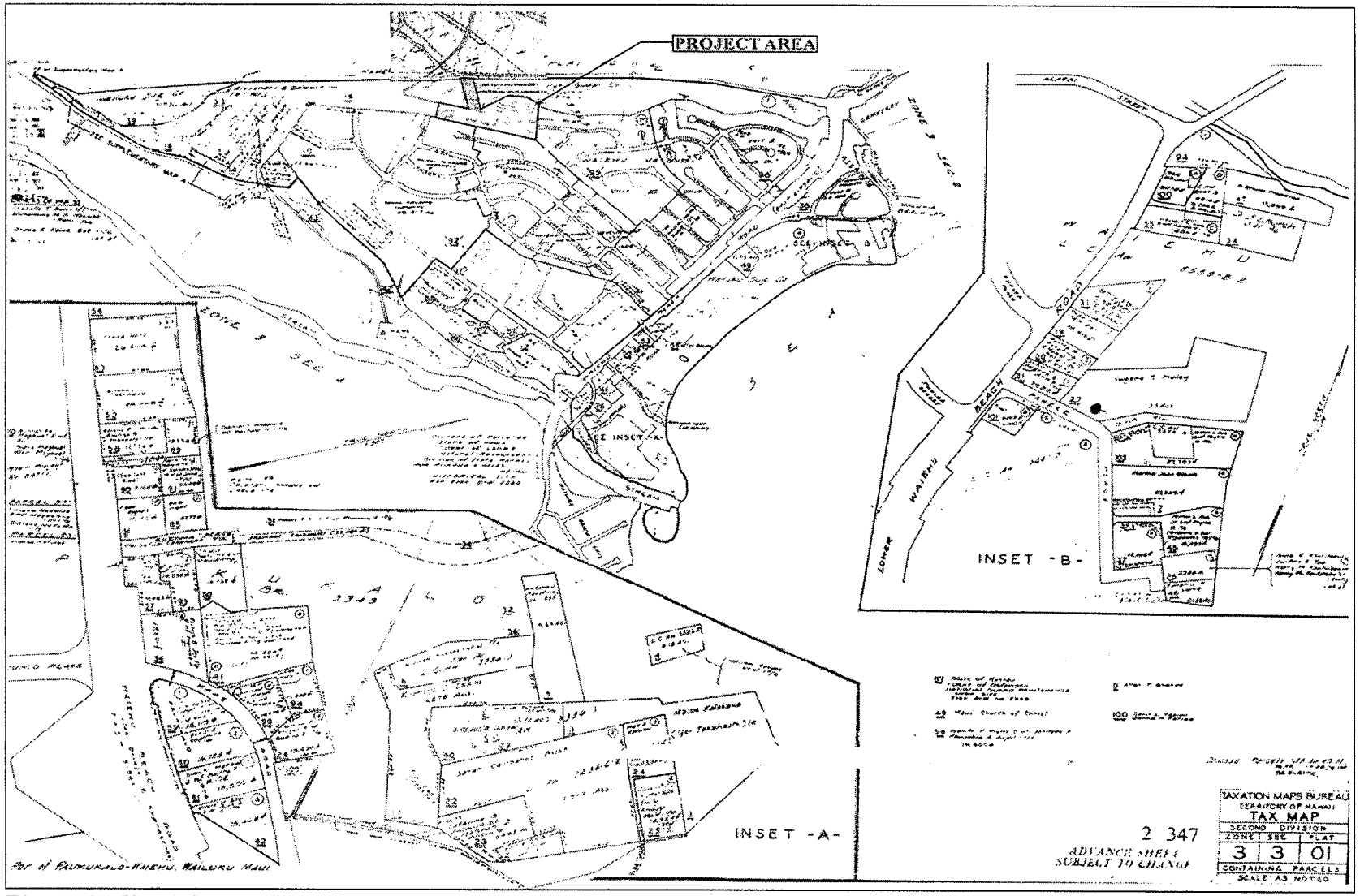


**Figure 2: Tax Map Key [TMK] Showing Project Area.**

## 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*), bufflegrass (*Cenchrus ciliaris*), and Bermuda grass (*Cynodon dactylon*); scattered stunted shrubs such as *koa haole*

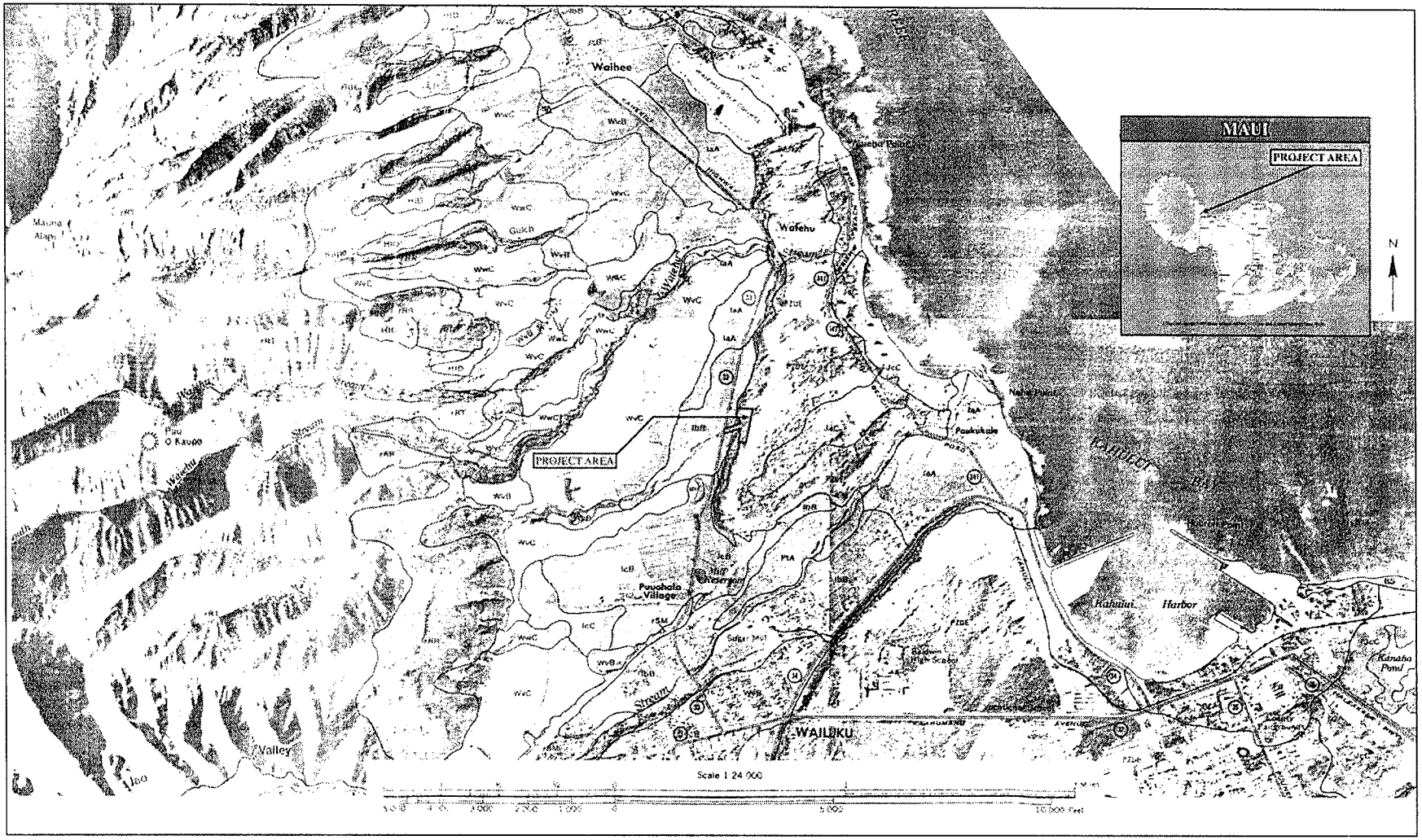


**Figure 3: USDA Soil Survey Map Showing Soil Series within Project Area.**

(*Leucaena leucocephala*), indigo (*Indigofera suffructicosa*), fleabane (*Pluchea symphytifolia*), and castor bean (*Ricinis 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 Strerling 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 *mauk*a 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 20$^{th}$ 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 19$^{th}$ century to early 20$^{th}$ 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 19$^{th}$ century to early 20$^{th}$ 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).

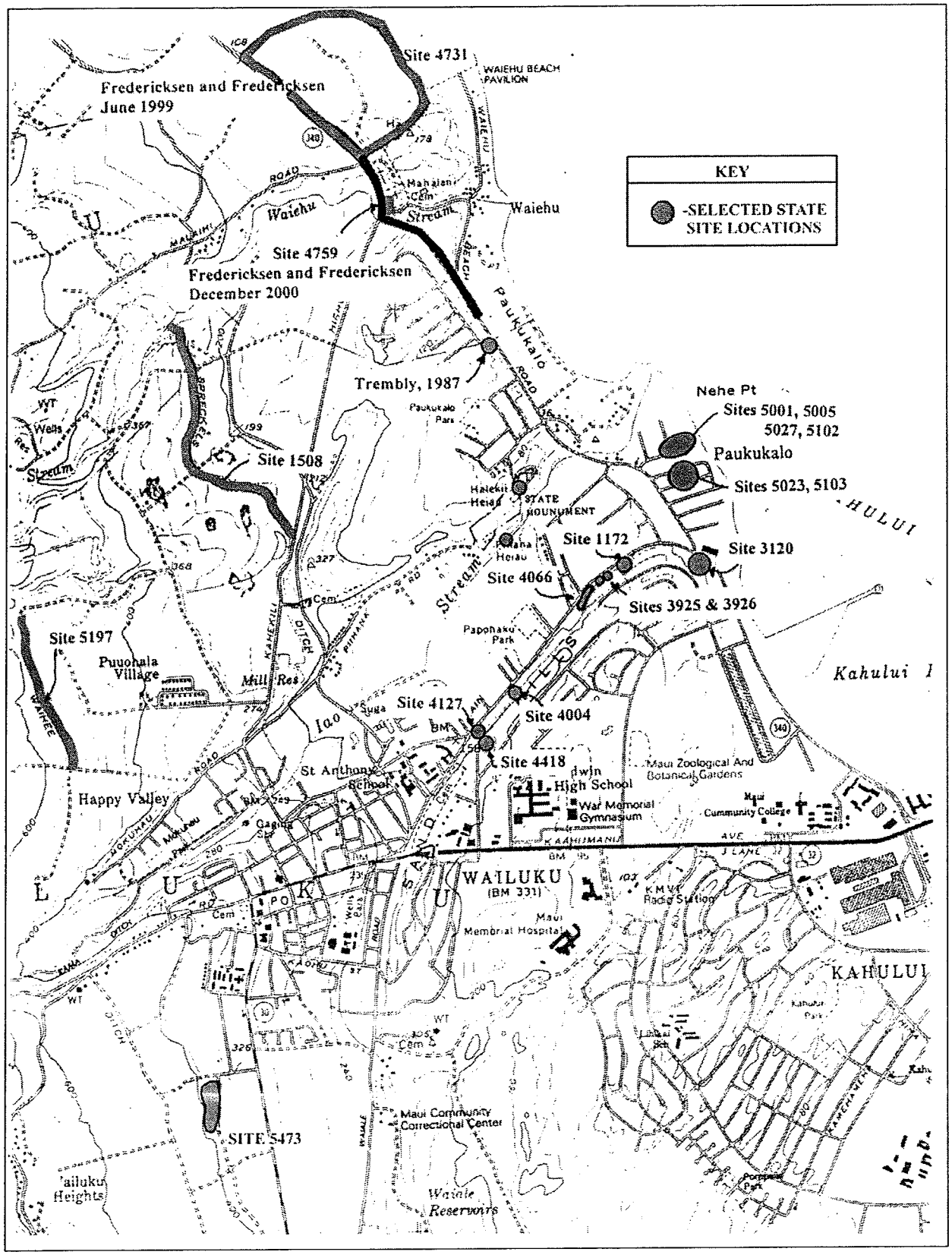


**Figure 4: Selected State Site Locations in Vicinity of Project Area. Adapted from Fredericksen and Fredericksen 2002: Map 5.**

**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 18th or early 19th 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 | Archaeologic al 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); *kuleana* 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 and1 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 1 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 *In situ* 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 *imu*, 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-Pihana State Monument: Phase I, Wai`ehu | Survey, Test Coring | Halekii (-4592): *ili-ili* stones, shell, charcoal. No evidence of cultural deposit earlier than construction date.<br>Pihana (-4592): *ili-ili* stones, shell, human and pig bone, human burial left *in situ* |
| 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 *ka`a* 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 *heiau* |
| 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, Paukukalo, 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. | *Archaeology of Maui* | Island-wide investigation | Among other records, documents 5 *heiau* in Wai`ehu and 13 *heiau* in Wailuku |
| 1918 | Stokes, J.F.G. | ". . . Heiau of Maui." | Island-wide investigation | Among other records, documents *heiau* in Wailuku District |
| 1917 | Thrum, T.G. | "Maui's Heiau . . ." | Island-wide investigation | Description of Wailuku's Pihana Heiau, among other records |

(Table1: 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.

## METHODOLGY

### 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. Photo-documentation and detailed stratigraphic profiles were completed following the termination of the backhoe excavations.

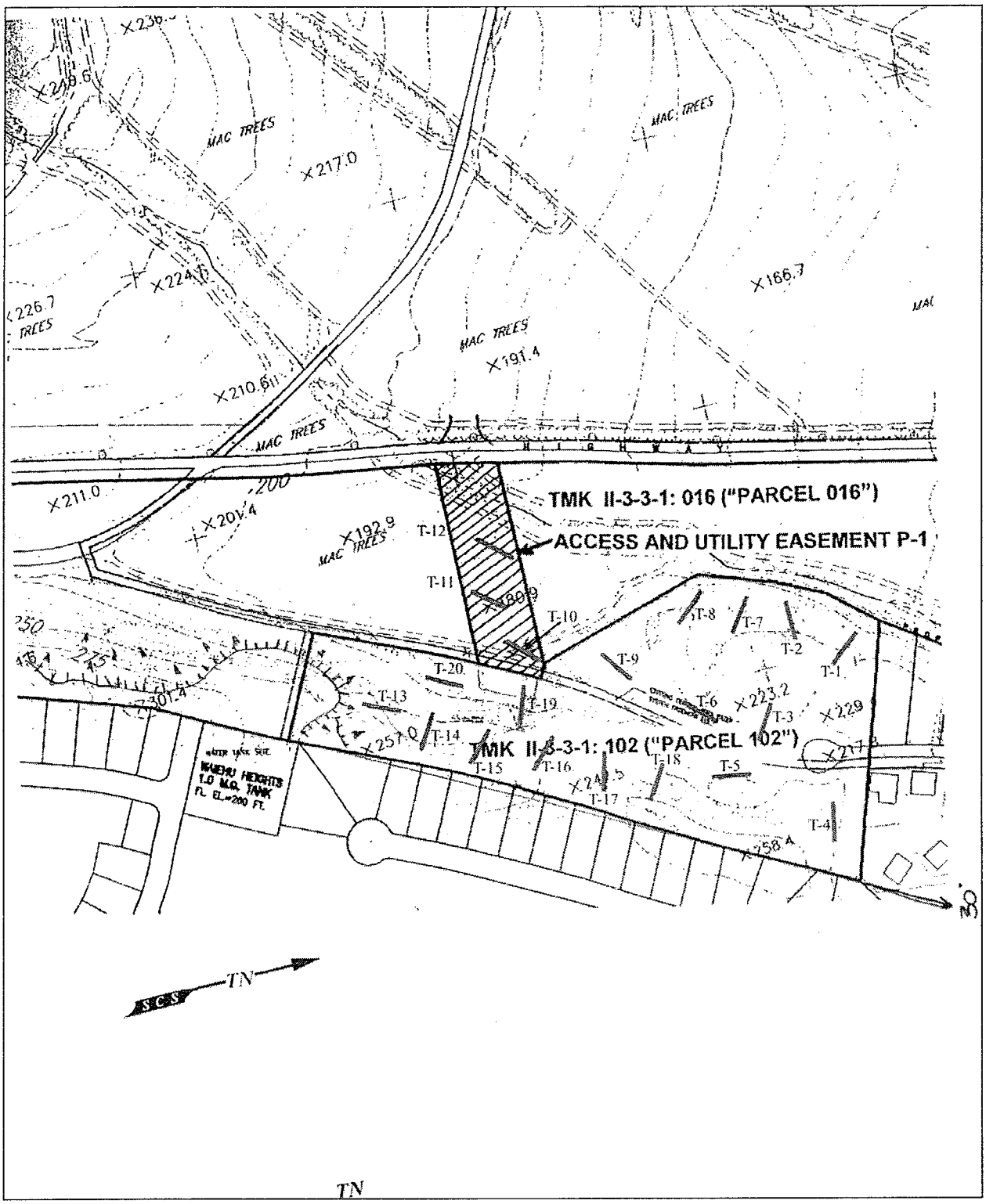


**Figure 5: Location of Backhoe Trenches 1 through 20.**

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 YR5/2). No cultural or datable materials were encountered in BT-1.

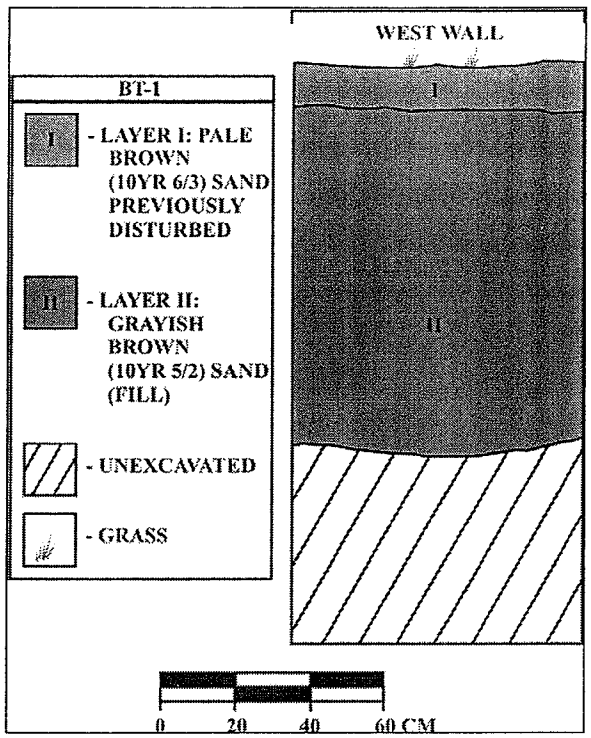


**Figure 6: Backhoe Trench 1 West Wall Profile.**

**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

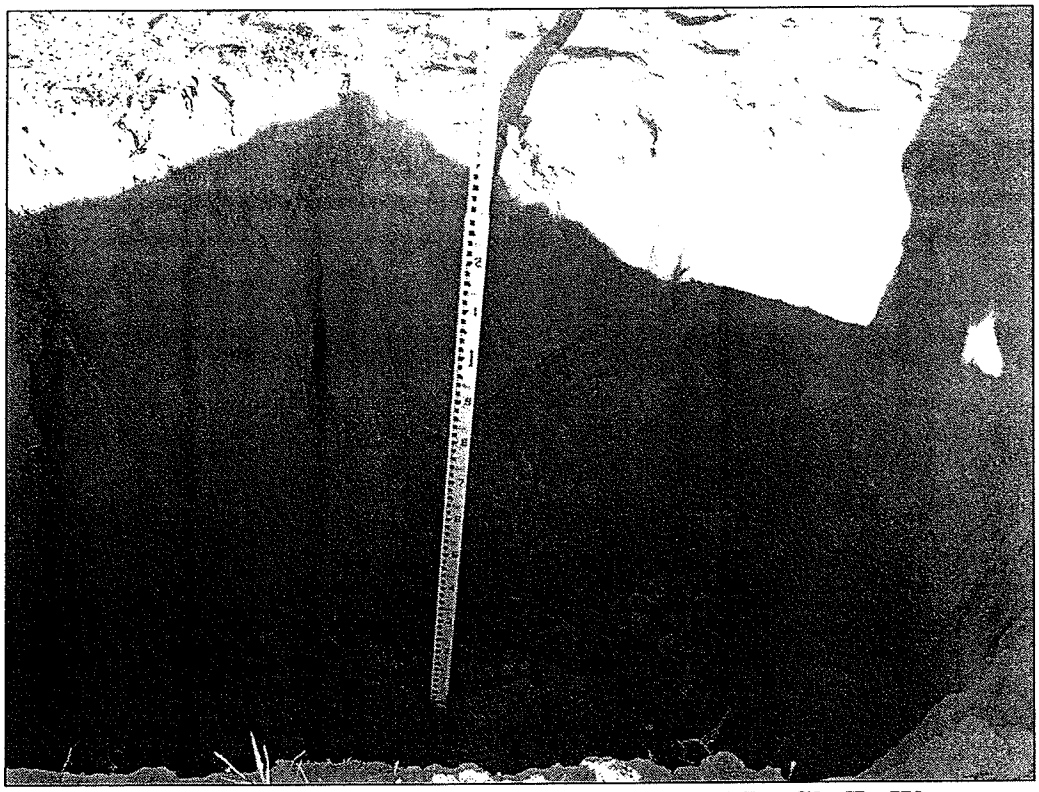

**Figure 7: Photograph of Backhoe Trench 1 West Wall Profile To West.**

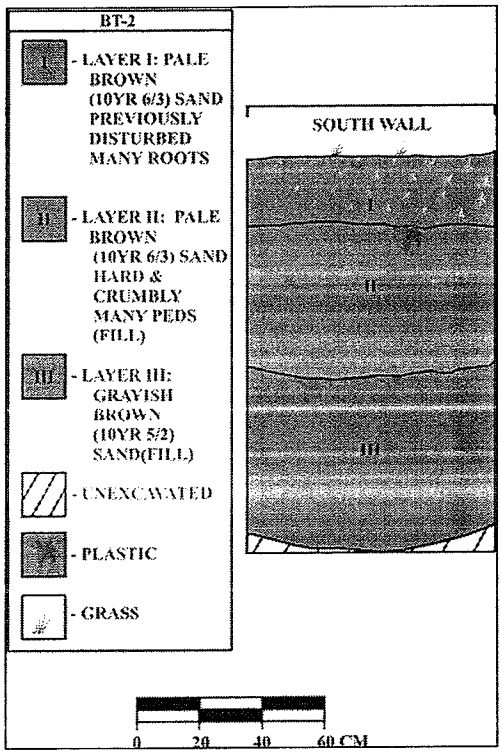


**Figure 8: Backhoe Trench 2 South Wall Profile.**

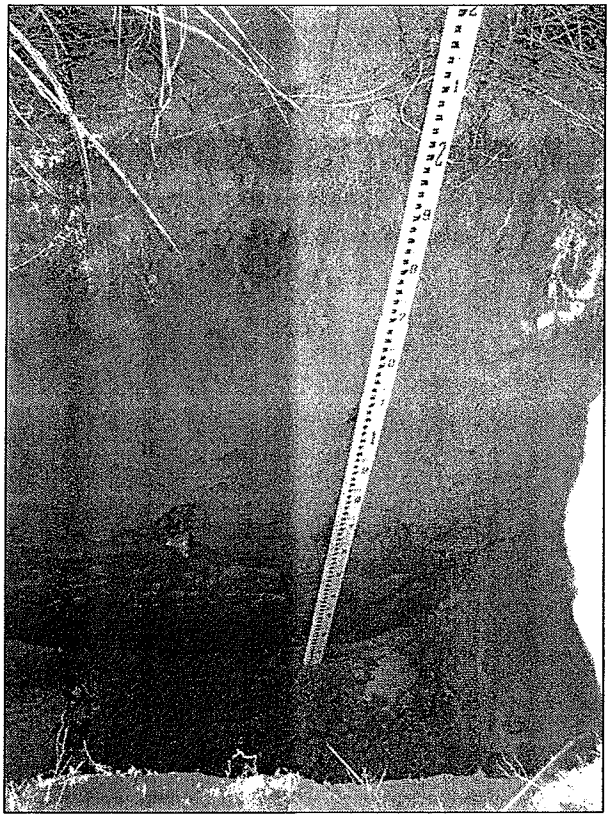

**Figure 9: Photograph of Backhoe Trench 2 South Wall Profile To South.**

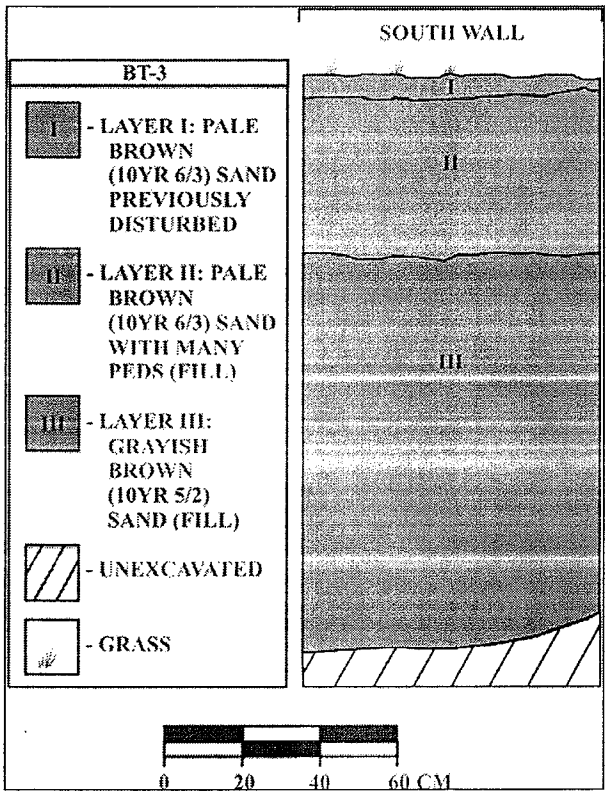


**Figure 10: Backhoe Trench 3 South Wall Profile.**

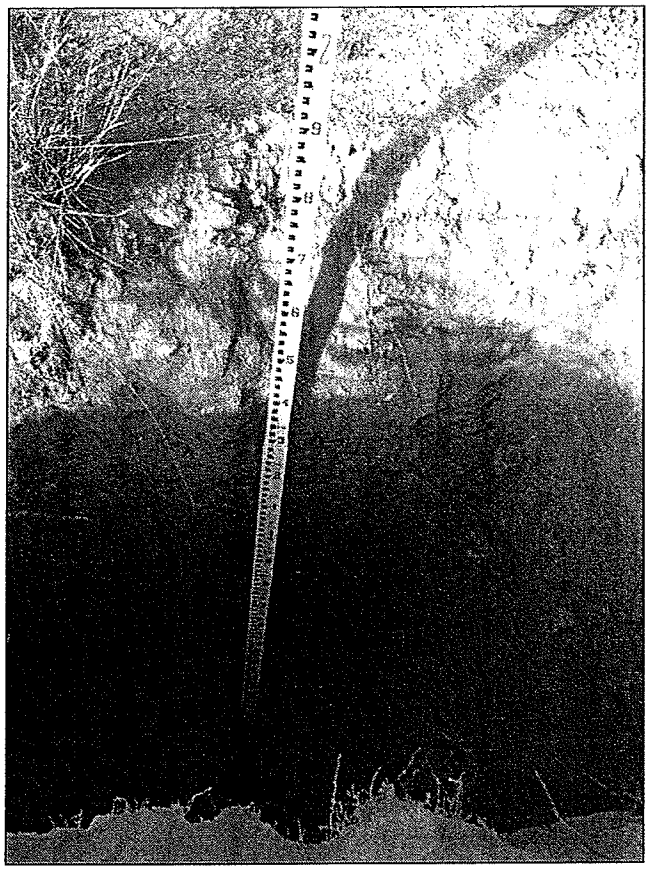

**Figure 11: Photograph of Backhoe Trench 3 South Wall Profile To South.**

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.

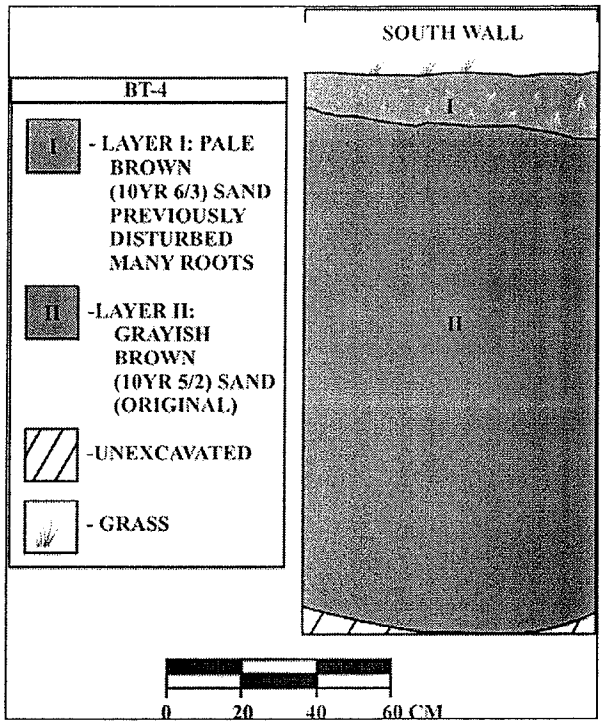


**Figure 12: Backhoe Trench 4 South Wall Profile.**

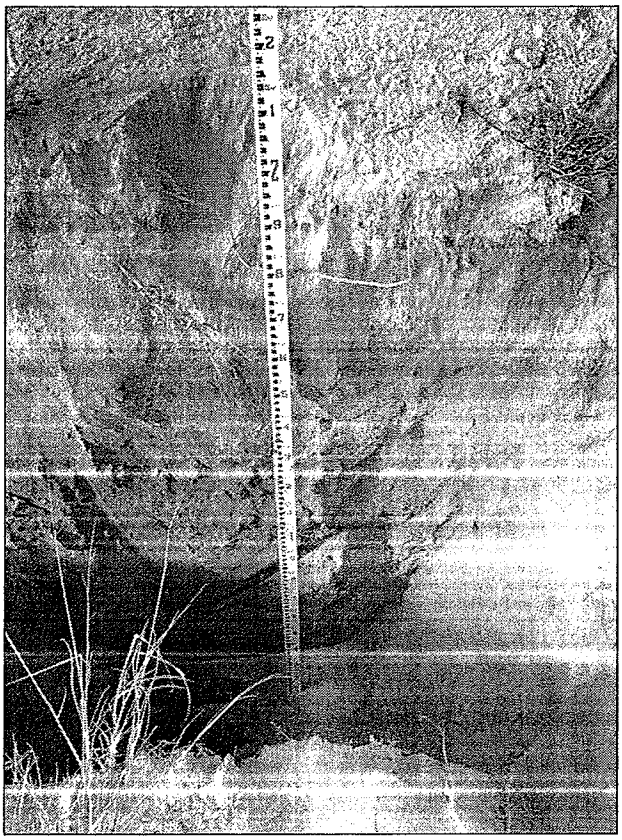

**Figure 13: Photograph of Backhoe Trench 4 South Wall Profile To South.**

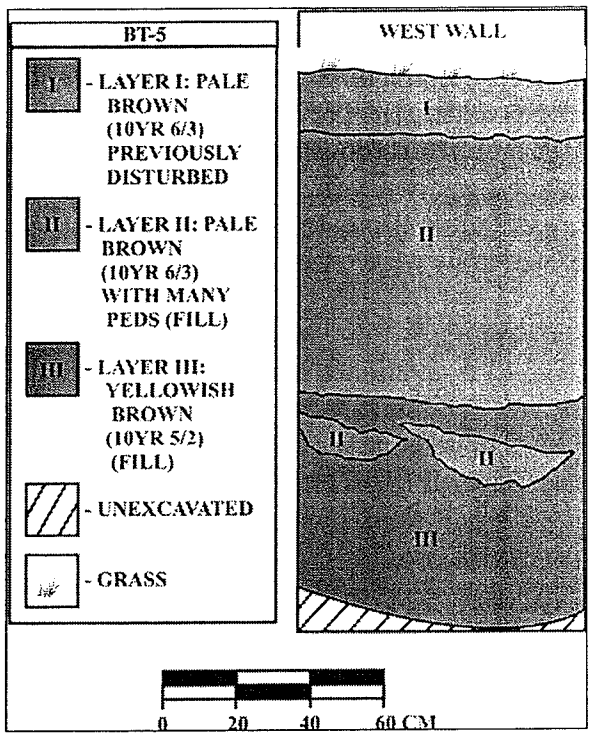


**Figure 14: Backhoe Trench 5 West Wall Profile.**

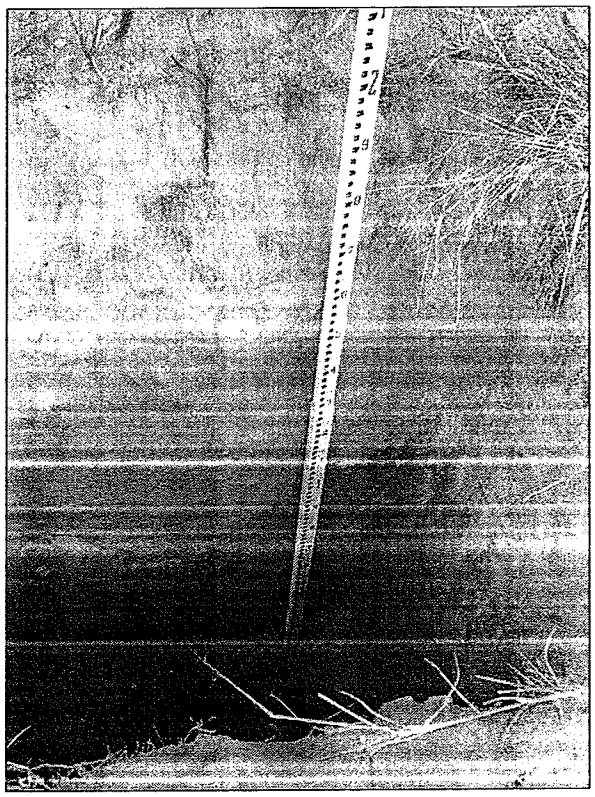

**Figure 15: Photograph of Backhoe Trench 5 West Wall Profile To West.**

**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.

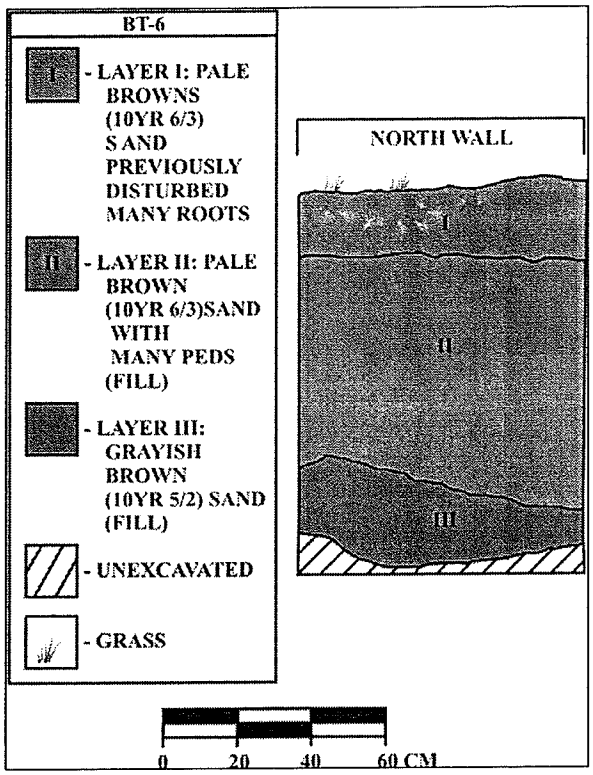


**Figure 16: Backhoe Trench 6 North Wall Profile.**

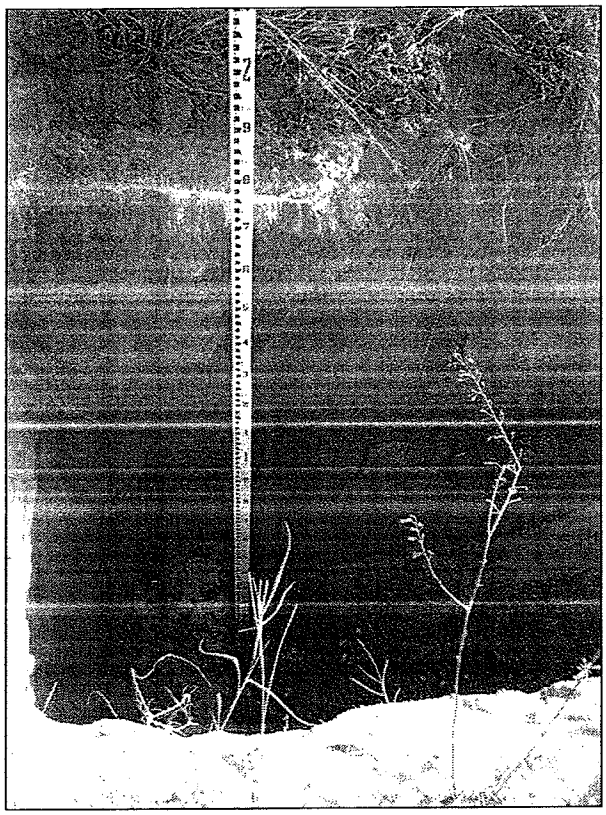

**Figure 17: Photograph of Backhoe Trench 6 North Wall Profile To North.**

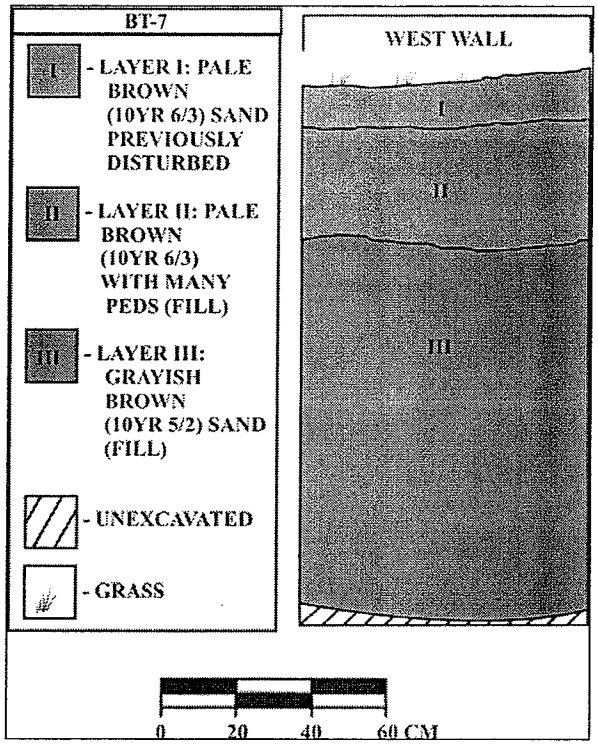


**Figure 18: Backhoe Trench 7 West Wall Profile.**

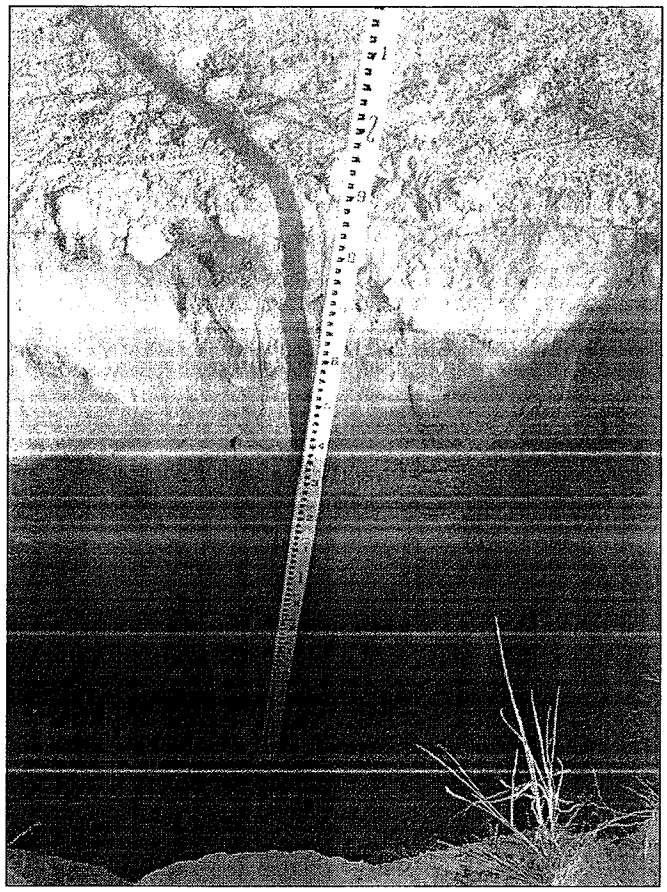

**Figure 19: Photograph of Backhoe Trench 7 West Wall Profile To West.**

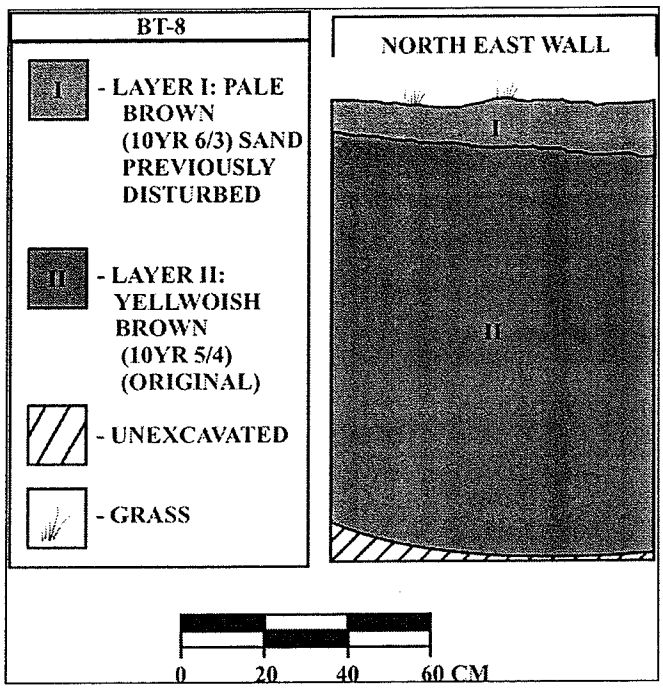


**Figure 20: Backhoe Trench 8 Northeast Wall Profile.**

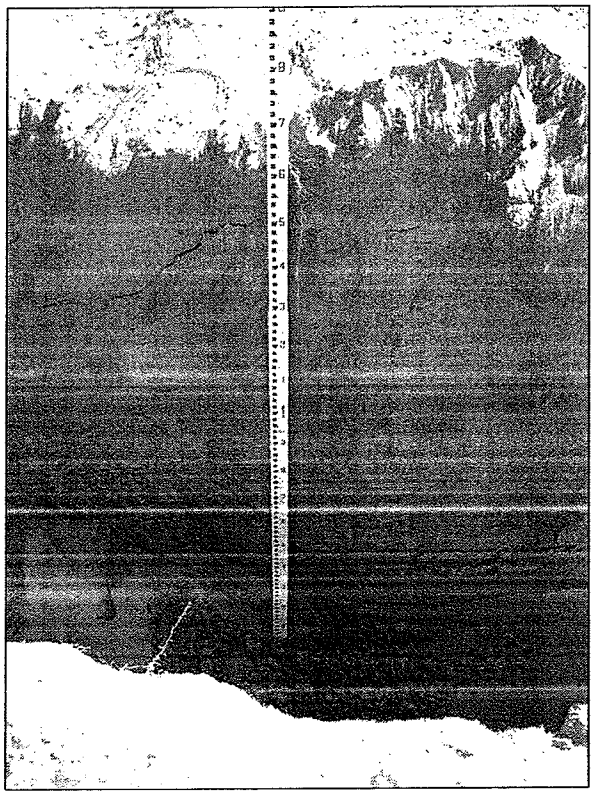

**Figure 21: Photograph of Backhoe Trench 8 Northeast Wall Profile To Northeast.**

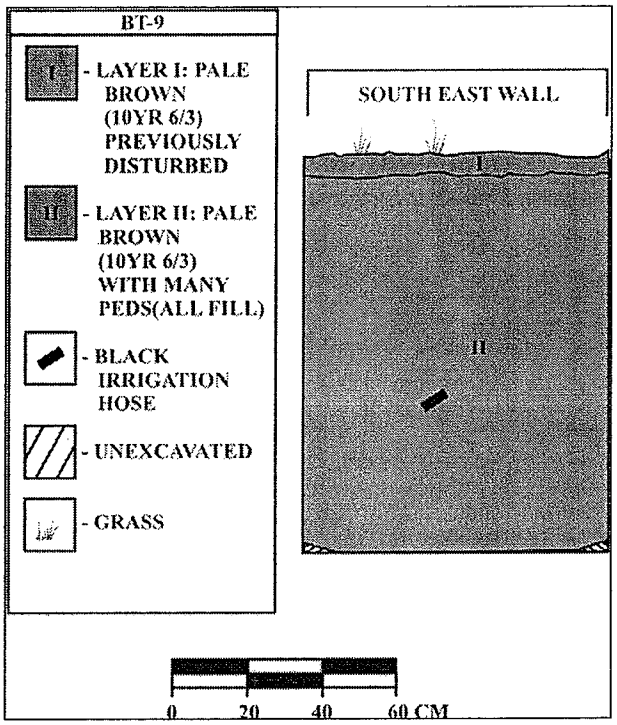


**Figure 22: Backhoe Trench 9 Southeast Wall Profile.**

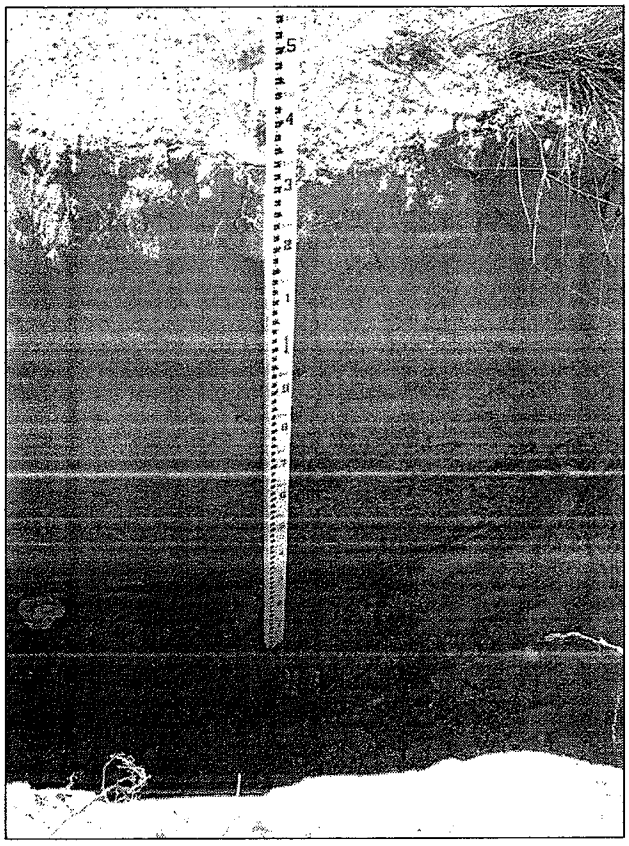

**Figure 23: Photograph of Backhoe Trench 9 Southeast Wall Profile To Southeast.**

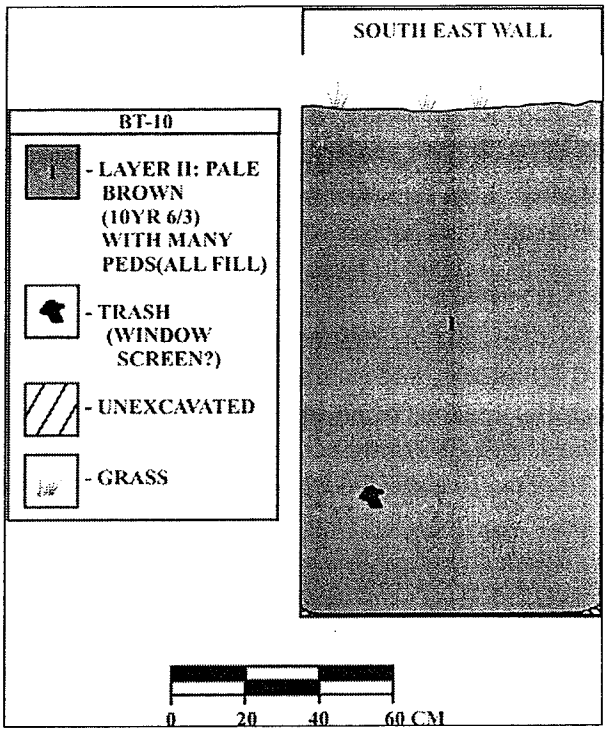


**Figure 24: Backhoe Trench 10 Southeast Wall Profile.**

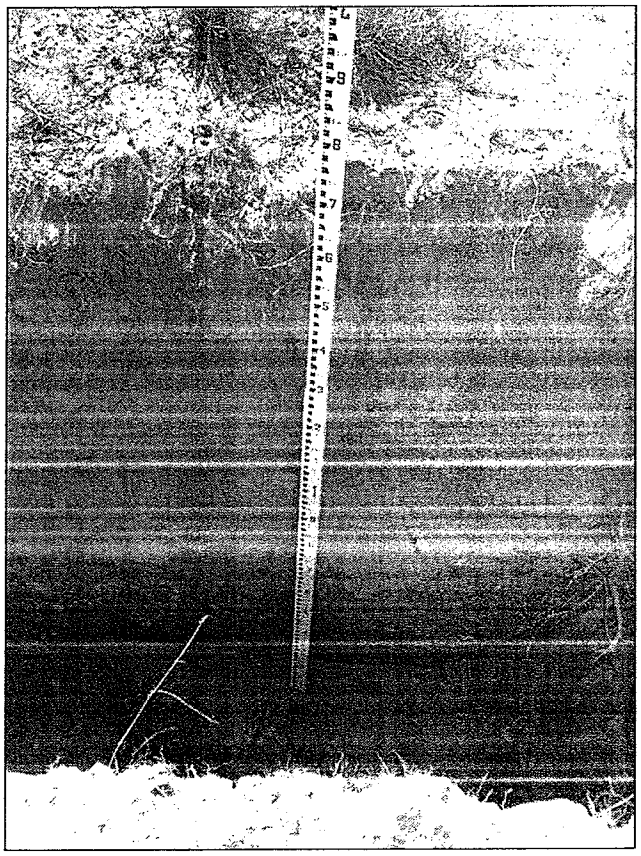

**Figure 25: Photograph of Backhoe Trench 10 Southeast Wall Profile To Southeast.**

**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.

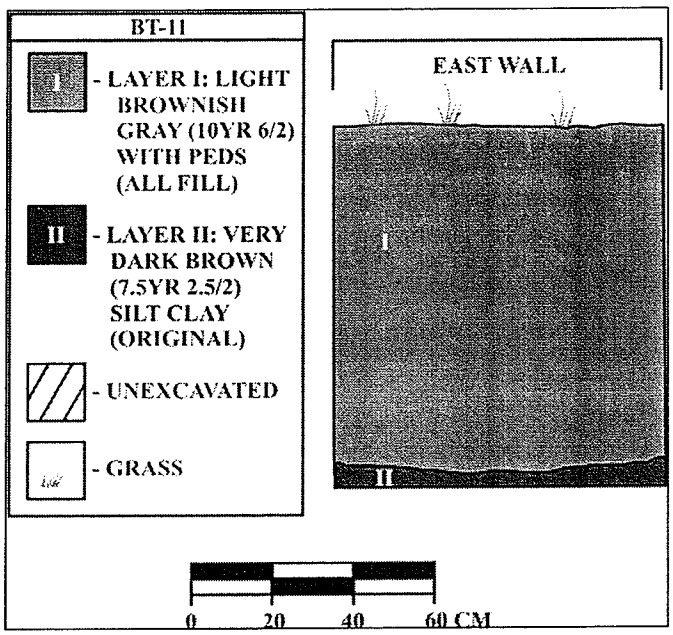


**Figure 26: Backhoe Trench 11 East Wall Profile.**

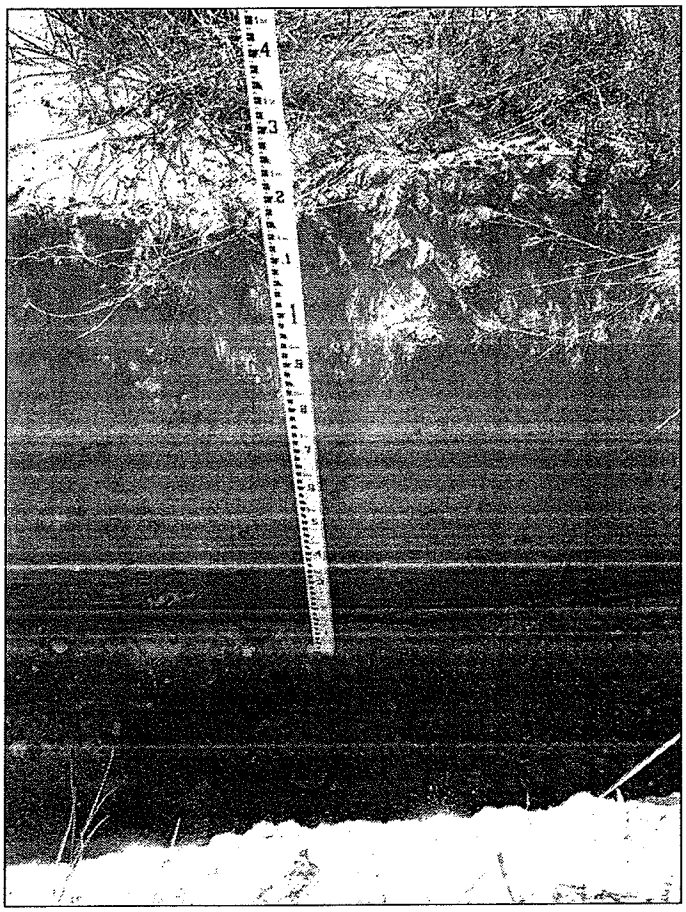

**Figure 27: Photograph of Backhoe Trench 11 East Wall Profile To East.**

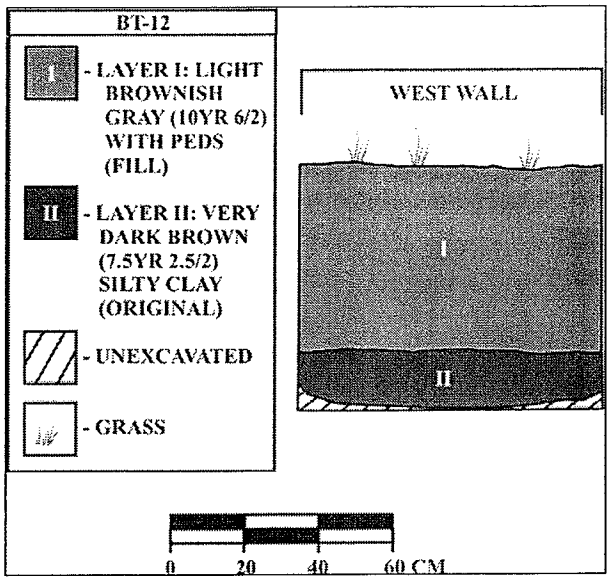


**Figure 28: Backhoe Trench 12 West Wall Profile.**

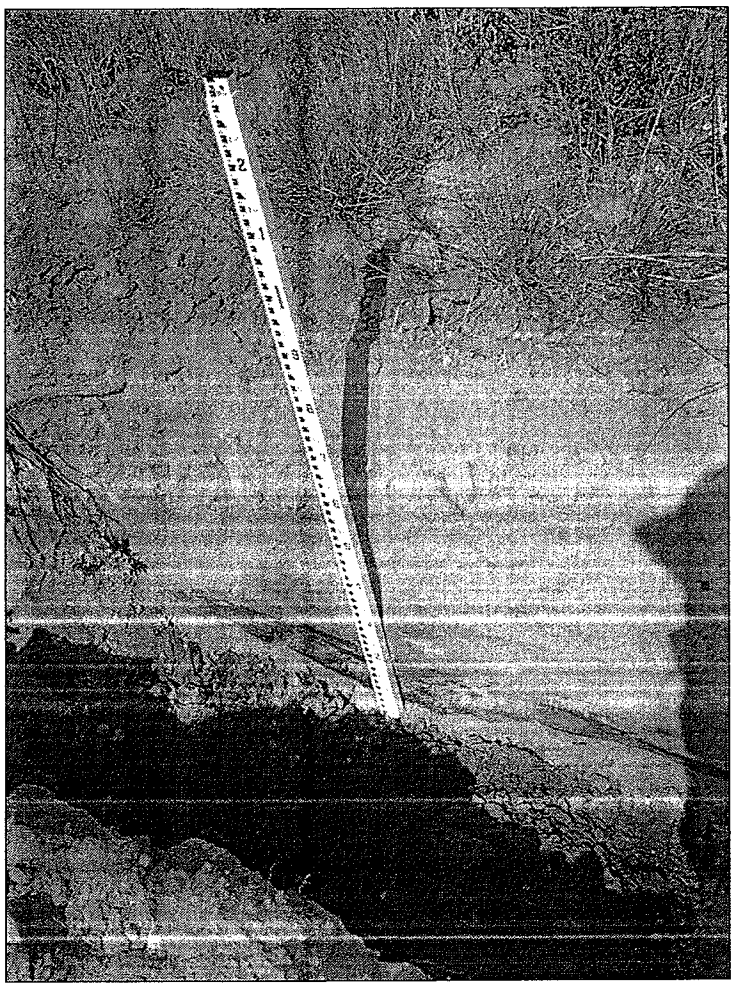

**Figure 29: Photograph of Backhoe Trench 12 West Wall Profile To West.**

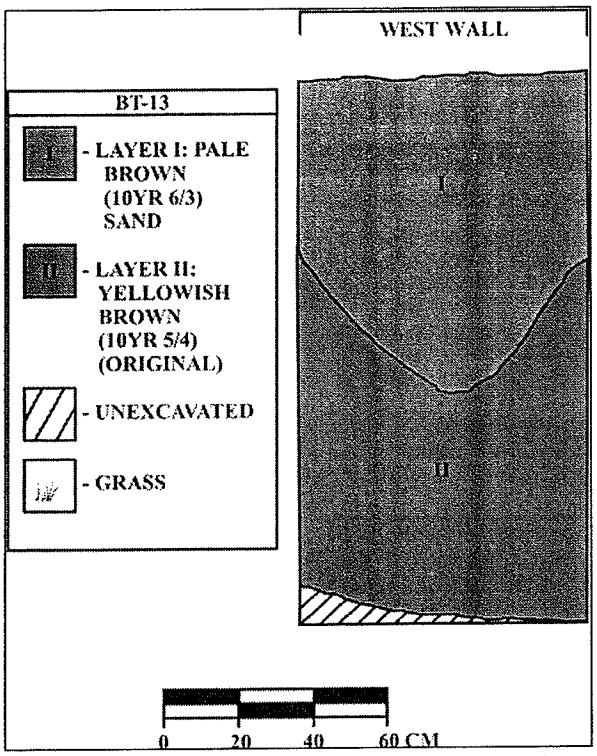


**Figure 30: Backhoe Trench 13 West Wall Profile.**

**Figure 31: Photograph of Backhoe Trench 13 West Wall Profile To Southwest.**

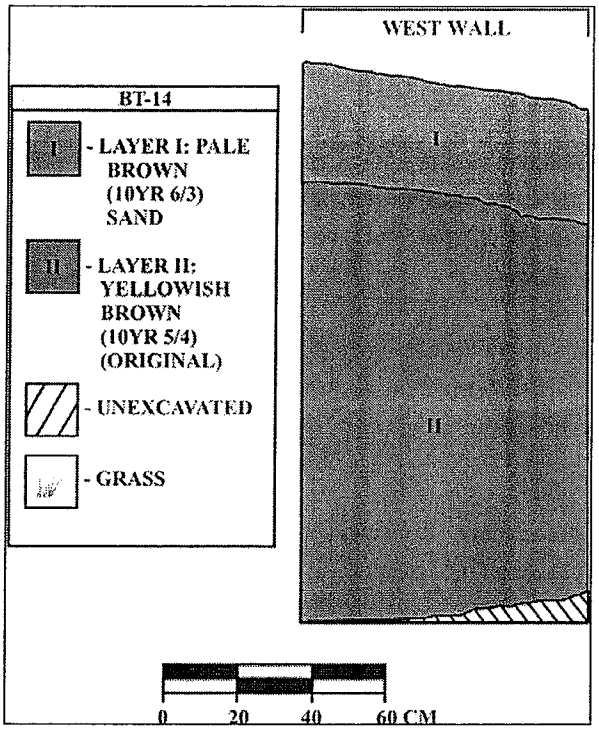


**Figure 32: Backhoe Trench 14 West Wall Profile.**

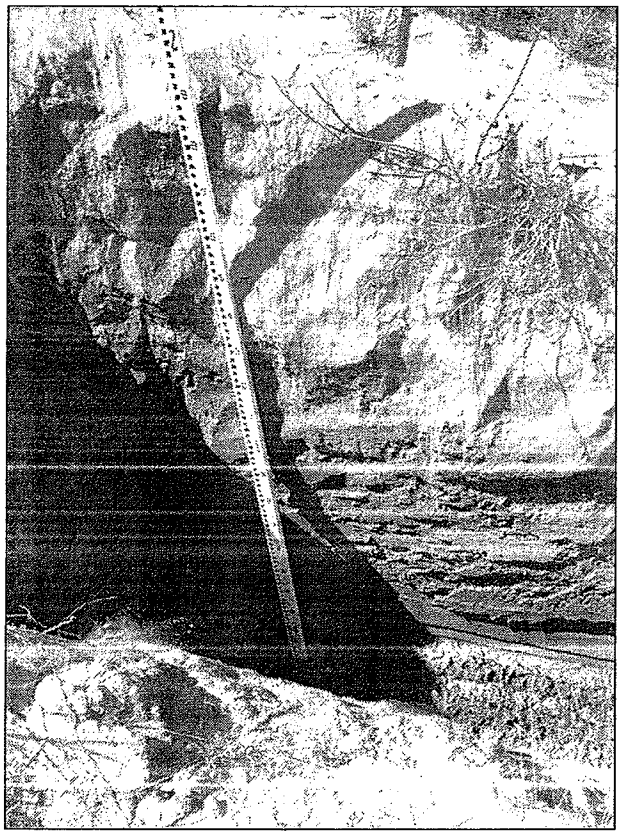

**Figure 33: Photograph of Backhoe Trench 14 West Wall Profile To Southwest.**

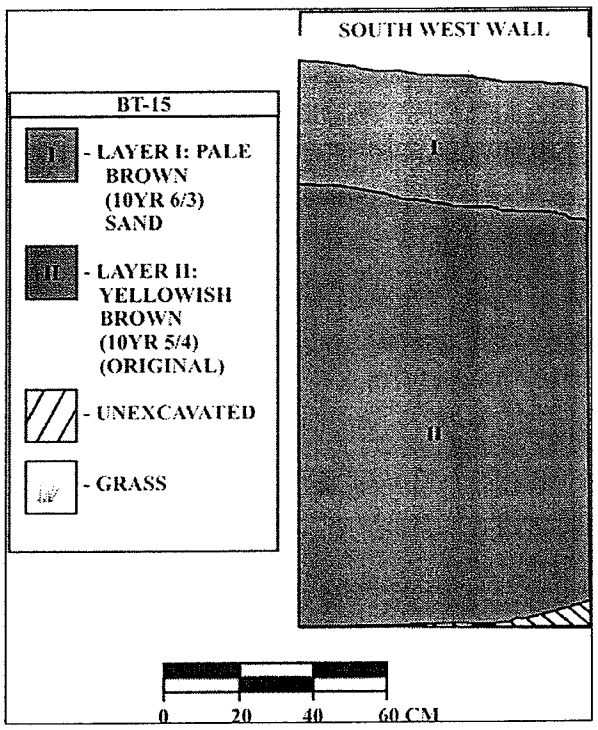


**Figure 34: Backhoe Trench 15 Southwest Wall Profile.**

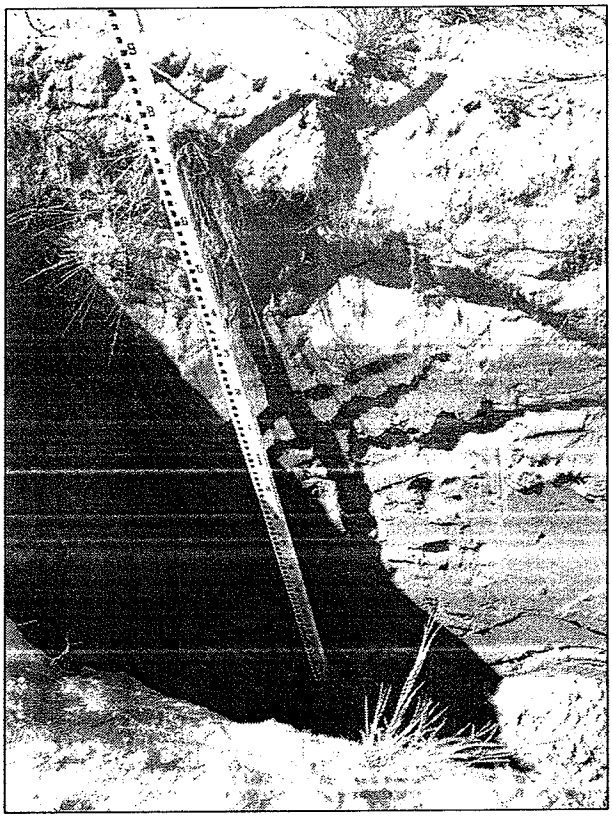

**Figure 35: Photograph of Backhoe Trench 15 Southwest Wall Profile To Southwest.**

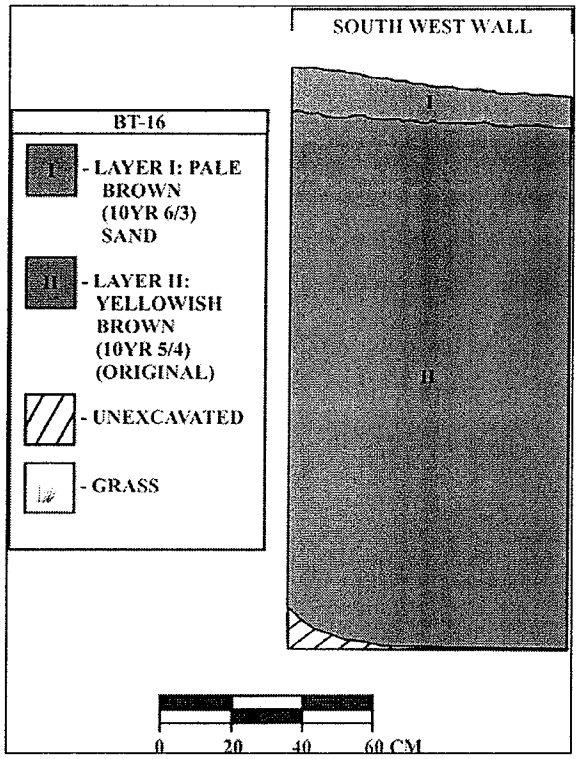


**Figure 36: Backhoe Trench 16 Southwest Wall Profile.**

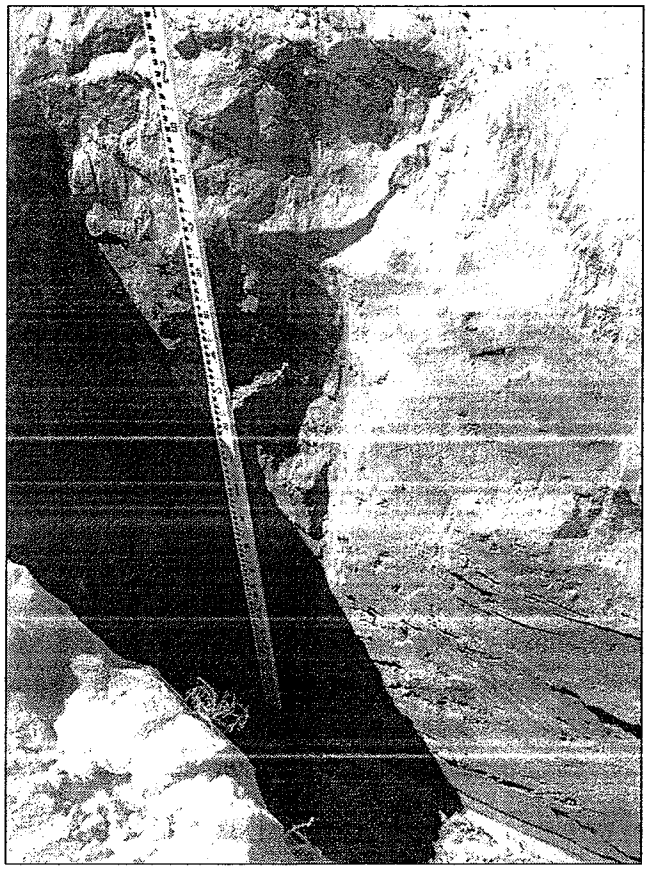

**Figure 37: Photograph of Backhoe Trench 16 Southwest Wall Profile To Southwest.**

**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 layer s (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 (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.

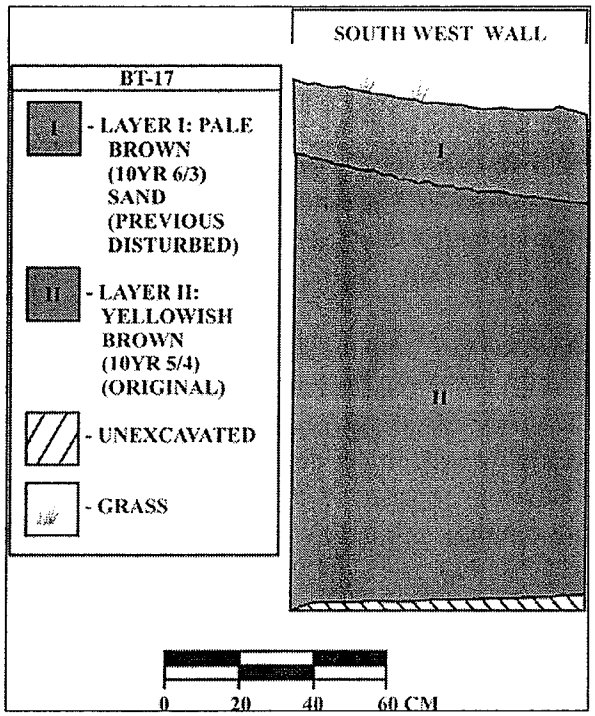


**Figure 38: Backhoe Trench 17 Southwest Wall Profile.**

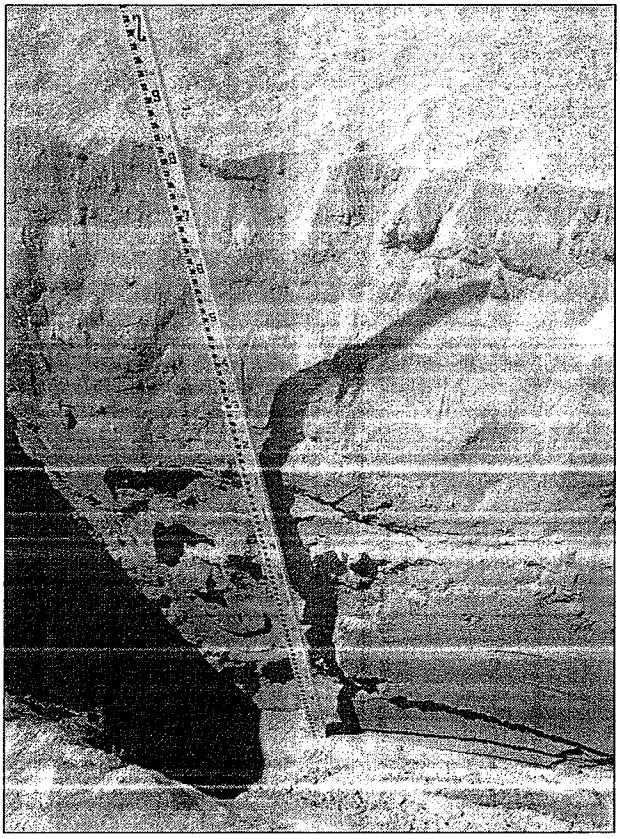

**Figure 39: Photograph of Backhoe Trench 17 Southwest Wall Profile To Southwest.**

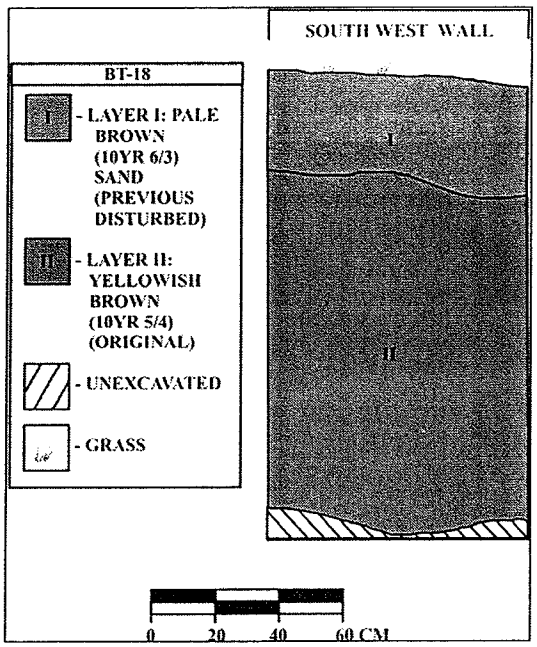


**Figure 40: Backhoe Trench 18 Southwest Wall Profile.**

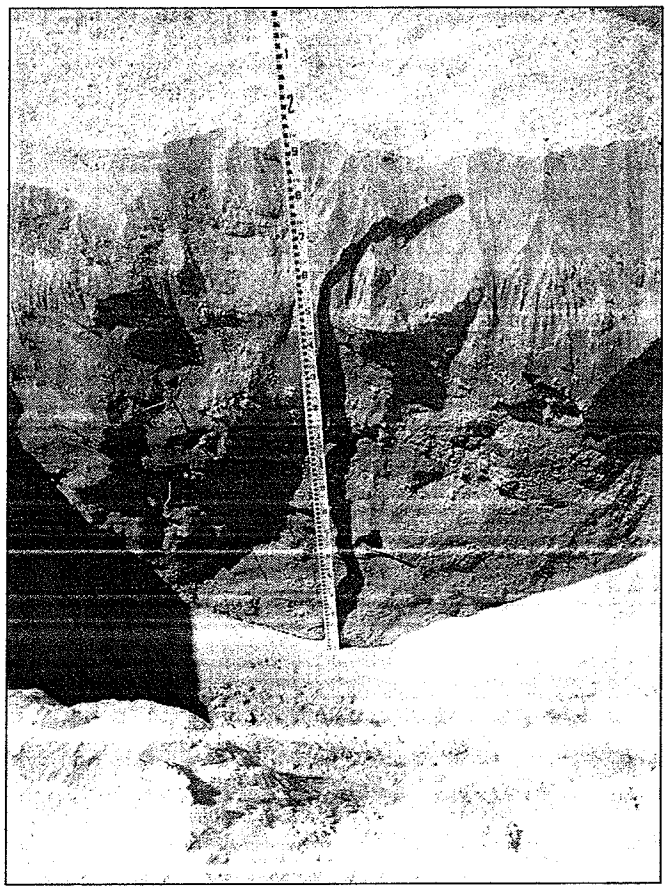

**Figure 41: Photograph of Backhoe Trench 18 Southwest Profile To Southwest.**

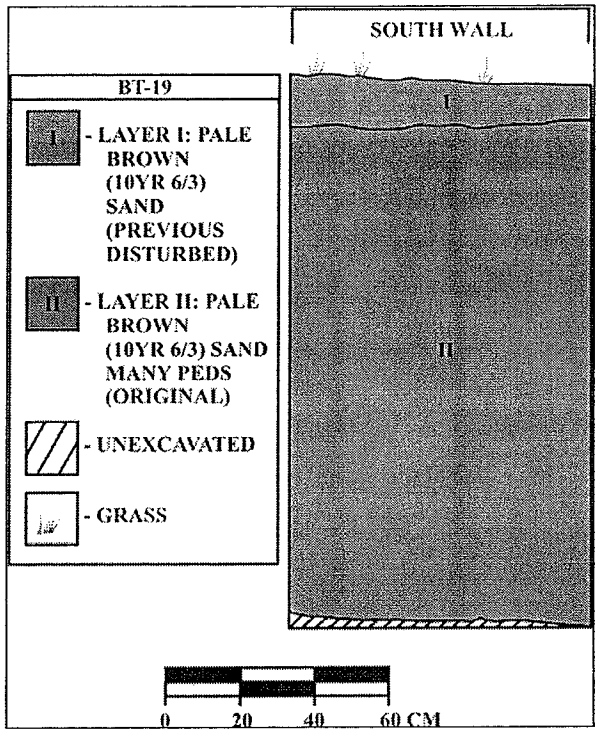


**Figure 42: Backhoe Trench 19 South Wall Profile.**

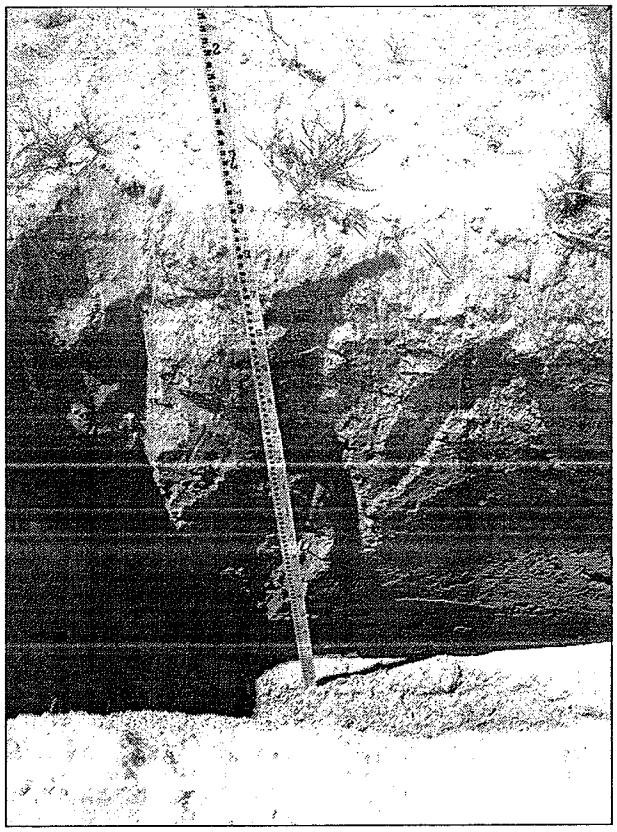

**Figure 43: Photograph of Backhoe Trench 19 South Wall Profile To South.**

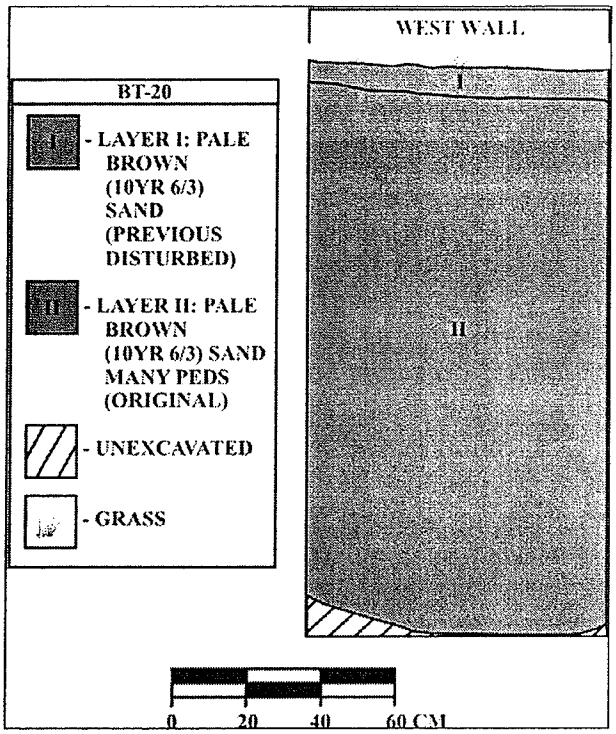


**Figure 44: Backhoe Trench 20 South Wall Profile.**

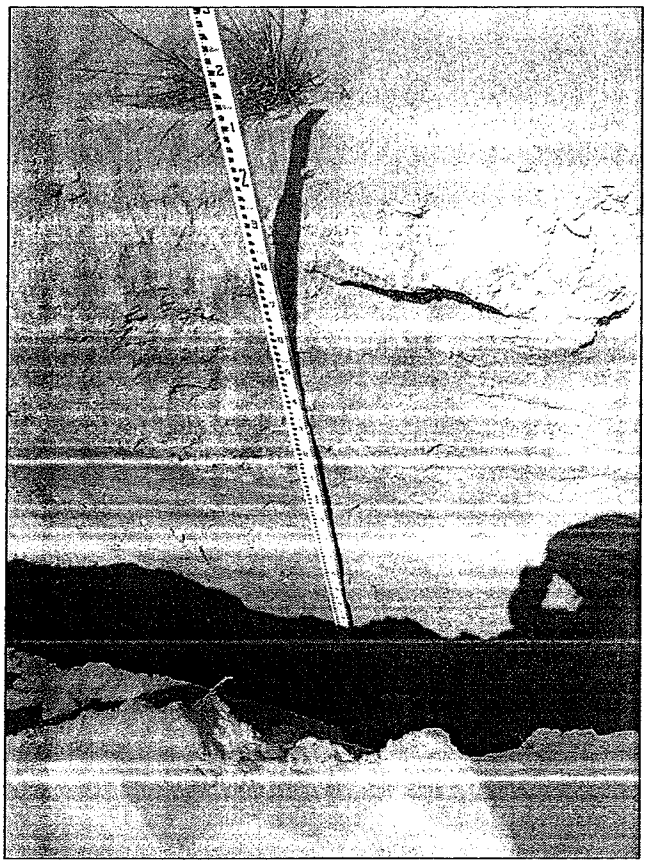

**Figure 45: Photograph of Backhoe Trench 20 South Wall Profile To South.**

## REFERENCES


Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii, 2nd Edition.* University of Hawaii Press. Honolulu.

Bordner, Richard
1983 *Archaeological Reconnaissance and Subsurface Testing: Waiehu, Maui, Hawaii.* Ms. On File State Historic Preservation Division.

Chinen, Jon J.
1961 *The Great Māhele: Hawaiian Land Division of 1848.* University of Hawaii Press. Honolulu.

Clark, D., and J.F. Balicki
1988 *Preliminary Research Report: The Maui Archaeology Project of Waihee.* Department of Anthropology, The Catholic University of America, Washington, D.C.

1989 *Archaeological Inventory Survey, Proposed Waihee Golf Club Project Area, Lands of Waihee and Wai`ehu, Wailuku District, Island of Maui.* PHRI Report 549-062589. Prepared for Wailuku Ocean Front Hawaii, Inc.

Cordy, R. H.
1981 *A Study of Prehistoric Social Change: The Development of Complex Societies in the Hawaiian Islands.* Academic Press, New York.

Dega, M.F.
2003 *Archaeological Inventory Survey in the Intermediate Dry Zone of Wailuku, Wailuku Ahupua`a, Wailuku (Kula) District, Maui Island, Hawai`i TMK:3-5-001:portion of 001).* Scientific Consultant Services, Inc., Honolulu.

Dixon, Boyd
1996 *Inadvertent Discovery of Human Remains at 741 Kuhio Place, Wailuku, Maui. State Site 50-50-04-1812. TMK: 3-3-06:47.* Ms. On File State Historic Preservation Division.

Donham, T.K.
2003 *Archaeological Assessment for Modification of a Dwelling at 1376 Kakae Place, Waiehu, Wailuku District, Maui TMK: (2) 3-2-20:64.* Akahele Archaeology, Kihei, Maui. Ms. On File State Historic Preservation Division.

1989 *Archaeological Inventory Survey, Proposed Waihee Golf Club Project Area Lands of Waihee and Wa`iehu, Wailuku District, Island of Maui.* PHRI Report 549-062589.

1978 *Cultural Reconnaissance of Hydroelectric Power Plant Sites in Waihee Valley, Maui and Lumaha`i Valley, Kauai: Archaeological Survey.* B. P. Bishop Museum, Honolulu.

Dorrance, W.H. and F.S. Morgan
2000 *Sugar Islands: The 165-Year Story of Sugar in Hawaii.* Mutual Publishing Co., Honolulu.

Foote, D.E., E. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Oahu, Maui, Molokai, and Lanai, State of Hawaii.* U.S. Department of Agriculture Soil Conservation Service. Washington. D.C.

Folk, W.H. and H. H. Hammatt
1992 *Archaeological Survey and Sub-Surface Testing at Waiehu, Maui (TMK: 3-2-13:05).* Cultural Surveys Hawaii. Ms. On File State Historic Preservation Division.

Fortini, W.R. and M.F. Dega
2006 *An Archaeological Monitoring Report for Residential Construction at 955 Puuloa Street, Ahupua`a of Waiehu, Wailuku District, Island of Maui, Hawaii [TMK: 3-3-10:12].* Scientific Consultant Services, Inc. Honolulu.

Fredericksen, E.M.
2003 *An Archaeological Monitoring Report for a Portion of Land in Wai`ehu, Wai`ehu Ahupua`a, Wailuku District, Maui Island (TMK: 3-2-20:Por. 47, Lot 9A.* Xamanek Researches. On File State Historic Preservation Division.

1997 *Report on Archaeological Monitoring of North Waihe`e Water Source Project, Phase III Transmission Line, Wai`ehu and Waihe`e Ahupua`a, Wailuku District, Maui Island (TMK: 3-2-08, 09, 13, 17)*, prepared for Mr. David Craddick, County of Maui Board of Water Supply, by Xamanek Researches, Pukalani, Hawaii.

Fredericksen, E.M., and D.L. Fredericksen
2004 *Archaeological Inventory Survey Report for Phase II of the Paukukalo 8-inch Waterline Replacement Project along Lilihua Place, Wailuku Ahupua`a, Wailuku District, Maui Island (TMK: 3-4-29).* Xamanek Researches. Ms. On File State Historic Preservation Division.

2002 *Archaeological Inventory Survey of Puuohala Mauka Residential Subdivision, Wailuku* Ahupua`a, *Wailuku District, Maui Island, (TMK 3-3-2:por. 1).* Ms. On File, State Historic Preservation Division.

2000 *Archaeological Inventory Survey For the Wai`ehu Kou Sewer Line Corridor, Wai`ehu* Ahupua`a, *Wailuku District, Maui Island (TMK: 3-2-3).* Ms. O On File, State Historic Preservation Division.

1998 *Archaeological Inventory Survey of Phases IV and V, North Waihe`e Water Source Project, Waihe`e Ahupua`a, Wailuku District, Maui Island(TMK: 3-2-01: por.03).* Ms. On File at State Historic Preservation Division.

1990 *An Archaeological Inventory Survey of a Drainage and Diversion Easement Corridor for the Department of Hawaiian Homelands, Wai`ehu Kou 2 Residential Development, Wai`ehu Ahupua`a, Wailuku District, Island of Maui (TMK: 3-2-13:por. 1 and 9).* Ms. On File, State Historic Preservation Division.

Griffin, Agnes

1993 *Inadvertent Burial Discovery, Site 50-50-04-3139, Paukukalo, Wailuku, Maui. TMK: 3-4-29:22.* Ms. On File, State Historic Preservation Division.

1993 1991 *Archaeological Surface Assessment of a 3.1 Acre Parcel Proposed Phase 4 Residential Lots, Paukukalo, Wailuku, Maui. TMK: 3-3-06:52.* Ms. On File, State Historic Preservation Division.

Handy, E.S. Craighill and Elizabeth Green Handy

1972 *Native Planters of Old Hawaii - Their Life, Lore, and Environment.* Bishop Museum Press. Honolulu, Hawaii.

Jones, B., J. Pantaleo, and A. Sinoto

1996 *An Archaeological Inventory Survey for the North Waihee Wells Waterline Project, Waihee and Wai`ehu Ahupua`a, Wailuku, Maui.* Aki Sinoto Consulting.

Kamakau, S.

1992 *Ruling Chiefs of Hawaii*, Revised Edition, Kamehameha Schools Press, Honolulu.

Kame`eleihiwa, Lilikalā

1992 *Native Land and Foreign Desires: Pehea Lā E Pono Ai?* Bishop Museum Press. Honolulu.

Kelly, M., Y. Sinoto, and R. Cordy

1978 *Archaeological Investigations at Wai`ehu Heights Subdivision, Wai`ehu, Maui.* Bishop Museum.

Kennedy, J.

1990 *Subsurface Testing Results for a Portion of the Piihana District, Piihana, Maui. TMK: 3-3-1:16 por.* Ms. On File, State Historic Preservation Division.

1990 Letter Dated September 13, 1990 to Mr. Jim Murray of C. Brewer Properties – Summary Document Re. Archaeological Activities Surrounding Piihana District #2. On File State Historic Preservation Division.

*1991* 1990 *Archaeological Survey and Subsurface Testing for the Proposed Grading Project, TMK: 3-3-01:16 (por.)* On File State Historic Preservation Division.

Kirch, Patrick Vincent
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

Monahan, Christopher M.
2005 *An Archaeological Inventory Survey on Approximately 1.5 Acres of Land at Waiehu Golf Course (Maintenance Building Project) In Waiehu, Waiehu Ahupua`a, Wailuku District, Island of Maui, Hawai`i [TMK: (2)3-2-13 Portion 06] With Addendum Added.* Scientific Consultant Services, Inc., Honolulu.

Munsell Color
1990 *Munsell Soil Color Charts.* Macbeth Division of Kollmorgen Instruments Corporation, Baltimore, MD.

Neal, Marie C.
1968 *In Gardens of Hawaii.* Bishop Museum Press, Honolulu.

Pukui, M.K., S.H. Elbert, &.T. Mookini
1976 *Place Names of Hawaii.* The University of Hawaii Press, Honolulu.

Sterling, Elspeth P.
1998 *Sites of Maui.* Bishop Museum Press, Honolulu, Hawaii.

Stokes, J.F.G.
1918 *Report on the Heiau of Maui.* Transcipt on file at the B.P. Bishop Museum, Honolulu.

Thrum , T.G.
1917 "Maui's Heiaus and Heiau Sites Revisited," *Hawaiian Annual for 1917.* Honolulu.

Trembly, Diane
1987 *Osteologial Analysis of Skeletal Materials Recovered from the Waiehu Planned Development Increment "A", Waiehu, Wailuku, Maui.* Bishop Museum. On File State Historic Preservation Division.

Waihona `Aina Corporation
2003 Mahele Database, www.waihona.com. Kane`ohe, HI.

Walker, Winslow
1931 *Archaeology of Maui.* Department of Anthropology, B.P. Bishop Museum, Honoluolu, HI.

Whistler, W. Arthur
1995 *Wayside Plants of the Islands: A Guide to the Lowland Flora of the Pacific Islands including Hawai`i, Samoa, Tonga, Tahiti, Fiji, Guam, Belau.* Isle Botanica, Honolulu, Hawaii.

Wilson, Jon and M.F. Dega
2004 *Archaeological Inventory Survey of 240.087 Acres Located in Wai`ehu Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK: (2) 3-3-02:portion of 001].* On file State Historic Preservation Division.

Yent, Martha
1984 *Additional Archaeological Testing at Halekii-Pihana State Monument, Paukukalo-Waiehu, Wailuku, Maui.* Ms. On file State Historic Preservation Division.

1983 *Halekii-Pihana State Monument Phase I: Archaeological Testing and the Development of Interpretive Themes.* Ms. on file State Historic Preservation Division.

# APPENDIX D-1.

# Archaeological Monitoring Plan

SCS Project Number 963 AMP-1

# 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, HAWAI`I [TMK: (2) 3-3-001:102 AND 016 (POR.)]


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June 2008

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## TABLE OF CONTENTS

TABLE OF CONTENTS ..... ii
LIST OF FIGURES ..... ii
LIST OF TABLES ..... ii
INTRODUCTION ..... 1
REASONS FOR MONITORING ..... 4
ENVIRONMENTAL SETTING ..... 5
  LOCATION ..... 5
  PROJECT AREA LANDFORM, SOIL, AND CLIMATE ..... 6
  VEGETATION ..... 8
PRE-CONTACT AND HISTORIC SETTING ..... 8
  THE PRE-CONTACT PERIOD ..... 8
  KNOWN HEIAU IN THE VICINITY ..... 10
HISTORIC SETTING OF THE PROJECT AREA AND ENVIRONS ..... 11
  LAND TENURE ..... 11
  HISTORIC ERA ..... 12
PREVIOUS ARCHAEOLOGY ..... 13
  OVERVIEW ..... 13
EXPECTED FINDINGS ..... 19
MONITORING CONVENTIONS AND METHODOLOGY ..... 20
LABORATORY ANALYSIS ..... 21
CURATION ..... 22
REPORTING ..... 22
REFERENCES ..... 23

## LIST OF FIGURES

Figure 1: USGS (Wailuku) Quadrangle Showing Project Area Location. ..... 2
Figure 2: Tax Map Key [TMK (2) 3-3-001: 102 and 016 (por.)] ..... 3
Figure 3: USDA Soil Survey Map Showing Soil Series within Project Area (from Foote *et al.* 1972) ..... 7
Figure 4: Selected State Site Locations in the Vicinity of the Project Area (Adapted from Fredericksen and Fredericksen 2002: Map 5) ..... 18

## LIST OF TABLES

Table 1: Summary of Previous Archaeology in Project Area (Adapted from Fredericksen and Fredericksen 2000: 12-13; 2002 12-13) ..... 14

## 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

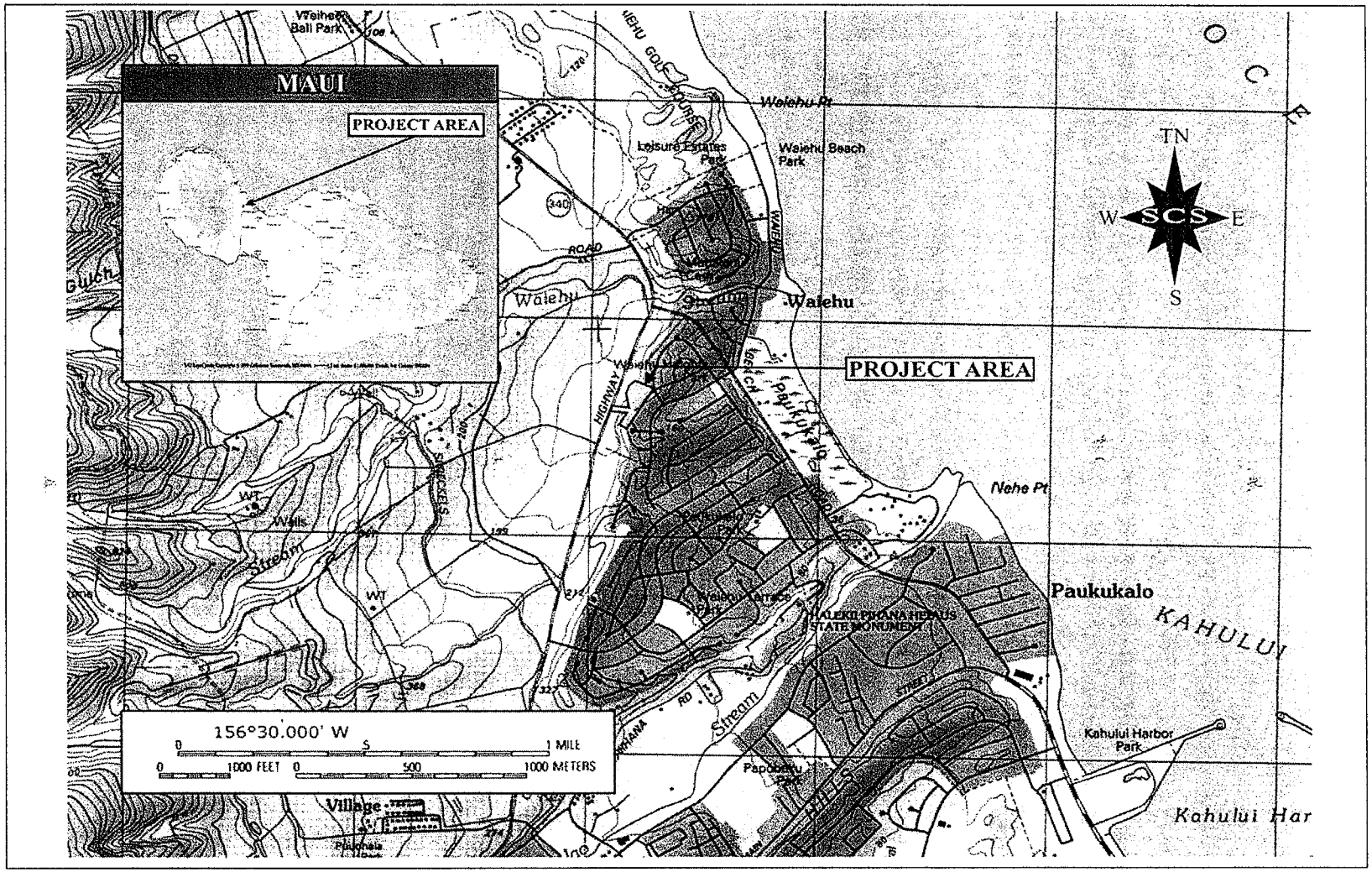


**Figure 1: USGS (Wailuku) Quadrangle Showing Project Area Location.**

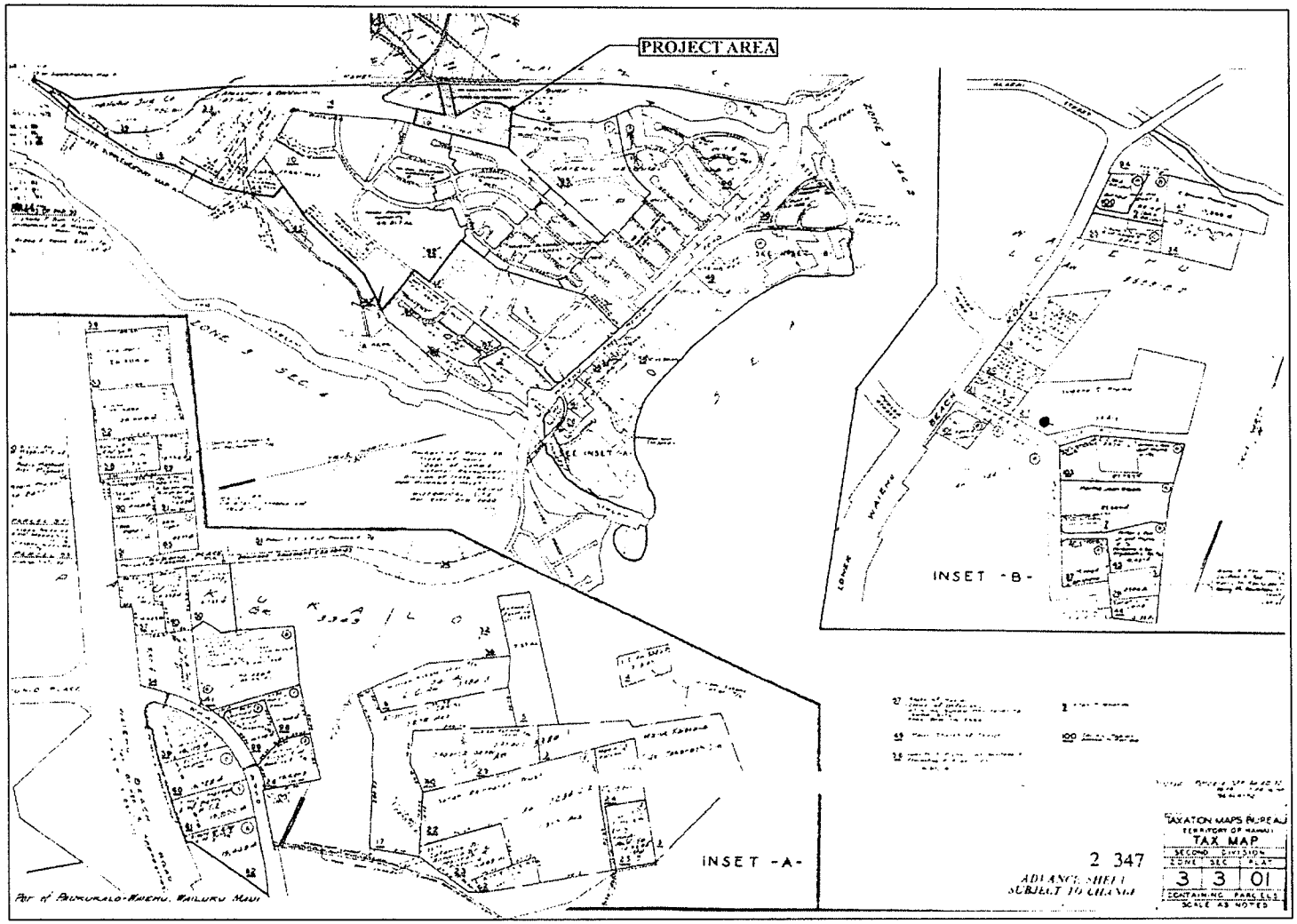


**Figure 2: Tax Map Key [TMK (2) 3-3-001: 102 and 016 (por.)]**

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 subsuface construction activity, this AMP will require approval from the SHPD. Details on the reasons for monitoring, potential site types that may be encontered 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 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 (*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.

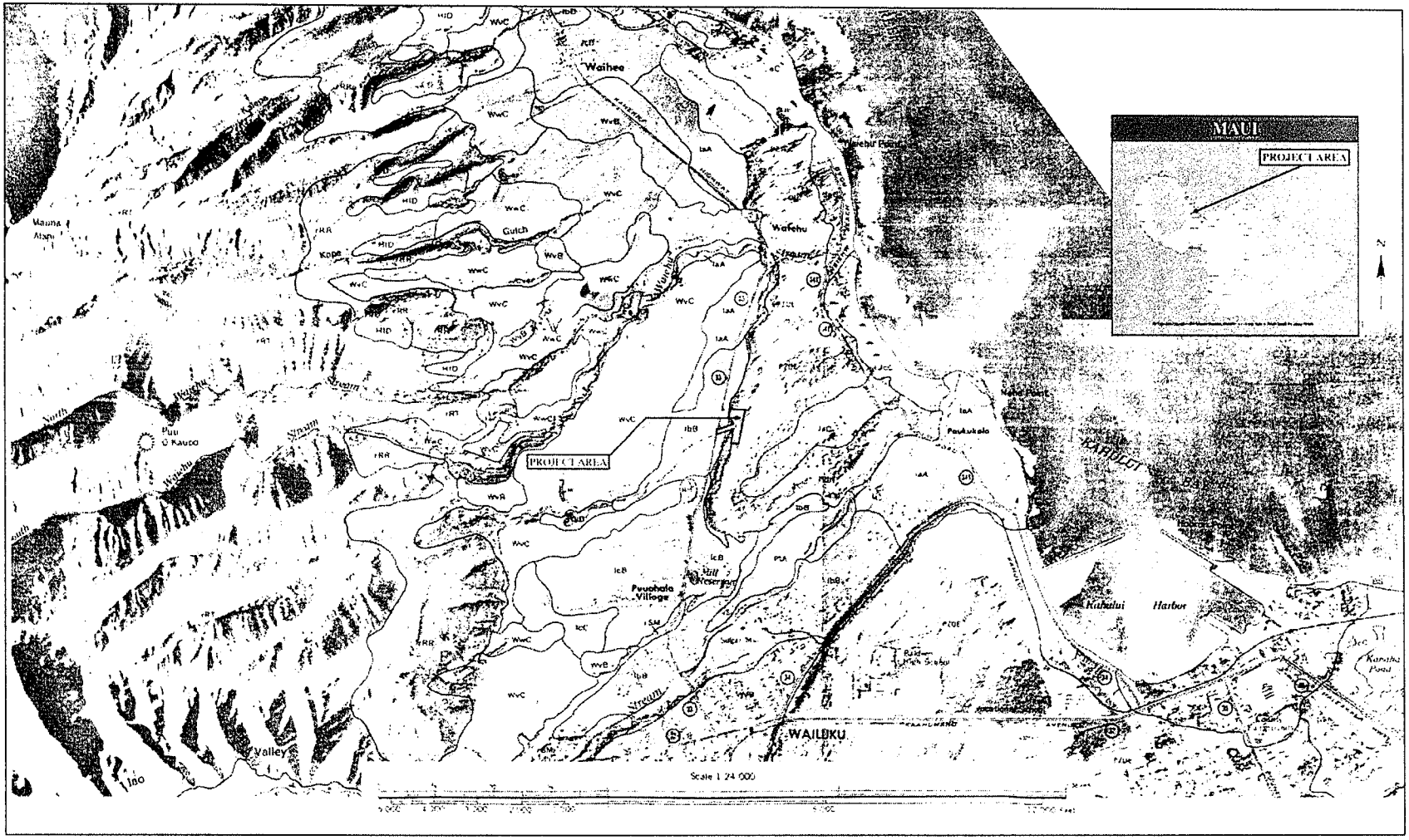


**Figure 3: USDA Soil Survey Map Showing Soil Series within Project Area (from Foote *et al.* 1972)**

## 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*), bufflegrass (*Cenchrus ciliaris*), and Bermuda grass (*Cynodon dactylon*); scattered stunted shrubs such as *koa haole* (*Leucaena leucocephala*), indigo (*Indigofera suffructicosa*), 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 Strerling 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 `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* (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 t 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 Fredericksen and Fredericksen 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 18th or early 19th 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 | Fredericksen , 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 | Fredericksen, 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 #) |
|---|---|---|---|---|
| | | | | 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, 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); *kuleana* water flume (-4371); the Old Poi Factory (-4372)<br>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 *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 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 *`ili `ili* 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 Piihana District, Piihana 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 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 *In situ* burials, secondary burials, fragmented and previously disturbed human skeletal remains, historic bottle fragments, stone terraces. |
| 1989 | Donham, T. | Waihe`e 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 | Waihe`e Midden Site | Inventory Survey | Coastal dune site: 4 fire hearths, 4 fire floors, an *imu*, 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-Pihana State Monument: Phase I, Waiehu | Survey, Test Coring | Halekii (-4592): *ili-ili* stones, shell, charcoal. No evidence of cultural deposit earlier than construction date.<br>Pihana (-4592): *ili-ili* stones, shell, human and pig bone, human burial left *in situ* |
| 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 Wailuku 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 *ko`a* 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 *Heiau* |
| 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. | *Archaeology of Maui* | Island-wide investigation | Among other records, documents 5 *heiau* in Waiehu and 13 *heiau* in Wailuku |
| 1918 | Stokes, J.F.G. | ". . . Heiau of Maui." | Island-wide investigation | Among other records, documents *heiau* in Wailuku District |
| 1917 | Thrum, T.G. | "Maui's Heiau . . ." | Island-wide investigation | Description of Wailuku's Pihana Heiau, among other records |

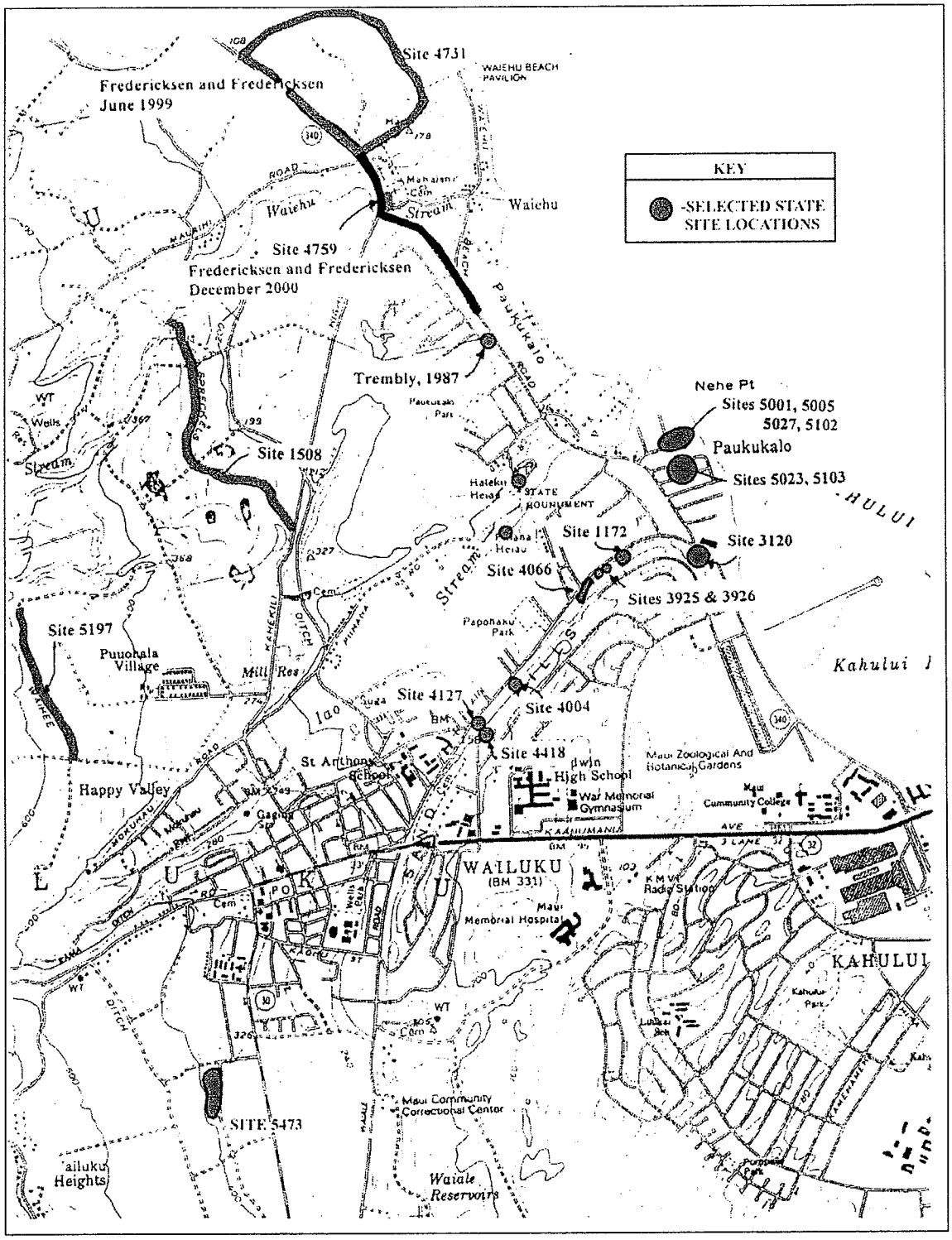


**Figure 4: Selected State Site Locations in the Vicinity of the Project Area (Adapted from Fredericksen and Fredericksen 2002: Map 5).**

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 Connolly1973). 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.

## REFERENCES


Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii, 2nd Edition.* University of Hawaii Press. Honolulu.

Bordner, Richard
1983 *Archaeological Reconnaissance and Subsurface Testing: Waiehu, Maui, Hawaii.* Ms. On File State Historic Preservation Division.

Chinen, Jon J.
1958 *Great Māhele: Hawaiian Land Division of 1848.* University of Hawaii Press. Honolulu.

Clark, D., and J.F. Balicki
1988 *Preliminary Research Report: The Maui Archaeology Project of Waihee.* Department of Anthropology, The Catholic University of America, Washington, D.C.

1989 *Archaeological Inventory Survey, Proposed Waihee Golf Club Project Area, Lands of Waihee and Wai`ehu, Wailuku District, Island of Maui.* PHRI Report 549-062589. Prepared for Wailuku Ocean Front Hawaii, Inc.

Cordy, R. H.
1981 *A Study of Prehistoric Social Change: The Development of Complex Societies in the Hawaiian Islands.* Academic Press, New York.

Cordy, R., M. Kelly, and C. Hee
1978 *Cultural Reconnaissance of Hydro-electric Power Plant Sites: Waihe`e Valley, Maui.* B.P. Bishop Museum, Honolulu, HI.

Dagher, C.A. and M.F. Dega
2006 *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, Hawai`i [TMK: (2) 3-3-001:102 and 016 por.)].* Scientific Consultant Services, Inc., Honolulu.

Dega, M.F.
2003 *Archaeological Inventory Survey in the Intermediate Dry Zone of Wailuku, Wailuku Ahupua`a, Wailuku (Kula) District, Maui Island, Hawai`i TMK:3-5-001:portion of 001).* Scientific Consultant Services, Inc., Honolulu.

Dixon, Boyd
1996 *Inadvertent Discovery of Human Remains at 741 Kuhio Place, Wailuku, Maui. State Site 50-50-04-1812. TMK: 3-3-06:47.* Ms. On File State Historic Preservation Division.

Donham, T.K.
2003 *Archaeological Assessment for Modification of a Dwelling at 1376 Kakae Place, Waiehu, Wailuku District, Maui TMK: (2) 3-2-20:64.* Akahele Archaeology, Kihei, Maui. Ms. On File State Historic Preservation Division.

1996 *A Summary of Archaeological Finds in Wailuku Showing Settlement Patterns.* Paper Presented at the 9th Annual Conference for the Society of Hawaiian Archaeology in Wailea, Maui.

1989 *Archaeological Inventory Survey, Proposed Waihee Golf Club Project Area Lands of Waihee and Wa`iehu, Wailuku District, Island of Maui.* PHRI Report 549-062589.

1978 *Cultural Reconnaissance of Hydroelectric Power Plant Sites in Waihee Valley, Maui and Lumaha`i Valley, Kauai: Archaeological Survey.* B. P. Bishop Museum, Honolulu.

Donham, T.K., S.T. Goodfellow, and P.H. Rosendahl
1992 *Additional Archaeological Subsurface Testing, Proposed Waihee Golf Club Project Area, Lands of Waihee and Waiehu, Wailuku District, Island of Maui (TMK: 3-2-10: 1).* On file at SHPD, Kapolei, HI.

Dorrance, W.H. and F.S. Morgan
2000 *Sugar Islands: The 165-Year Story of Sugar in Hawaii.* Mutual Publishing Co., Honolulu.

Emory, K.P.
1921 *An Archaeological Survey of Haleakala.* B.P.Bishop Museum Occasional Papers 9 (11):237–259.

Emory, K.P. and H.H. Hammatt
1972 *Endangered Hawaiian Archaeological Sites with Maui County.* Report 72-2, Department of Anthropology, B.P. Bishop Museum, Honolulu, HI.

Foote, D.E., E. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Oahu, Maui, Molokai, and Lanai, State of Hawaii.* U.S. Department of Agriculture Soil Conservation Service. Washington. D.C.

Folk, W.H. and H. H. Hammatt
1992 *Archaeological Survey and Sub-Surface Testing at Waiehu, Maui (TMK: 3-2-13:05).* Cultural Surveys Hawaii. Ms. On File State Historic Preservation Division.

Fortini, W.R. and M.F. Dega
2006 *An Archaeological Monitoring Report for Residential Construction at 955 Puuloa Street, Ahupua`a of Waiehu, Wailuku District, Island of Maui, Hawaii [TMK: 3-3-10:12].* Scientific Consultant Services, Inc. Honolulu.

Fredericksen, E.M.
2003 *An Archaeological Monitoring Report for a Portion of Land in Waiehu, Waiehu Ahupua`a, Wailuku District, Maui Island (TMK: 3-2-20:Por. 47, Lot 9A.* Xamanek Researches. On File State Historic Preservation Division.

1997 *Report on Archaeological Monitoring of North Waihe`e Water Source Project, Phase III Transmission Line, Waiehu and Waihe`e Ahupua`a, Wailuku District, Maui Island (TMK: 3-2-08, 09, 13, 17)*, prepared for Mr. David Craddick, County of Maui Board of Water Supply, by Xamanek Researches, Pukalani, Hawaii.

Fredericksen, E.M., and D.L. Fredericksen
2004 *Archaeological Inventory Survey Report for Phase II of the Paukukalo 8-inch Waterline Replacement Project along Lilihua Place, Wailuku Ahupua`a, Wailuku District, Maui Island (TMK: 3-4-29).* Xamanek Researches. Ms. On File State Historic Preservation Division.

2002 *Archaeological Inventory Survey of Puuohala Mauka Residential Subdivision, Wailuku* Ahupua`a, *Wailuku District, Maui Island, (TMK 3-3-2:por. 1).* Ms. On File, State Historic Preservation Division.

2000 *Archaeological Inventory Survey For the Waiehu Kou Sewer Line Corridor, Waiehu* Ahupua`a, *Wailuku District, Maui Island (TMK: 3-2-3).* Ms. O On File, State Historic Preservation Division.

1998 *Archaeological Inventory Survey of Phases IV and V, North Waihe`e Water Source Project, Waihe`e Ahupua`a, Wailuku District, Maui Island (TMK: 3-2-01: por.03).* Ms. On File at State Historic Preservation Division.
1990 *An Archaeological Inventory Survey of a Drainage and Diversion Easement Corridor for the Department of Hawaiian Homelands, Waiehu Kou 2 Residential Development, Waiehu Ahupua`a, Wailuku District, Island of Maui (TMK: 3-2-13:por. 1 and 9).* Ms. On File, State Historic Preservation Division.

Griffin, Agnes
1993 *Inadvertent Burial Discovery, Site 50-50-04-3139, Paukukalo, Wailuku, Maui. TMK: 3-4-29:22.* Ms. On File, State Historic Preservation Division.

1991 *Archaeological Surface Assessment of a 3.1 Acre Parcel Proposed Phase 4 Residential Lots, Paukukalo, Wailuku, Maui. TMK: 3-3-06:52.* Ms. On File, State Historic Preservation Division.

Han, T.
1982 *Archaeological Investigations of a Portion of the Waiehu Dune Area, Waiehu, Maui.* Department of Anthropology, B.P. Bishop Museum, Honolulu, HI.

Handy, E.S. Craighill and Elizabeth Green Handy
1972 *Native Planters of Old Hawaii - Their Life, Lore, and Environment.* Bishop Museum Press. Honolulu, Hawaii.

Hommon, Robert J. and Robert Connolly
1973 *Hawaii Register of Historic Places.* State of Hawaii Department of Land and Natural Resources, State Parks Division. Honolulu. On File at SHPD, Kapolei, HI.

Info Grafix
2007 HawaiiHistory Database, www.hawaiihistory.com, HI. Accessed June 2008.

Jones, B., J. Pantaleo, and A. Sinoto
1996 *An Archaeological Inventory Survey for the North Waihee Wells Waterline Project, Waihee and Waiehu Ahupua`a, Wailuku, Maui.* Aki Sinoto Consulting.

Kamakau, S.
1992 *Ruling Chiefs of Hawaii*, Revised Edition, Kamehameha Schools Press, Honolulu.

Kame`eleihiwa, Lilikalā
1992 *Native Land and Foreign Desires: Pehea Lā E Pono Ai?* Bishop Museum Press. Honolulu.

Kelly, M., Y. Sinoto, and R. Cordy
1978 *Archaeological Investigations at Waiehu Heights Subdivision, Waiehu, Maui.* Bishop Museum.

Kennedy, J.
1990a *Subsurface Testing Results for a Portion of the Piihana District, Piihana, Maui. TMK: 3-3-1:16 por.* Ms. On File, State Historic Preservation Division.

1990b Letter Dated September 13, 1990 to Mr. Jim Murray of C. Brewer Properties – Summary Document Re. Archaeological Activities Surrounding Piihana District #2. On File State Historic Preservation Division.

1990c *Archaeological Survey and Subsurface Testing for the Proposed Grading Project, TMK: 3-3-01:16 (por.)* On File State Historic Preservation Division.

Kirch, Patrick Vincent
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

Monahan, Christopher M.
2005 *An Archaeological Inventory Survey on Approximately 1.5 Acres of Land at Waiehu Golf Course (Maintenance Building Project) In Waiehu, Waiehu Ahupua`a, Wailuku District, Island of Maui, Hawai`i [TMK: (2)3-2-13 Portion 06] With Addendum Added.* Scientific Consultant Services, Inc., Honolulu.

Neal, Marie C.
1968 *In Gardens of Hawaii.* Bishop Museum Press, Honolulu.

Pukui, M.K., S.H. Elbert, &.T. Mookini
1974 *Place Names of Hawaii.* The University of Hawaii Press, Honolulu.

State of Hawai`i Administrative Rules
2002 "Rules Governing Standards for Archaeological Monitoring Studies and Reports." Department of Land and Natural Resources and the State Historic Preservation Division... §13-279-4. Hawai`i, 2002.

Sterling, Elspeth P.
1998 *Sites of Maui.* Bishop Museum Press, Honolulu, Hawaii.

Stokes, J.F.G.
1918 *Report on the Heiau of Maui.* Transcript on file at the B.P. Bishop Museum, Honolulu.

Thrum , T.G.
1917 "Maui's Heiaus and Heiau Sites Revisited," *Hawaiian Annual for 1917.* Honolulu.

Trembly, Diane
1987 *Osteologial Analysis of Skeletal Materials Recovered from the Waiehu Planned Development Increment "A", Waiehu, Wailuku, Maui.* Bishop Museum. On File State Historic Preservation Division.

United States Department of Agriculture
1990 *Munsell Soil Color Charts.* Macbeth Division of Kollmorgen Instruments Corporation, Baltimore, MD.

Waihona `Aina Corporation
2003 Māhele and Land Grant Database, www.waihona.com. HI. Accessed May 2008. .

Walker, Winslow
1931 *Archaeology of Maui.* Department of Anthropology, B.P. Bishop Museum, Honolulu, HI.

Whistler, W. Arthur
1995 *Wayside Plants of the Islands: A Guide to the Lowland Flora of the Pacific Islands including Hawai`i, Samoa, Tonga, Tahiti, Fiji, Guam, Belau.* Isle Botanical, Honolulu, Hawaii.

Wilson, Jon and M.F. Dega
2004 *Archaeological Inventory Survey of 240.087 Acres Located in Waiehu Ahupua`a, Wailuku District, Maui Island, Hawai`i [TMK: (2) 3-3-02: portion of 001].* On file State Historic Preservation Division.

Yent, Martha
1984 *Additional Archaeological Testing at Halekii-Pihana State Monument, Paukukalo-Waiehu, Wailuku, Maui.* Ms. On file State Historic Preservation Division.

1982 *Halekii-Pihana State Monument Phase I: Archaeological Testing and the Development of Interpretive Themes.* Ms. on file State Historic Preservation Division.

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

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

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

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.

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,

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

SCS Project Number 964-CIA-2

# A CULTURAL IMPACT ASSESSMENT OF APPROXIMATELY 8.5 ACRES LOCATED IN WAI'EHU AHUPUA'A, WAILUKU DISTRICT, MAUI ISLAND, HAWAI'I [TMK 3-3-001: por. 016 and 102]


Prepared By:
**Leann McGerty, B.A.**
and
**Robert L. Spear, Ph.D.**

December 2008

Prepared For:
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## TABLE OF CONTENTS

TABLE OF CONTENTS ..... ii

LIST OF FIGURES ..... ii

INTRODUCTION ..... 1

METHODOLOGY ..... 5
- ARCHIVAL RESEARCH ..... 6
- INTERVIEW METHODOLOGY ..... 7
- PROJECT AREA AND VICINITY ..... 8

CULTURAL HISTORICAL CONTEXT ..... 8
- PAST POLITICAL BOUNDARIES ..... 9
- TRADITIONAL SETTLEMENT PATTERNS ..... 9
- *WAHI PANA* (LEGENDARY PLACES) ..... 10
- WAI'EHU SETTLEMENT PATTERNS ..... 11
- THE GREAT MĀHELE ..... 12
- HISTORIC LAND USE ..... 13

SUMMARY ..... 13

CIA INQUIRY RESPONSE ..... 14

CULTURAL ASSESSMEMNT ..... 14

REFERENCES CITED ..... 16

APPENDIX A: CONSULTATION INQUIRIES ..... A

## LIST OF FIGURES

Figure 1: USGS Quadrangle Map Showing Project Area Location. ..... 2
Figure 2: Map Showing Project Area. ..... 3

## 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].

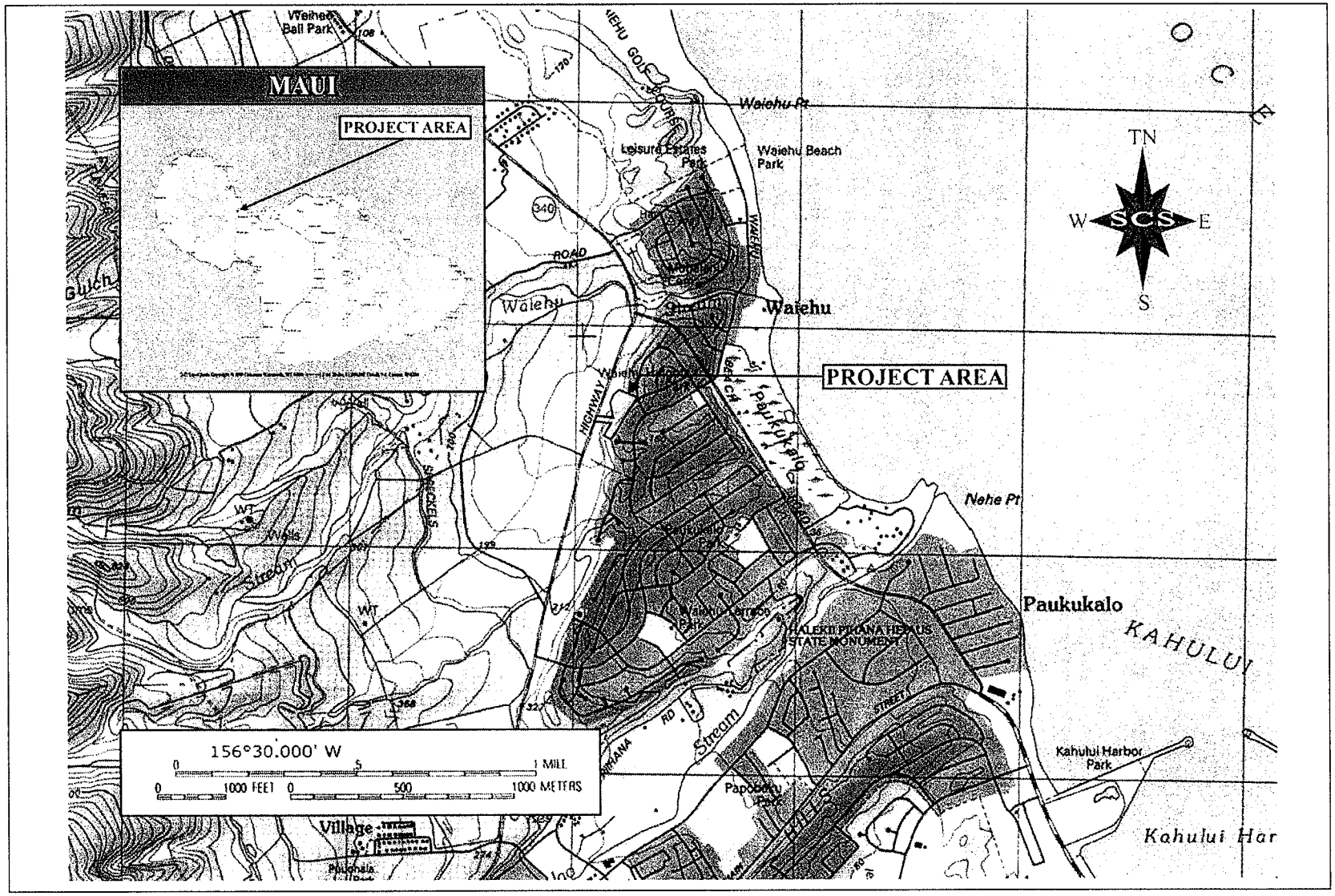


Figure 1: USGS Quadrangle Map Showing Project Area Location.

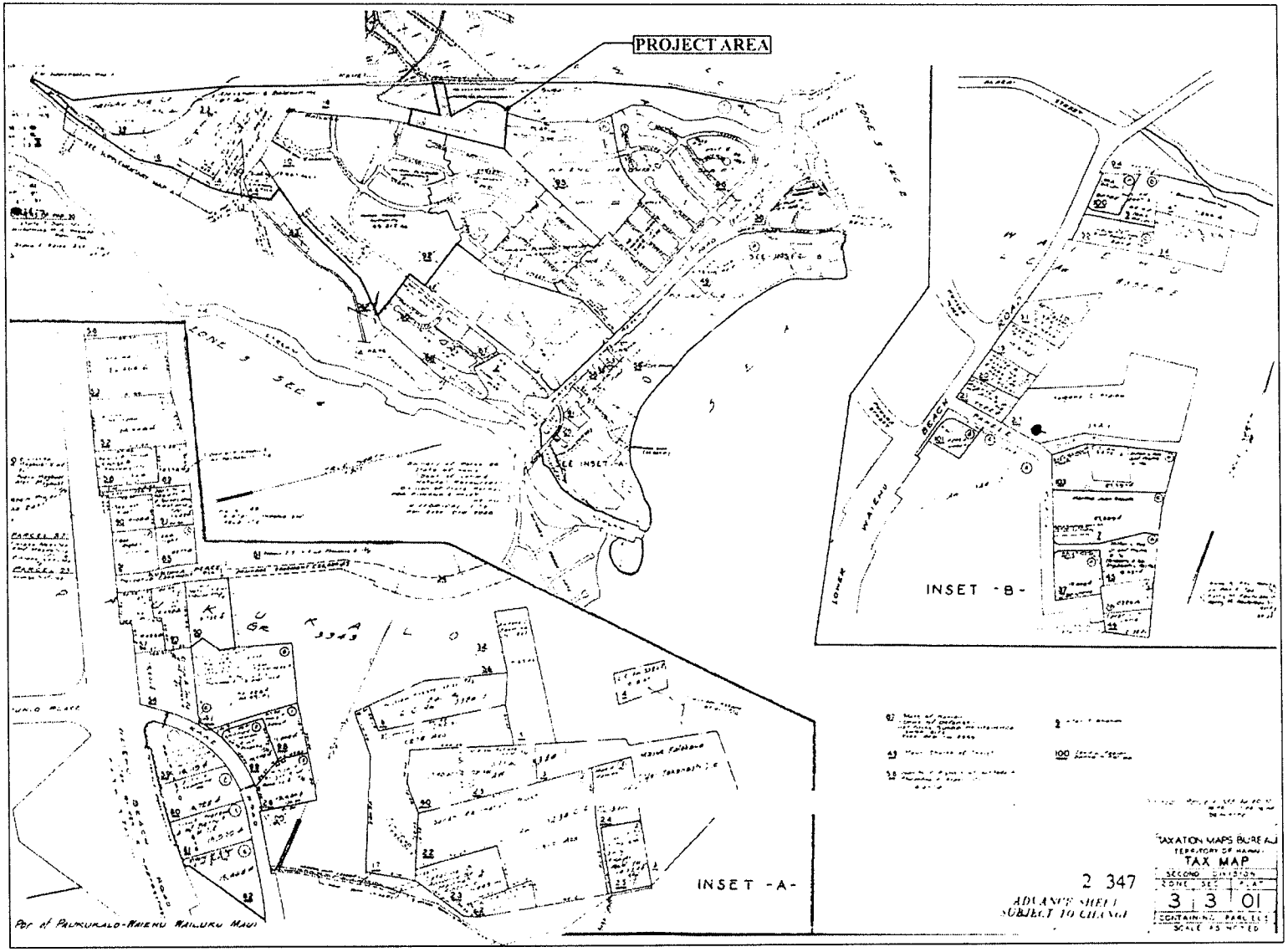


Figure 2: Map Showing Project Area.

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 of 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`ī, 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 to 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 officinaruma*) 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 alter. 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`opu`u 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..." (Kamakau1961:85-89).

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 proceded 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 slows 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, Kauikeaouli (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`ī, 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.

## REFERENCES CITED


Beckwith, Martha
1940 *Hawaiian Mythology*. The University of Hawaii. Honolulu.

Chinen, Jon
1961 Original Land Titles in Hawaii. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.

Clark, John
1980 *The Beaches of Maui County*. A Kolowalu Book, University Press of Hawaii: Honolulu.

Condé, Jesse, and Gerald Best
1973 *Sugar Trains, Narrow Gauge Rails of Hawaii*. Glenwood Publishers: Felton, California.

Daws, G.
1968 *Shoal of Time: History of the Hawaiian Islands*. University of Hawai`i Press. Honolulu.

Fornander, Abraham
1969 *An Account of the Polynesian Race, Its Origins and Migrations*. Vol. 1 to 3. Charles E. Tuttle Co. Inc.: Jutland.

1919 *Hawaiian Antiquities and Folklore*. Bishop Museum Press: Honolulu.

Handy, Craighill and Elizabeth Handy
1972 *Native Planters in Old Hawaii*. Bulletin 233. Bishop Museum Press: Honolulu.

Kamakau, Samuel
1961 *Ruling Chiefs of Hawaii*. The Kamehameha Schools Press: Honolulu.

Kame`eleihiwa, Lilikalā
1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press. Honolulu.

Kelly, Marion
1983 *Nā Māla o Kona: Gardens of Kona*. Dept. of Anthropology Report Series 83-2. Bishop Museum. Honolulu.

1998 A Gunboat Diplomacy, Sandalwood Lust and National Debt. In *Ka Wai Ola o OHA,* Vol. 15, No. 4, April 1998.

Kirch, Patrick
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.

Kirch, Patrick V. and Marshall Sahlins
1992 *Anahulu*. Vol. 1 and 2. University of Chicago Press. Chicago.

Kuykendall, R.S.
1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai`i Press. Honolulu.

Lucas, Paul F. Nahoa
1995 *A Dictionary of Hawaiian Legal Land-terms*. Native Hawaiian Legal Corporation. University of Hawai`i Committee for the Preservation and Study of Hawaiian Language, Art and Culture.. University of Hawai`i Press.

Lyons, C.J.
1875 Land Matters in Hawaii. *The Islander*, Vol. I. Honolulu.

OEQC (Hawaii State Office of Environmental Quality Control)
1997 "Guidelines for Assessing Cultural Impacts." Adopted by the Environmental Council, November 1997

Parker, Patricia and Thomas King
1990 Guidelines for Evaluationg and Documenting Traditional Cultural Properties. *National Register Bulletin.* No. 38. U.S, Department of the Interior, National Park Service.

Pukui, Mary Kawena, Samuel Elbert
1981 *Hawaiian Dictionary*. University Press of Hawaii. Honolulu.

Pukui, Mary Kawena, Samuel Elbert, Esther Mookini
1974 *Place Names of Hawaii*. University of Hawai`i Press: Honolulu.

Sterling, Elspeth
1998 *Sites of Maui*. Bishop Museum. Hong Kong.

Valeri, Valerio
1985 *Kingship and Sacrifice*. The University of Chicago Press. Chicago.

Walker, Winslow
1931 *Archaeological Survey of Maui.* Manuscript in Bishop Museum Library.

## APPENDIX A: CONSULTATION INQUIRIES

(Figures not included)

SCIENTIFIC CONSULTANT SERVICES, Inc
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 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, Wailku, 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

Leann McGerty,
Senior Archaeologist
Enclosures (2)

Ph: 808-597-1182 SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS Fax: 808-597-1193
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

SCIENTIFIC CONSULTANT SERVICES, Inc
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Kai Markell
Director of Native Rights
C/o Office of Hawaiian Affairs
711 Kapi'olani Blvd. Suite 500
Honolulu, HI 96813

May 19, 2008

Dear Mr. Markell:

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Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

SCIENTIFIC CONSULTANT SERVICES, Inc
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Thelma 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, Wailku, 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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711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 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'ehu, Wailku, 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)

Ph: 808-597-1182 SCS... SERVING ALL YOUR ARCHAEOLOGICAL NEEDS Fax: 808-597-1193
Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

SCIENTIFIC CONSULTANT SERVICES, Inc.
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

Hinano Rodrigues, Cultural Historian
DLNR Maui Office
130 Mahalani Street
Wailuku, HI 96793

May 19, 2008

Dear Hinano:

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Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

SCIENTIFIC CONSULTANT SERVICES, Inc
711 Kapiolani Blvd., Suite 975 Honolulu, Hawai'i 96813

May 19, 2008

Hawaiian Civic Club
Central Maui
310 Ka'ahumanu Ave.
Kahului, Maui 96732

Dear Members:

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, Wailku, 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, 225-2355; or home, (808) 637-9539, with any information or recommendations concerning this Cultural Impact Assessment.

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Neighbor Island Offices • Hawai'i Island • Maui • Kaua'i

# 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@hawiiantel.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 <u>without</u> 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.

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[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 is 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.

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[2] *Trip Generation Handbook*, Institute of Transportation Engineers, Washington, D.C., 1998

[3] *Trip Generation*, Institute of Transportation Engineers, Washington, D.C., 2003

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 Haunanu 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 congestion 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 Wailupe 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 |
| ***Wailupe 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.

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[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.

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[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**

| | AM Peak Hour [1] | | | | | | PM Peak Hour | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Existing (2009) | | 2015 Without Project | | 2015 With Project | | Existing (2009) | | 2015 Without Project | | 2015 Without Project | |
| Approach and Movement | 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 (50 | | 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**

| | AM Peak Hour [1] | | | | | | PM Peak Hour | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Existing (2009) | | 2015 Without Project | | 2015 With Project | | Existing (2009) | | 2015 Without Project | | 2015 Without Project | |
| Approach and Movement | 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 | | | 13.5 | B | 13.6 | B | | | 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 | | | | | 14.8 | B | | | | | 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 us 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 a 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].

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[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.

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 Analio 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

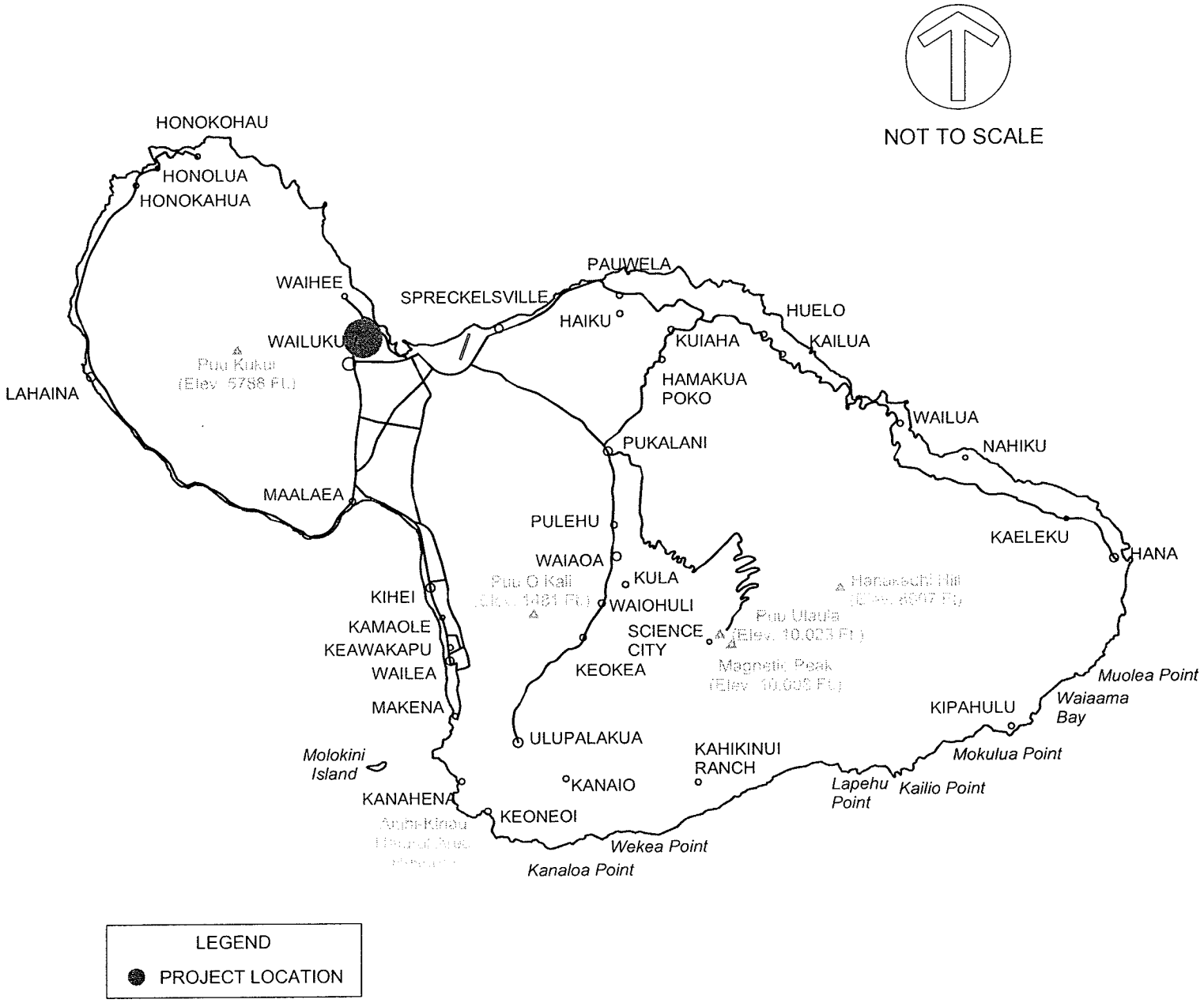
O. 2015 Lane Configurations and Right-of-Way Controls with Hale Mua

P. 2015 Lane Configurations and Right-of-Way Controls without Hale Mua

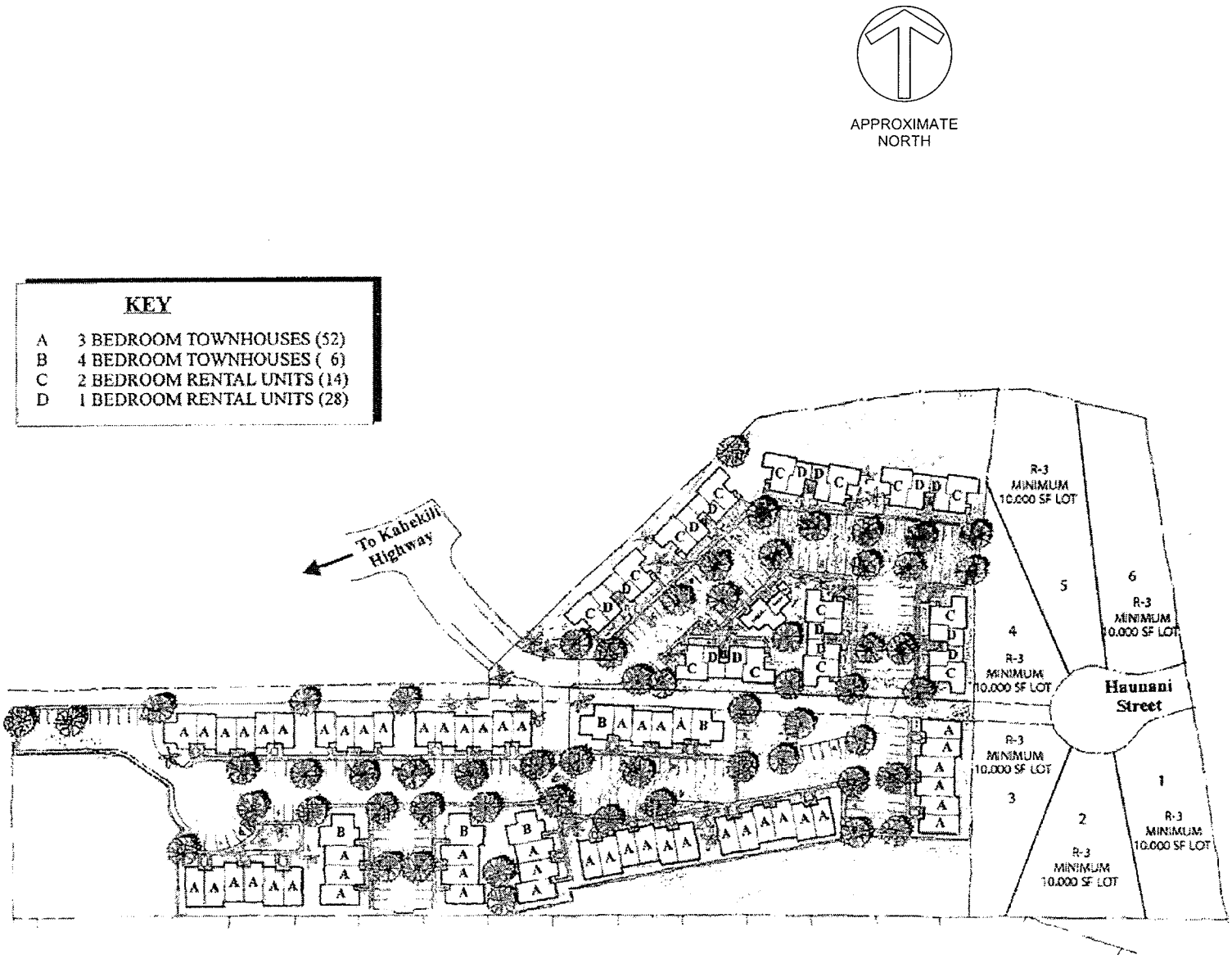
Q. Level-of-Service Worksheets

R. The Maui Bus Service in Waiehu Heights Area

S. Traffic Signal Warrant Analysis Warrant 2 - Four Hour Vehicular Warrant



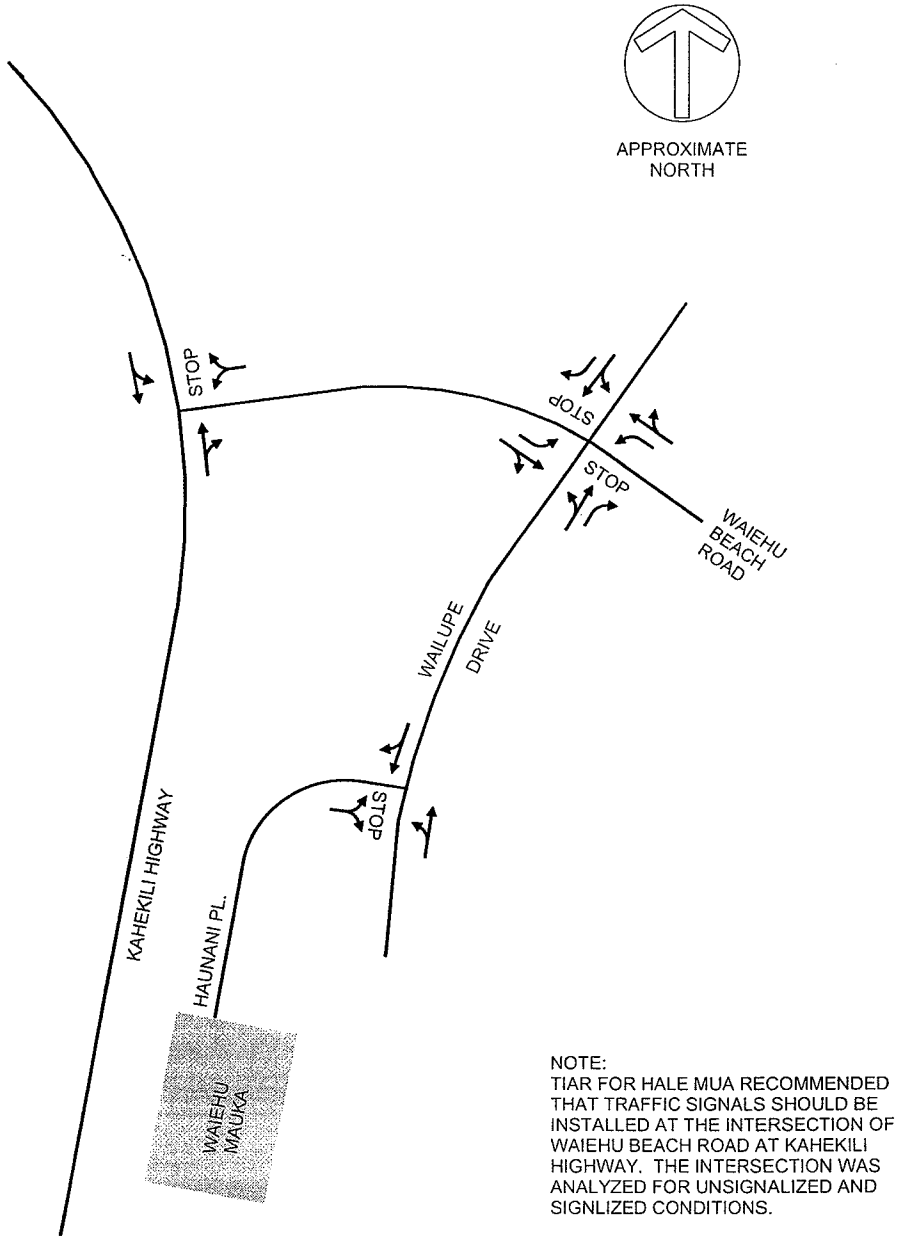

**Attachment A**
**PROJECT LOCATION MAP**




Source: Hans Riecke

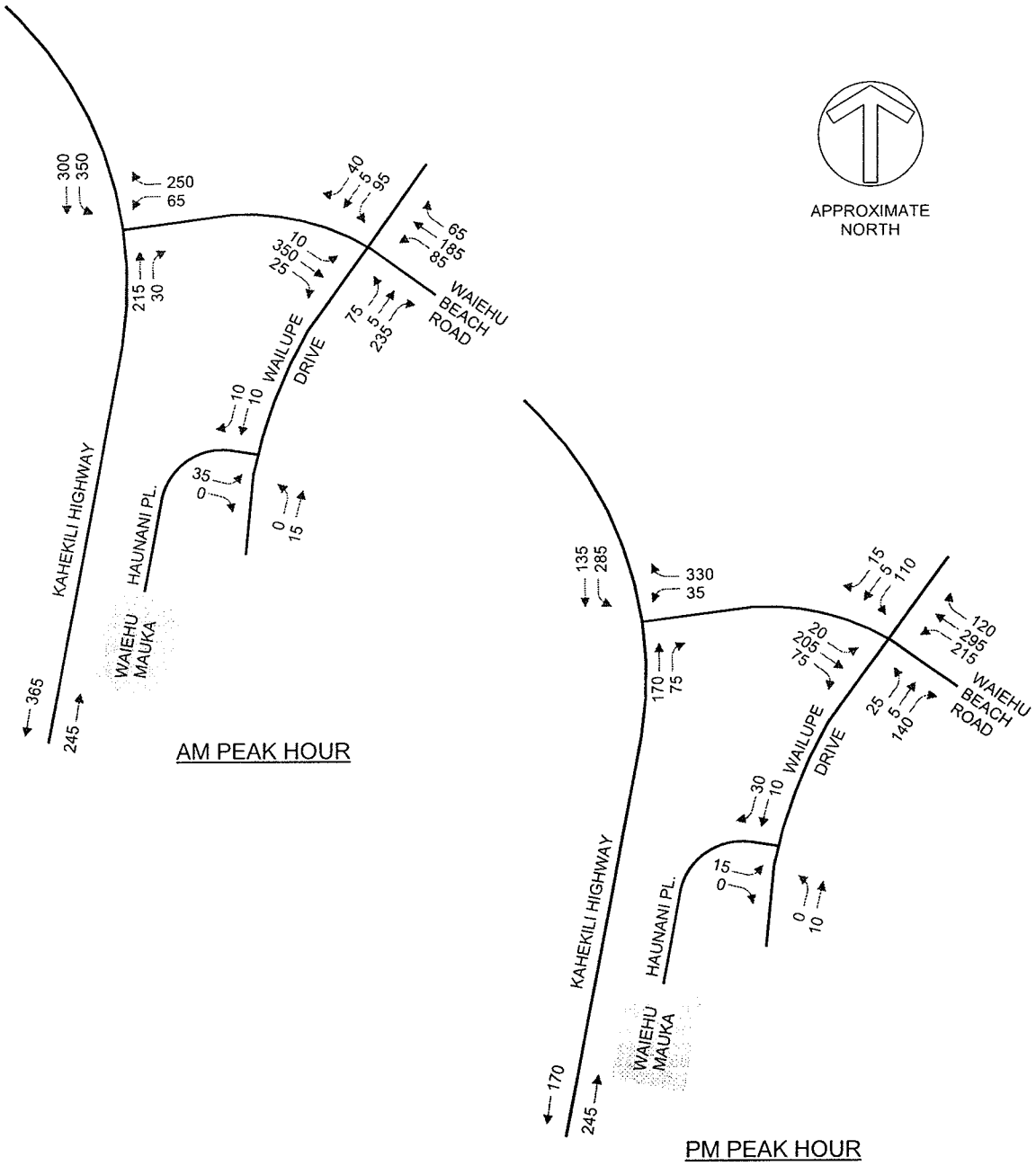
SOURCE: MUNEKIYO & HIRAGA, INC.

**Attachment B**
**PROJECT SITE PLAN**




NOTE:
TIAR FOR HALE MUA RECOMMENDED THAT TRAFFIC SIGNALS SHOULD BE INSTALLED AT THE INTERSECTION OF WAIEHU BEACH ROAD AT KAHEKILI HIGHWAY. THE INTERSECTION WAS ANALYZED FOR UNSIGNALIZED AND SIGNLIZED 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:**

| | | North Approach | | | East Approach | | | South Approach | | | West Approach | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval | Start Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Totals |
| 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:**

| | | North Approach | | | East Approach | | | South Approach | | | West Approach | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval | Start Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Totals |
| 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:**

| | | North Approach | | | East Approach | | | South Approach | | | West Approach | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval | Start Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Totals |
| 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 | 14 | 1 | 1 | 0 | 34 | 65 |
| Per Cent of Approach | | 60% | 100% | 0% | 0% | 0% | 0% | 0% | 88% | 50% | 3% | 0% | 34% | |
| Peak Hour Factor: | | 0.75 | 0.5 | 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. Wailupe 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:**

| | | North Approach | | | East Approach | | | South Approach | | | West Approach | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval | Start Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Totals |
| 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:**

| | | North Approach | | | East Approach | | | South Approach | | | West Approach | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval | Start Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Totals |
| 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

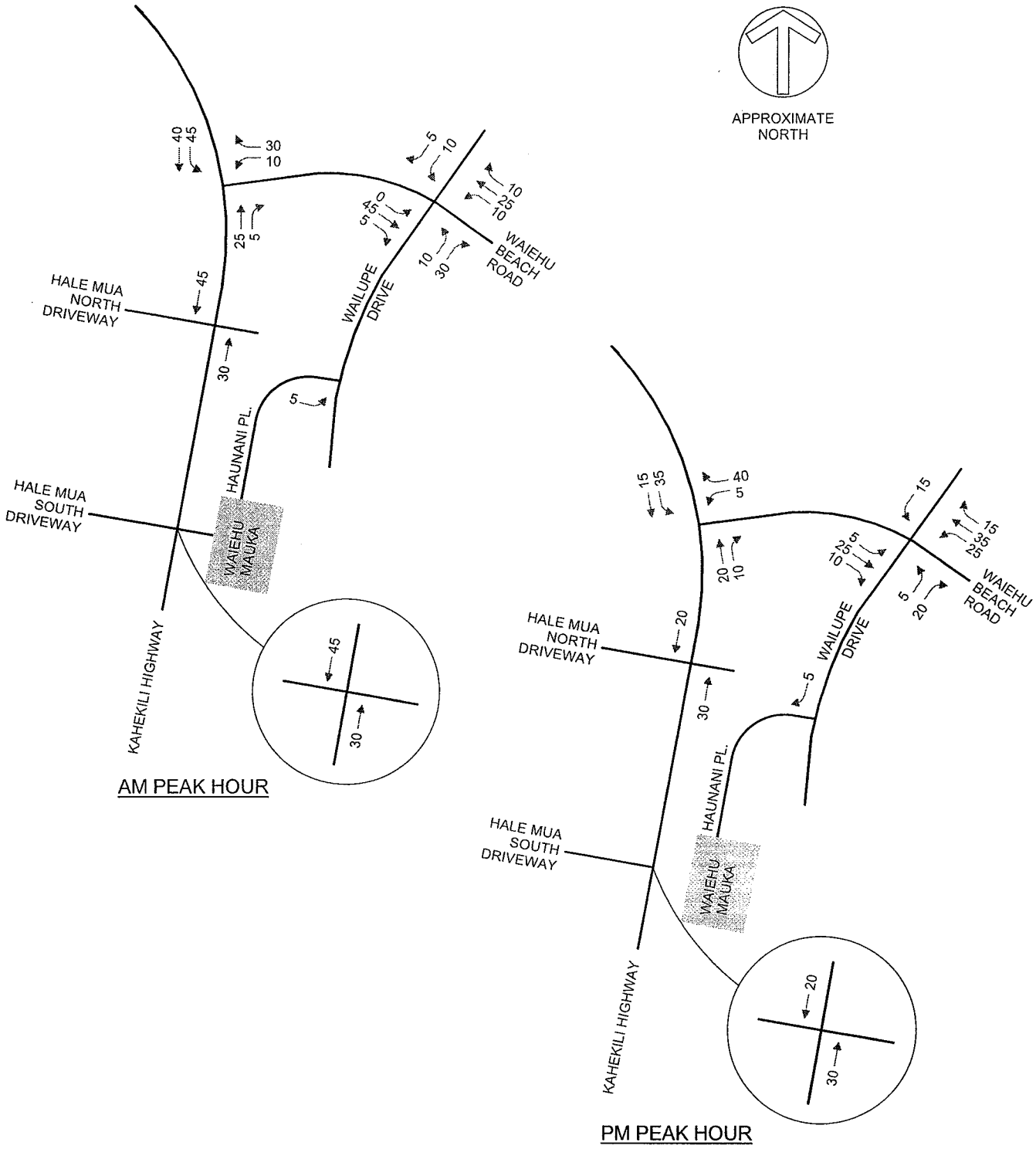
**15-Minute Volumes Beginning at:**

| | | North Approach | | | East Approach | | | South Approach | | | West Approach | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Interval | Start Time | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Totals |
| 1 | 3:30 pm | | 30 | 57 | 58 | | 6 | 14 | 34 | | | | | 199 |
| 2 | 3:45 pm | | 37 | 52 | 78 | | 7 | 10 | 36 | | | | | 220 |
| 3 | 4:00 pm | | 35 | 61 | 62 | | 15 | 9 | 30 | | | | | 212 |
| 4 | 4:15 pm | | 31 | 62 | 73 | | 4 | 13 | 29 | | | | | 212 |
| 5 | 4:30 pm | | 26 | 63 | 95 | | 7 | 21 | 54 | | | | | 266 |
| 6 | 4:45 pm | | 28 | 78 | 78 | | 10 | 19 | 39 | | | | | 252 |
| 7 | 5:00 pm | | 29 | 58 | 84 | | 9 | 15 | 37 | | | | | 232 |
| 8 | 5:15 pm | | 24 | 79 | 74 | | 5 | 20 | 41 | | | | | 243 |
| 9 | 5:30 pm | | 25 | 72 | 69 | | 5 | 15 | 29 | | | | | 215 |
| 10 | 5:45 pm | | 26 | 53 | 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 |

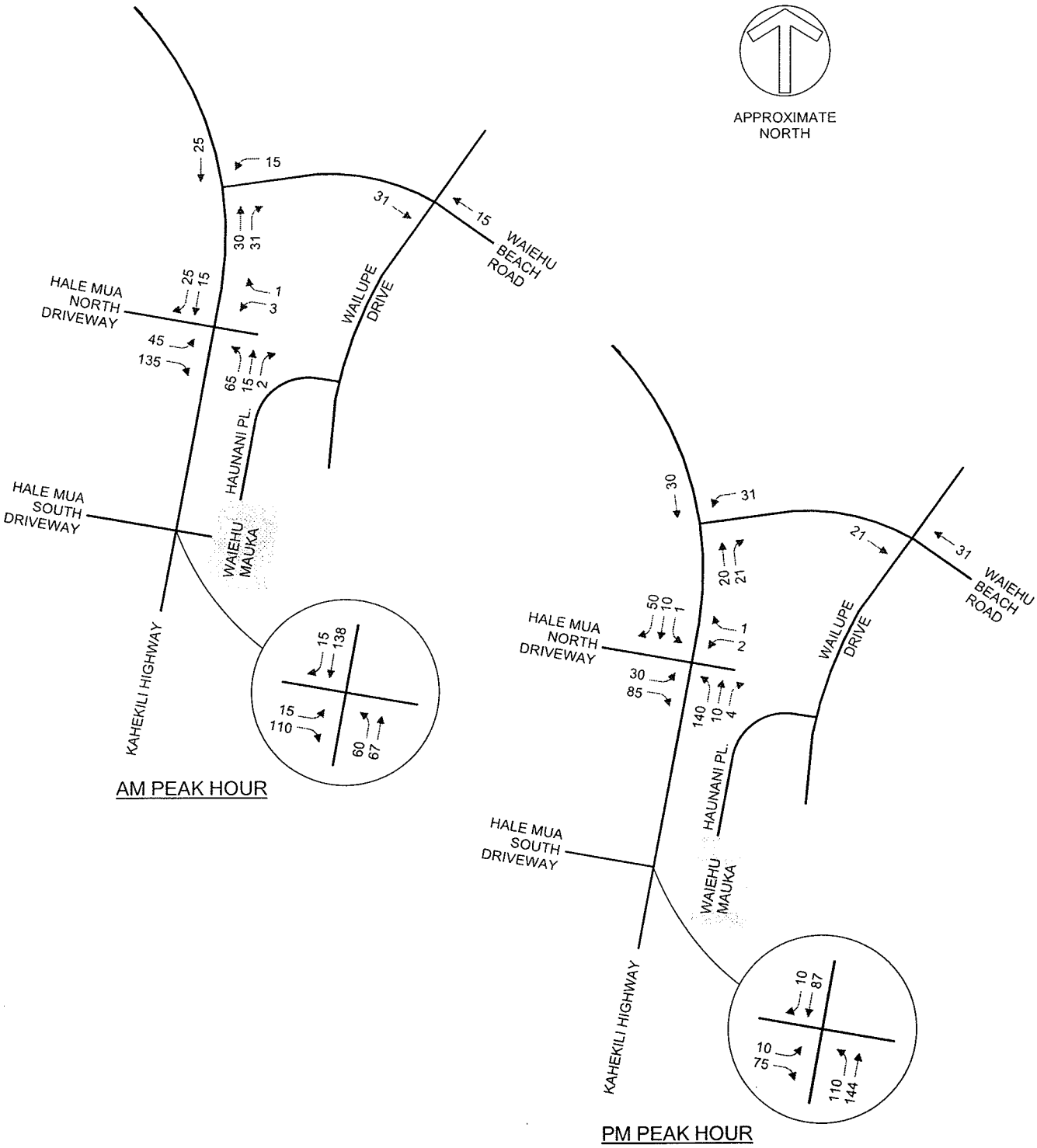
**Hourly Volume of Each Movement**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |

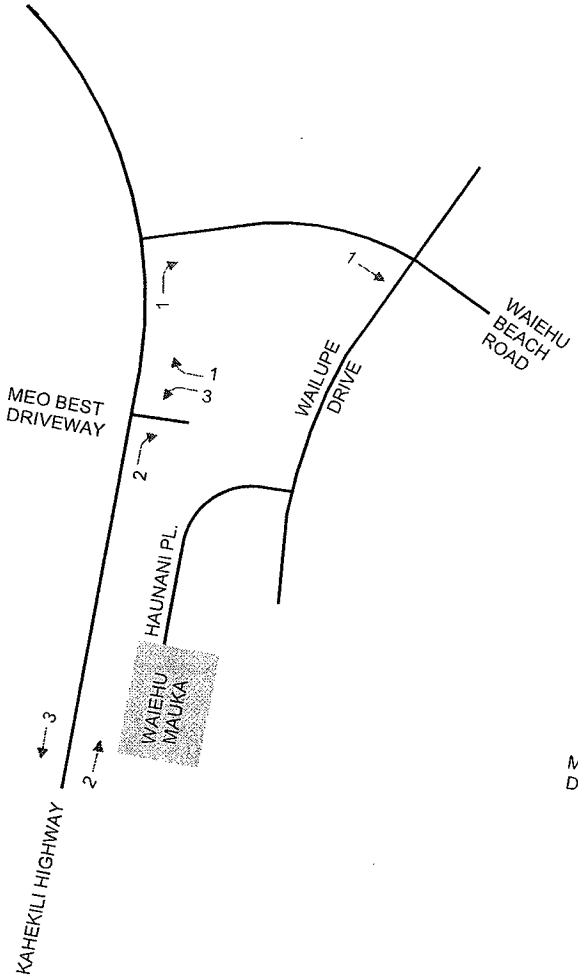
| | | | |
|---|---|---|---|
| Total Arrivals | 420 | 367 | 246 | 0 |
| Total Departures | 502 | 362 | 169 | 0 |
| Total | 922 | 729 | 415 | 0 |



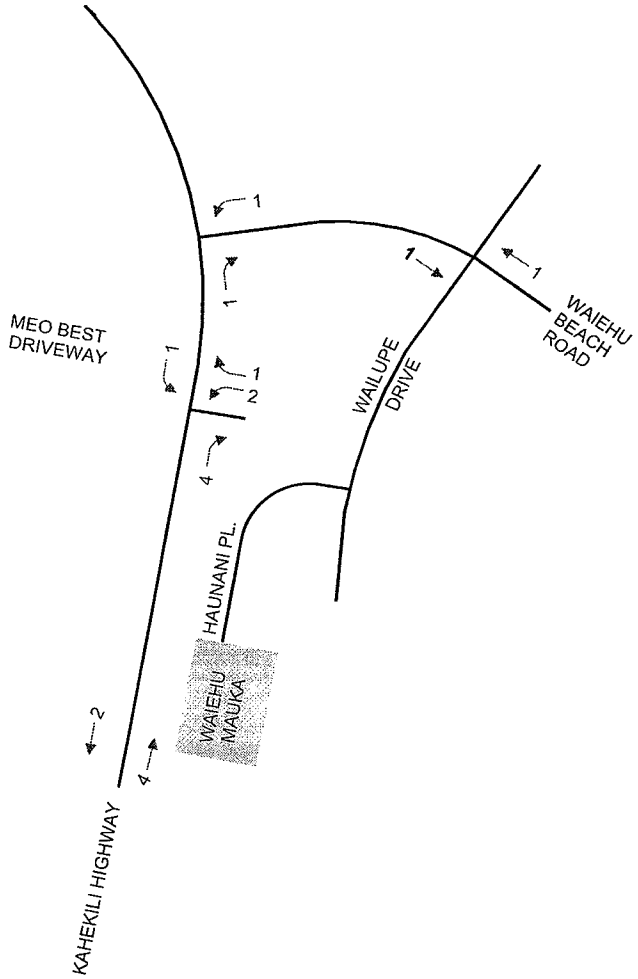

**Attachment E**
**BACKGROUND GROWTH (2009 TO 2015)**




**Attachment F**
**RELATED PROJECTS' PEAK HOUR TRIP ASSIGNMENTS WITH HALE MUA**

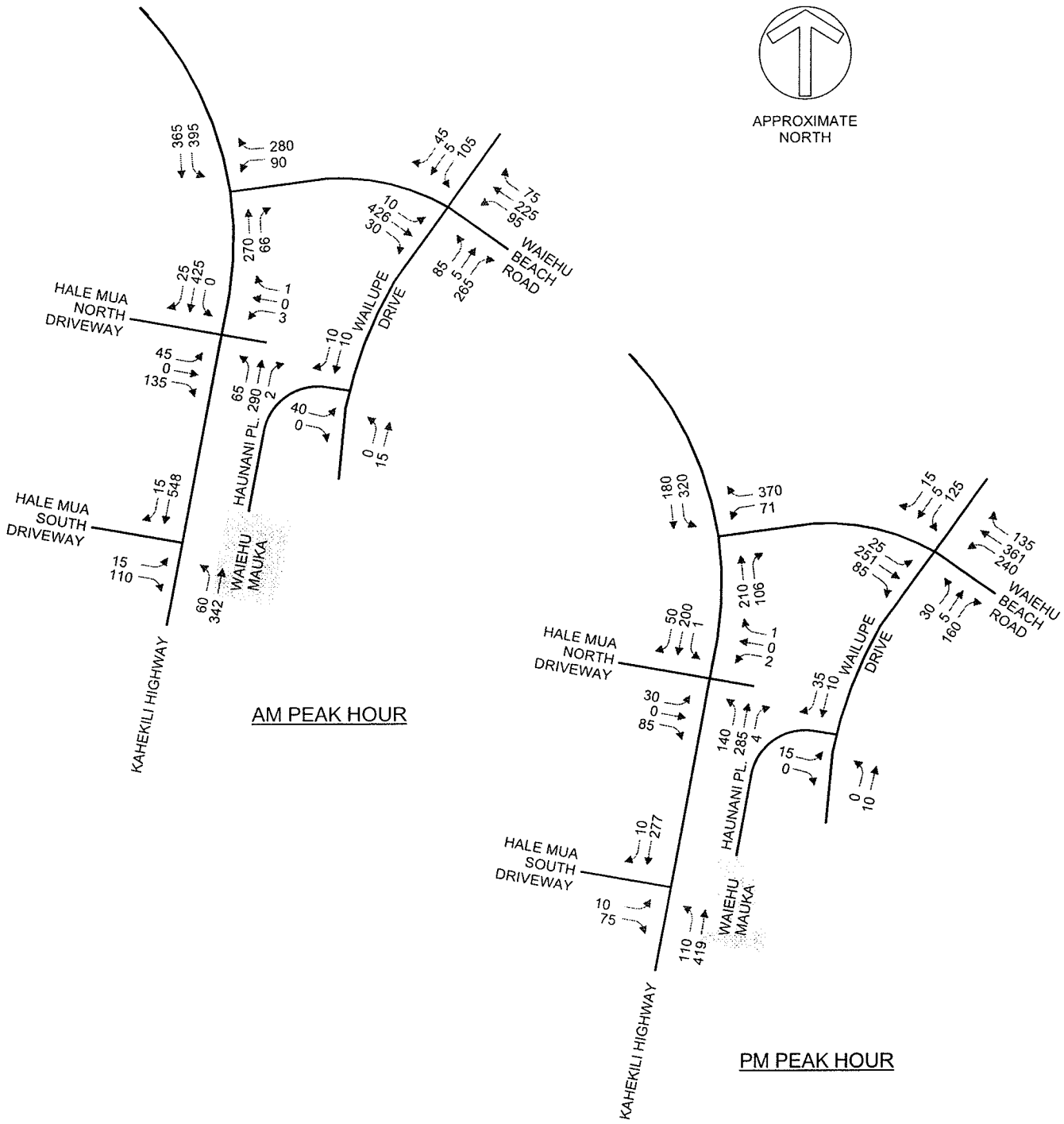



AM PEAK HOUR

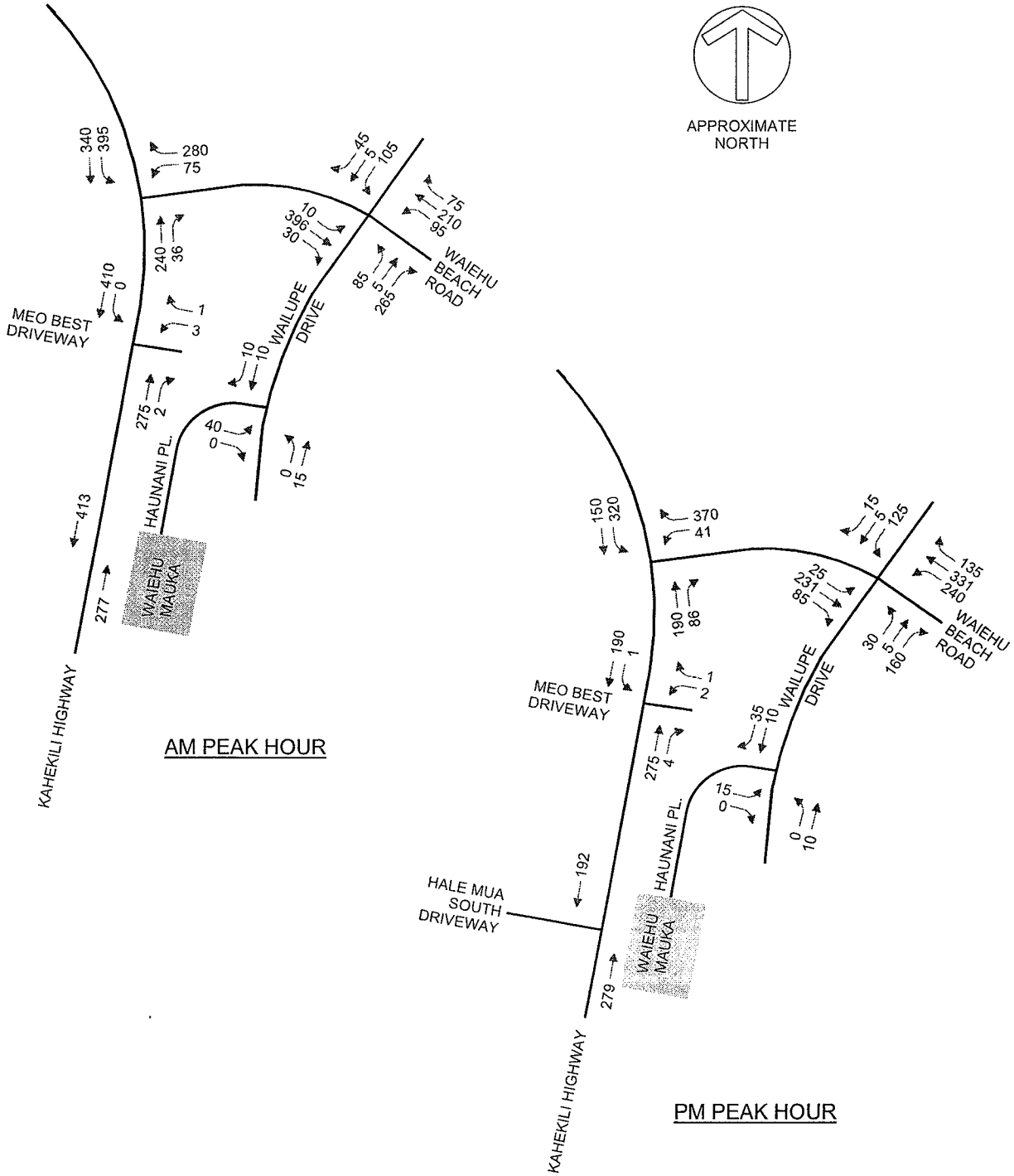



PM PEAK HOUR

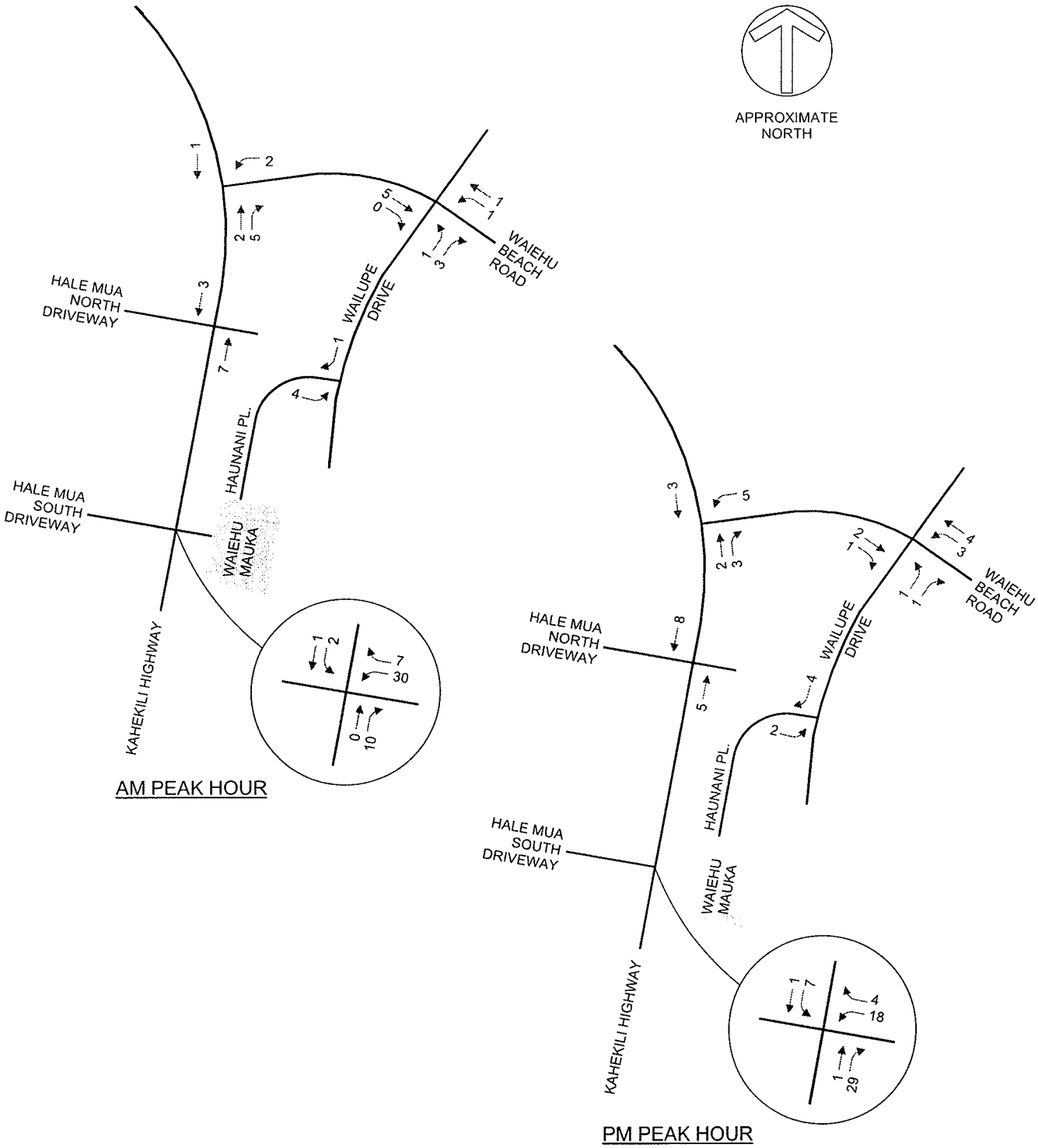
**Attachment G**
**RELATED PROJECTS' PEAK HOUR TRIP ASSIGNMENTS**
**WITHOUT HALE MUA**



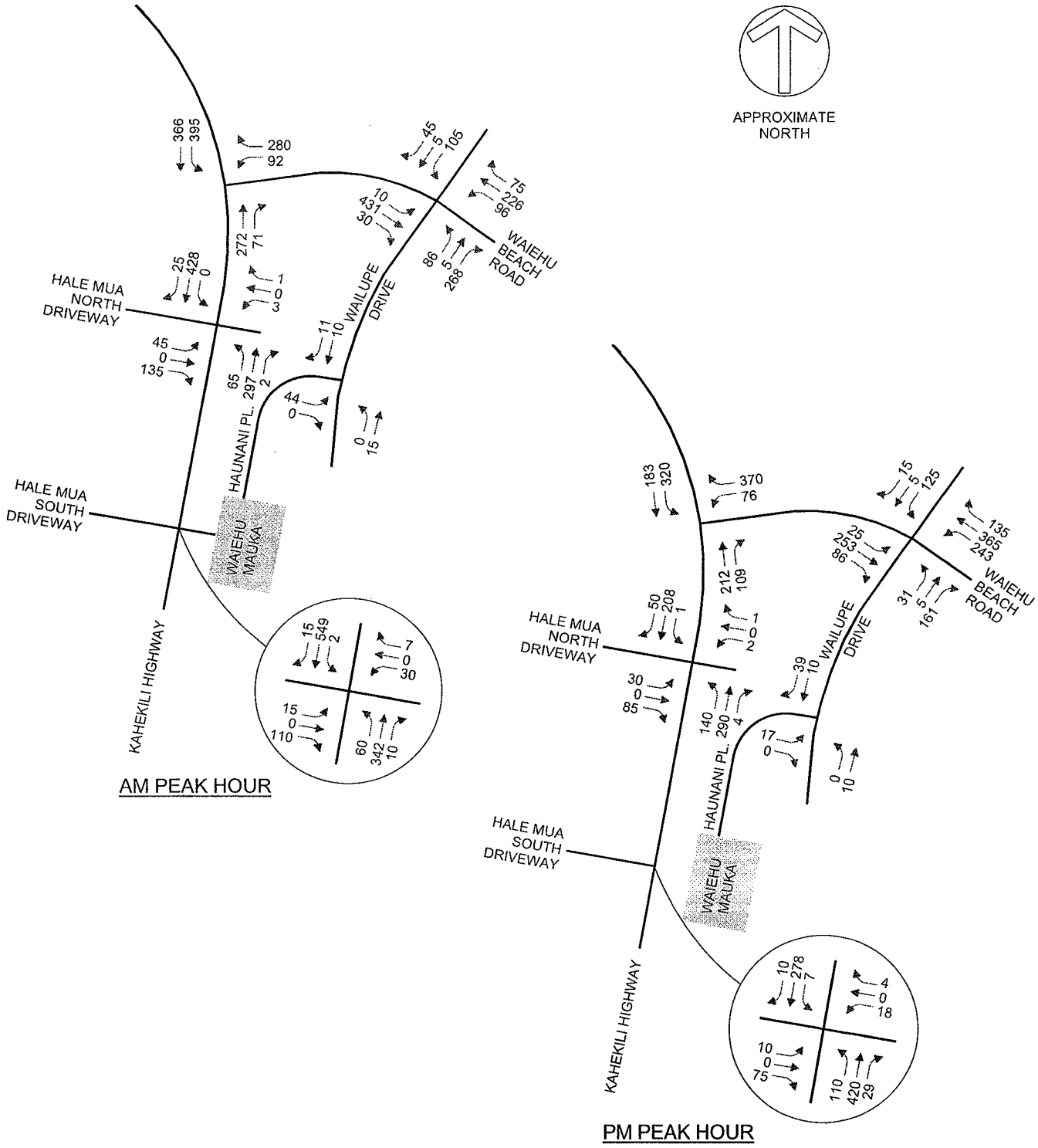

**Attachment H**
**2015 BACKGROUND PEAK HOUR TRAFFIC PROJECTIONS WITH HALE MUA**



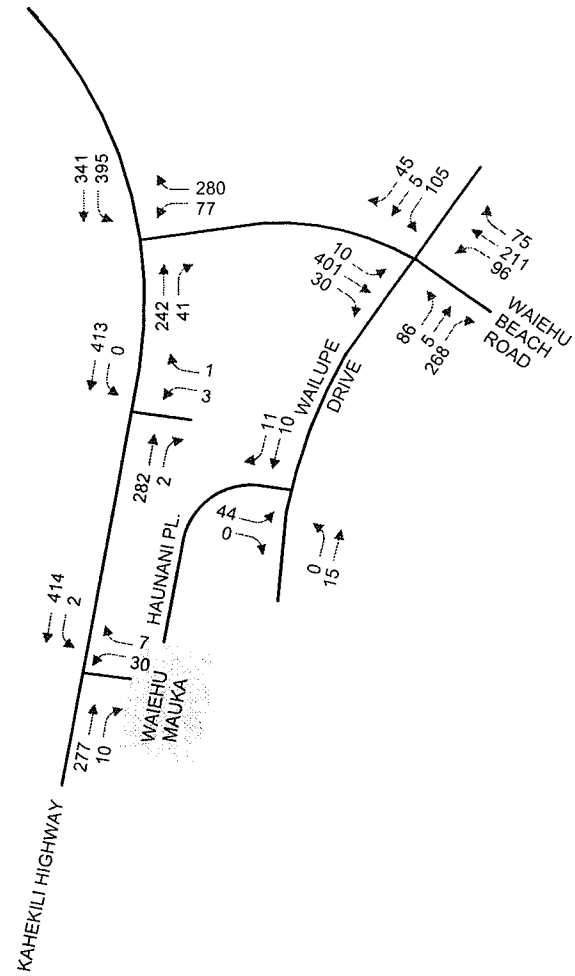

**Attachment I**
**2015 BACKGROUND PEAK HOUR TRAFFIC PROJECTIONS**
**WITHOUT HALE MUA**



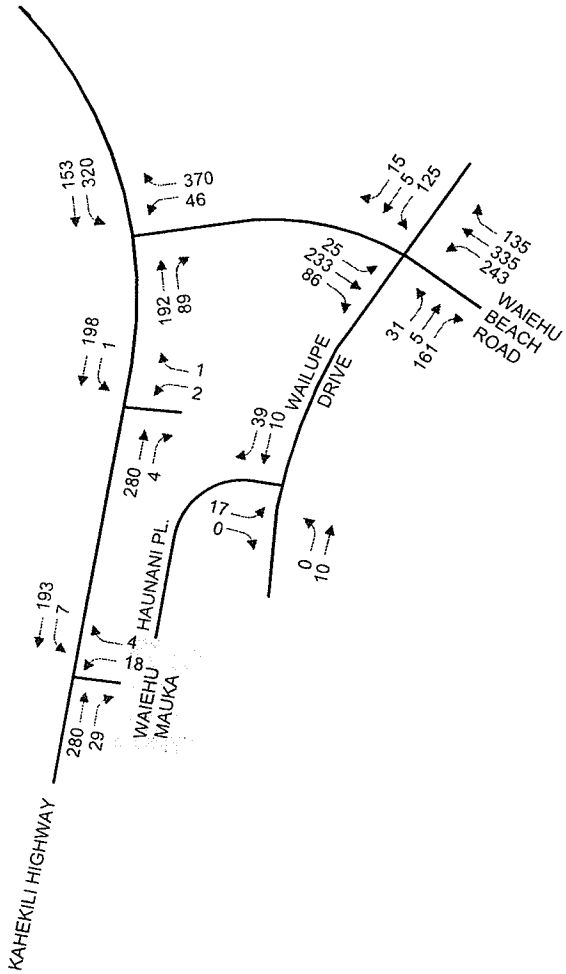

**Attachment J**
**PROJECT TRIP ASSIGNMENTS**




**Attachment K**
**2015 BACKGROUND PLUS PROJECT PEAK HOUR TRAFFIC PROJECTIONS WITH HALE MUA**




AM PEAK HOUR




PM PEAK HOUR

**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 Wailupe Drive

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | 40 | 15 | 5 | 0 | | | | | 0 | 0 | 45 | 15 | | | | | 0 | 0 | 45 | 15 |
| 2 | TH | 5 | 5 | 0 | 0 | | | | | 0 | 0 | 5 | 5 | | | | | 0 | 0 | 5 | 5 |
| 3 | LT | 95 | 110 | 10 | 15 | | | | | 0 | 0 | 105 | 125 | | | | | 0 | 0 | 105 | 125 |
| 4 | E- RT | 65 | 120 | 10 | 15 | | | | | 0 | 0 | 75 | 135 | | | | | 0 | 0 | 75 | 135 |
| 5 | TH | 185 | 295 | 25 | 35 | 15 | 30 | | 1 | 15 | 31 | 225 | 361 | | | 1 | 4 | 1 | 4 | 226 | 365 |
| 6 | LT | 85 | 215 | 10 | 25 | | | | | 0 | 0 | 95 | 240 | 1 | 3 | | | 1 | 3 | 96 | 243 |
| 7 | S- RT | 235 | 140 | 30 | 20 | | | | | 0 | 0 | 265 | 160 | 3 | 1 | | | 3 | 1 | 268 | 161 |
| 8 | TH | 5 | 5 | 0 | 0 | | | | | 0 | 0 | 5 | 5 | | | | | 0 | 0 | 5 | 5 |
| 9 | LT | 75 | 25 | 10 | 5 | | | | | 0 | 0 | 85 | 30 | 1 | 1 | | | 1 | 1 | 86 | 31 |
| 10 | W- RT | 25 | 75 | 5 | 10 | | | | | 0 | 0 | 30 | 85 | 0 | 1 | | | 0 | 1 | 30 | 86 |
| 11 | TH | 350 | 205 | 45 | 25 | 30 | 20 | 1 | 1 | 31 | 21 | 426 | 251 | | | 5 | 2 | 5 | 2 | 431 | 253 |
| 12 | LT | 10 | 20 | 0 | 5 | | | | | 0 | 0 | 10 | 25 | | | | | 0 | 0 | 10 | 25 |
| TOTAL | | 1175 | 1230 | 150 | 155 | | | | | 46 | 52 | 1371 | 1437 | | | | | 11 | 12 | 1382 | 1449 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | |
| From North | | 140 | 130 | 0 15 | 15 | | | | | 0 | 0 | 155 | 145 | | | | | | | 155 | 145 |
| From East | | 335 | 630 | 0 45 | 75 | | | | | 15 | 31 | 395 | 736 | | | | | | | 397 | 743 |
| From South | | 315 | 170 | 0 40 | 25 | | | | | 0 | 0 | 355 | 195 | | | | | | | 359 | 197 |
| From West | | 385 | 300 | 0 50 | 40 | | | | | 31 | 21 | 466 | 361 | | | | | | | 471 | 364 |
| Total | | 1175 | 1230 | 0 150 | 155 | | | | | 46 | 52 | 1371 | 1437 | | | | | | | 1382 | 1449 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | |
| To North | | 80 | 145 | 0 10 | 20 | | | | | 0 | 0 | 90 | 165 | | | | | | | 90 | 165 |
| To East | | 680 | 455 | 0 85 | 60 | | | | | 31 | 21 | 796 | 536 | | | | | | | 804 | 539 |
| To South | | 115 | 295 | 0 15 | 35 | | | | | 0 | 0 | 130 | 330 | | | | | | | 131 | 334 |
| To West | | 300 | 335 | 0 40 | 40 | | | | | 15 | 31 | 355 | 406 | | | | | | | 357 | 411 |
| Total | | 1175 | 1230 | 0 150 | 155 | | | | | 46 | 52 | 1371 | 1437 | | | | | | | 1382 | 1449 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | |
| North | | 220 | 275 | 0 25 | 35 | | | | | 0 | 0 | 245 | 310 | | | | | | | 245 | 310 |
| East | | 1015 | 1085 | 0 130 | 135 | | | | | 46 | 52 | 1191 | 1272 | | | | | | | 1201 | 1282 |
| South | | 430 | 465 | 0 55 | 60 | | | | | 0 | 0 | 485 | 525 | | | | | | | 490 | 531 |
| West | | 685 | 635 | 0 90 | 80 | | | | | 46 | 52 | 821 | 767 | | | | | | | 828 | 775 |
| Total | | 2350 | 2460 | 0 300 | 310 | | | | | 92 | 104 | 2742 | 2874 | | | | | | | 2764 | 2898 |

Part 2.1

# Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 2
INTERSECTION OF Wailupe Drive at Haunani Place

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 :015 Background AM | Case 2 :015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | 10 | 30 | | 0 | 5 | | | | | 0 | 0 | 10 | 35 | 1 | 4 | | | 1 | 4 | 11 | 39 |
| 2 | TH | 10 | 10 | | 0 | 0 | | | | | 0 | 0 | 10 | 10 | | | | | 0 | 0 | 10 | 10 |
| 3 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 4 | E- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 5 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 7 | S- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 8 | TH | 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 |
| 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 |
| 12 | LT | 35 | 15 | | 5 | 0 | | | | | 0 | 0 | 40 | 15 | 4 | 2 | | | 4 | 2 | 44 | 17 |
| TOTAL | | 70 | 65 | | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | 5 | 6 | 80 | 76 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | | |
| From North | | 20 | 40 | 0 | 0 | 5 | | | | | 0 | 0 | 20 | 45 | | | | | | | 21 | 49 |
| From East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| From South | | 15 | 10 | 0 | 0 | 0 | | | | | 0 | 0 | 15 | 10 | | | | | | | 15 | 10 |
| From West | | 35 | 15 | 0 | 5 | 0 | | | | | 0 | 0 | 40 | 15 | | | | | | | 44 | 17 |
| Total | | 70 | 65 | 0 | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | | | 80 | 76 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | | |
| To North | | 50 | 25 | 0 | 5 | 0 | | | | | 0 | 0 | 55 | 25 | | | | | | | 59 | 27 |
| To East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| To South | | 10 | 10 | 0 | 0 | 0 | | | | | 0 | 0 | 10 | 10 | | | | | | | 10 | 10 |
| To West | | 10 | 30 | 0 | 0 | 5 | | | | | 0 | 0 | 10 | 35 | | | | | | | 11 | 39 |
| Total | | 70 | 65 | 0 | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | | | 80 | 76 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | | |
| North | | 70 | 65 | 0 | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | | | 80 | 76 |
| East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| South | | 25 | 20 | 0 | 0 | 0 | | | | | 0 | 0 | 25 | 20 | | | | | | | 25 | 20 |
| West | | 45 | 45 | 0 | 5 | 5 | | | | | 0 | 0 | 50 | 50 | | | | | | | 55 | 56 |
| Total | | 140 | 130 | 0 | 10 | 10 | | | | | 0 | 0 | 150 | 140 | | | | | | | 160 | 152 |

Part 2.1

# Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 3
INTERSECTION OF Waiehu Beach Road at Kahekili Highway

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 2 | TH | 300 | 135 | | 40 | 15 | 25 | 30 | | | 25 | 30 | 365 | 180 | | | 1 | 3 | 1 | 3 | 366 | 183 |
| 3 | LT | 350 | 285 | | 45 | 35 | | | | | 0 | 0 | 395 | 320 | | | | | 0 | 0 | 395 | 320 |
| 4 | E- RT | 250 | 330 | | 30 | 40 | | | | | 0 | 0 | 280 | 370 | | | | | 0 | 0 | 280 | 370 |
| 5 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | 65 | 35 | | 10 | 5 | 15 | 30 | | 1 | 15 | 31 | 90 | 71 | 1 | 1 | 1 | 4 | 2 | 5 | 92 | 76 |
| 7 | S- RT | 30 | 75 | | 5 | 10 | 30 | 20 | 1 | 1 | 31 | 21 | 66 | 106 | 0 | 1 | 5 | 2 | 5 | 3 | 71 | 109 |
| 8 | TH | 215 | 170 | | 25 | 20 | 30 | 20 | | | 30 | 20 | 270 | 210 | | | 2 | 2 | 2 | 2 | 272 | 212 |
| 9 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 10 | W- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 11 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 12 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| TOTAL | | 1210 | 1030 | | 155 | 125 | | | | | 101 | 102 | 1466 | 1257 | | | | | 10 | 13 | 1476 | 1270 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | | |
| From North | | 650 | 420 | 0 | 85 | 50 | | | | | 25 | 30 | 760 | 500 | | | | | | | 761 | 503 |
| From East | | 315 | 365 | 0 | 40 | 45 | | | | | 15 | 31 | 370 | 441 | | | | | | | 372 | 446 |
| From South | | 245 | 245 | 0 | 30 | 30 | | | | | 61 | 41 | 336 | 316 | | | | | | | 343 | 321 |
| From West | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 1210 | 1030 | 0 | 155 | 125 | | | | | 101 | 102 | 1466 | 1257 | | | | | | | 1476 | 1270 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | | |
| To North | | 465 | 500 | 0 | 55 | 60 | | | | | 30 | 20 | 550 | 580 | | | | | | | 552 | 582 |
| To East | | 380 | 360 | 0 | 50 | 45 | | | | | 31 | 21 | 461 | 426 | | | | | | | 466 | 429 |
| To South | | 365 | 170 | 0 | 50 | 20 | | | | | 40 | 61 | 455 | 251 | | | | | | | 458 | 259 |
| To West | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 1210 | 1030 | 0 | 155 | 125 | | | | | 101 | 102 | 1466 | 1257 | | | | | | | 1476 | 1270 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | | |
| North | | 1115 | 920 | 0 | 140 | 110 | | | | | 55 | 50 | 1310 | 1080 | | | | | | | 1313 | 1085 |
| East | | 695 | 725 | 0 | 90 | 90 | | | | | 46 | 52 | 831 | 867 | | | | | | | 838 | 875 |
| South | | 610 | 415 | 0 | 80 | 50 | | | | | 101 | 102 | 791 | 567 | | | | | | | 801 | 580 |
| West | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 2420 | 2060 | 0 | 310 | 250 | | | | | 202 | 204 | 2932 | 2514 | | | | | | | 2952 | 2540 |

Part 2.1

# Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 4
INTERSECTION OF Kahekili Highway at Hale Mua North Driveway/MEO Best Driveway

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | | | | 0 | 0 | 25 | 50 | | | 25 | 50 | 25 | 50 | | | | | 0 | 0 | 25 | 50 |
| 2 | TH | 365 | 170 | | 45 | 20 | 15 | 10 | | | 15 | 10 | 425 | 200 | 1 | 1 | 2 | 7 | 3 | 8 | 428 | 208 |
| 3 | LT | | | | 0 | 0 | | | 0 | 1 | 0 | 1 | 0 | 1 | | | | | 0 | 0 | 0 | 1 |
| 4 | E- RT | | | | 0 | 0 | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 0 | 0 | 1 | 1 |
| 5 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | | | | 0 | 0 | | | 3 | 2 | 3 | 2 | 3 | 2 | | | | | 0 | 0 | 3 | 2 |
| 7 | S- RT | | | | 0 | 0 | | | 2 | 4 | 2 | 4 | 2 | 4 | | | | | 0 | 0 | 2 | 4 |
| 8 | TH | 245 | 245 | | 30 | 30 | 15 | 10 | | | 15 | 10 | 290 | 285 | 0 | 1 | 7 | 4 | 7 | 5 | 297 | 290 |
| 9 | LT | | | | 0 | 0 | 65 | 140 | | | 65 | 140 | 65 | 140 | | | | | 0 | 0 | 65 | 140 |
| 10 | W- RT | | | | 0 | 0 | 135 | 85 | | | 135 | 85 | 135 | 85 | | | | | 0 | 0 | 135 | 85 |
| 11 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 12 | LT | | | | 0 | 0 | 45 | 30 | | | 45 | 30 | 45 | 30 | | | | | 0 | 0 | 45 | 30 |
| TOTAL | | 610 | 415 | | 75 | 50 | | | | | 306 | 333 | 991 | 798 | | | | | 10 | 13 | 1001 | 811 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | | |
| From North | | 365 | 170 | 0 | 45 | 20 | | | | | 40 | 61 | 450 | 251 | | | | | | | 453 | 259 |
| From East | | 0 | 0 | 0 | 0 | 0 | | | | | 4 | 3 | 4 | 3 | | | | | | | 4 | 3 |
| From South | | 245 | 245 | 0 | 30 | 30 | | | | | 82 | 154 | 357 | 429 | | | | | | | 364 | 434 |
| From West | | 0 | 0 | 0 | 0 | 0 | | | | | 180 | 115 | 180 | 115 | | | | | | | 180 | 115 |
| Total | | 610 | 415 | 0 | 75 | 50 | | | | | 306 | 333 | 991 | 798 | | | | | | | 1001 | 811 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | | |
| To North | | 245 | 245 | 0 | 30 | 30 | | | | | 61 | 41 | 336 | 316 | | | | | | | 343 | 321 |
| To East | | 0 | 0 | 0 | 0 | 0 | | | | | 2 | 5 | 2 | 5 | | | | | | | 2 | 5 |
| To South | | 365 | 170 | 0 | 45 | 20 | | | | | 153 | 97 | 563 | 287 | | | | | | | 566 | 295 |
| To West | | 0 | 0 | 0 | 0 | 0 | | | | | 90 | 190 | 90 | 190 | | | | | | | 90 | 190 |
| Total | | 610 | 415 | 0 | 75 | 50 | | | | | 306 | 333 | 991 | 798 | | | | | | | 1001 | 811 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | | |
| North | | 610 | 415 | 0 | 75 | 50 | | | | | 101 | 102 | 786 | 567 | | | | | | | 796 | 580 |
| East | | 0 | 0 | 0 | 0 | 0 | | | | | 6 | 8 | 6 | 8 | | | | | | | 6 | 8 |
| South | | 610 | 415 | 0 | 75 | 50 | | | | | 235 | 251 | 920 | 716 | | | | | | | 930 | 729 |
| West | | 0 | 0 | 0 | 0 | 0 | | | | | 270 | 305 | 270 | 305 | | | | | | | 270 | 305 |
| Total | | 1220 | 830 | 0 | 150 | 100 | | | | | 612 | 666 | 1982 | 1596 | | | | | | | 2002 | 1622 |

Part 2.1

# Traffic Projection Worksheet

Walehu Mauka
January 2009

INTERSECTION NO 5
INTERSECTION OF Kahekili Highway at Hale Mua South Driveway/Waiehu Mauka Driveway

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | | | 0 | 0 | 15 | 10 | | | 15 | 10 | 15 | 10 | | | | | 0 | 0 | 15 | 10 |
| 2 | TH | 365 | 170 | 45 | 20 | 135 | 85 | 3 | 2 | 138 | 87 | 548 | 277 | 1 | 1 | | | 1 | 1 | 549 | 278 |
| 3 | LT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 2 | 7 | 2 | 7 | 2 | 7 |
| 4 | E- RT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 7 | 4 | 7 | 4 | 7 | 4 |
| 5 | TH | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| 7 | S- RT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 10 | 29 | 10 | 29 | 10 | 29 |
| 8 | TH | 245 | 245 | 30 | 30 | 65 | 140 | 2 | 4 | 67 | 144 | 342 | 419 | 0 | 1 | | | 0 | 1 | 342 | 420 |
| 9 | LT | | | 0 | 0 | 60 | 110 | | | 60 | 110 | 60 | 110 | | | | | 0 | 0 | 60 | 110 |
| 10 | W- RT | | | 0 | 0 | 110 | 75 | | | 110 | 75 | 110 | 75 | | | | | 0 | 0 | 110 | 75 |
| 11 | TH | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 12 | LT | | | 0 | 0 | 15 | 10 | | | 15 | 10 | 15 | 10 | | | | | 0 | 0 | 15 | 10 |
| TOTAL | | 610 | 415 | 75 | 50 | | | | | 405 | 436 | 1090 | 901 | | | | | 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 | 1090 | 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 | 1090 | 901 | | | | | | | 1140 | 961 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | |
| North | | 610 | 415 | 0 | 75 | 50 | | | | 235 | 251 | 920 | 716 | | | | | | | 930 | 729 |
| East | | 0 | 0 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | | | | | | | 49 | 58 |
| South | | 610 | 415 | 0 | 75 | 50 | | | | 375 | 416 | 1060 | 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 Wailupe Drive

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | 40 | 15 | | 5 | 0 | | | | | 0 | 0 | 45 | 15 | | | | | 0 | 0 | 45 | 15 |
| 2 | TH | 5 | 5 | | 0 | 0 | | | | | 0 | 0 | 5 | 5 | | | | | 0 | 0 | 5 | 5 |
| 3 | LT | 95 | 110 | | 10 | 15 | | | | | 0 | 0 | 105 | 125 | | | | | 0 | 0 | 105 | 125 |
| 4 | E- RT | 65 | 120 | | 10 | 15 | | | | | 0 | 0 | 75 | 135 | | | | | 0 | 0 | 75 | 135 |
| 5 | TH | 185 | 295 | | 25 | 35 | | | | 1 | 0 | 1 | 210 | 331 | | | 1 | 4 | 1 | 4 | 211 | 335 |
| 6 | LT | 85 | 215 | | 10 | 25 | | | | | 0 | 0 | 95 | 240 | 1 | 3 | | | 1 | 3 | 96 | 243 |
| 7 | S- RT | 235 | 140 | | 30 | 20 | | | | | 0 | 0 | 265 | 160 | 3 | 1 | | | 3 | 1 | 268 | 161 |
| 8 | TH | 5 | 5 | | 0 | 0 | | | | | 0 | 0 | 5 | 5 | | | | | 0 | 0 | 5 | 5 |
| 9 | LT | 75 | 25 | | 10 | 5 | | | | | 0 | 0 | 85 | 30 | 1 | 1 | | | 1 | 1 | 86 | 31 |
| 10 | W- RT | 25 | 75 | | 5 | 10 | | | | | 0 | 0 | 30 | 85 | 0 | 1 | | | 0 | 1 | 30 | 86 |
| 11 | TH | 350 | 205 | | 45 | 25 | | | 1 | 1 | 1 | 1 | 396 | 231 | | | 5 | 2 | 5 | 2 | 401 | 233 |
| 12 | LT | 10 | 20 | | 0 | 5 | | | | | 0 | 0 | 10 | 25 | | | | | 0 | 0 | 10 | 25 |
| TOTAL | | 1175 | 1230 | | 150 | 155 | | | | | 1 | 2 | 1326 | 1387 | | | | | 11 | 12 | 1337 | 1399 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | | |
| From North | | 140 | 130 | 0 | 15 | 15 | | | | | 0 | 0 | 155 | 145 | | | | | | | 155 | 145 |
| From East | | 335 | 630 | 0 | 45 | 75 | | | | | 0 | 1 | 380 | 706 | | | | | | | 382 | 713 |
| From South | | 315 | 170 | 0 | 40 | 25 | | | | | 0 | 0 | 355 | 195 | | | | | | | 359 | 197 |
| From West | | 385 | 300 | 0 | 50 | 40 | | | | | 1 | 1 | 436 | 341 | | | | | | | 441 | 344 |
| Total | | 1175 | 1230 | 0 | 150 | 155 | | | | | 1 | 2 | 1326 | 1387 | | | | | | | 1337 | 1399 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | | |
| To North | | 80 | 145 | 0 | 10 | 20 | | | | | 0 | 0 | 90 | 165 | | | | | | | 90 | 165 |
| To East | | 680 | 455 | 0 | 85 | 60 | | | | | 1 | 1 | 766 | 516 | | | | | | | 774 | 519 |
| To South | | 115 | 295 | 0 | 15 | 35 | | | | | 0 | 0 | 130 | 330 | | | | | | | 131 | 334 |
| To West | | 300 | 335 | 0 | 40 | 40 | | | | | 0 | 1 | 340 | 376 | | | | | | | 342 | 381 |
| Total | | 1175 | 1230 | 0 | 150 | 155 | | | | | 1 | 2 | 1326 | 1387 | | | | | | | 1337 | 1399 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | | |
| North | | 220 | 275 | 0 | 25 | 35 | | | | | 0 | 0 | 245 | 310 | | | | | | | 245 | 310 |
| East | | 1015 | 1085 | 0 | 130 | 135 | | | | | 1 | 2 | 1146 | 1222 | | | | | | | 1156 | 1232 |
| South | | 430 | 465 | 0 | 55 | 60 | | | | | 0 | 0 | 485 | 525 | | | | | | | 490 | 531 |
| West | | 685 | 635 | 0 | 90 | 80 | | | | | 1 | 2 | 776 | 717 | | | | | | | 783 | 725 |
| Total | | 2350 | 2460 | 0 | 300 | 310 | | | | | 2 | 4 | 2652 | 2774 | | | | | | | 2674 | 2798 |

Part 2.1

# Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 2
INTERSECTION OF Wailupe Drive at Haunani Place

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | 10 | 30 | | 0 | 5 | | | | | 0 | 0 | 10 | 35 | 1 | 4 | | | 1 | 4 | 11 | 39 |
| 2 | TH | 10 | 10 | | 0 | 0 | | | | | 0 | 0 | 10 | 10 | | | | | 0 | 0 | 10 | 10 |
| 3 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 4 | E- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 5 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 7 | S- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 8 | TH | 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 |
| 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 |
| 12 | LT | 35 | 15 | | 5 | 0 | | | | | 0 | 0 | 40 | 15 | 4 | 2 | | | 4 | 2 | 44 | 17 |
| TOTAL | | 70 | 65 | | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | 5 | 6 | 80 | 76 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | | |
| From North | | 20 | 40 | 0 | 0 | 5 | | | | | 0 | 0 | 20 | 45 | | | | | | | 21 | 49 |
| From East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| From South | | 15 | 10 | 0 | 0 | 0 | | | | | 0 | 0 | 15 | 10 | | | | | | | 15 | 10 |
| From West | | 35 | 15 | 0 | 5 | 0 | | | | | 0 | 0 | 40 | 15 | | | | | | | 44 | 17 |
| Total | | 70 | 65 | 0 | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | | | 80 | 76 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | | |
| To North | | 50 | 25 | 0 | 5 | 0 | | | | | 0 | 0 | 55 | 25 | | | | | | | 59 | 27 |
| To East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| To South | | 10 | 10 | 0 | 0 | 0 | | | | | 0 | 0 | 10 | 10 | | | | | | | 10 | 10 |
| To West | | 10 | 30 | 0 | 0 | 5 | | | | | 0 | 0 | 10 | 35 | | | | | | | 11 | 39 |
| Total | | 70 | 65 | 0 | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | | | 80 | 76 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | | |
| North | | 70 | 65 | 0 | 5 | 5 | | | | | 0 | 0 | 75 | 70 | | | | | | | 80 | 76 |
| East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| South | | 25 | 20 | 0 | 0 | 0 | | | | | 0 | 0 | 25 | 20 | | | | | | | 25 | 20 |
| West | | 45 | 45 | 0 | 5 | 5 | | | | | 0 | 0 | 50 | 50 | | | | | | | 55 | 56 |
| Total | | 140 | 130 | 0 | 10 | 10 | | | | | 0 | 0 | 150 | 140 | | | | | | | 160 | 152 |

Part 2.1

# Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 3
INTERSECTION OF Waiehu Beach Road at Kahekili Highway

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 :015 Background AM | Case 2 :015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 2 | TH | 300 | 135 | 40 | 15 | | | | | 0 | 0 | 340 | 150 | | | 1 | 3 | 1 | 3 | 341 | 153 |
| 3 | LT | 350 | 285 | 45 | 35 | | | | | 0 | 0 | 395 | 320 | | | | | 0 | 0 | 395 | 320 |
| 4 | E- RT | 250 | 330 | 30 | 40 | | | | | 0 | 0 | 280 | 370 | | | | | 0 | 0 | 280 | 370 |
| 5 | TH | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | 65 | 35 | 10 | 5 | | | | 1 | 0 | 1 | 75 | 41 | 1 | 1 | 1 | 4 | 2 | 5 | 77 | 46 |
| 7 | S- RT | 30 | 75 | 5 | 10 | | | 1 | 1 | 1 | 1 | 36 | 86 | 0 | 1 | 5 | 2 | 5 | 3 | 41 | 89 |
| 8 | TH | 215 | 170 | 25 | 20 | | | | | 0 | 0 | 240 | 190 | | | 2 | 2 | 2 | 2 | 242 | 192 |
| 9 | LT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 10 | W- RT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 11 | TH | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 12 | LT | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| TOTAL | | 1210 | 1030 | 155 | 125 | | | | | 1 | 2 | 1366 | 1157 | | | | | 10 | 13 | 1376 | 1170 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | |
| From North | | 650 | 420 | 0 85 | 50 | | | | | 0 | 0 | 735 | 470 | | | | | | | 736 | 473 |
| From East | | 315 | 365 | 0 40 | 45 | | | | | 0 | 1 | 355 | 411 | | | | | | | 357 | 416 |
| From South | | 245 | 245 | 0 30 | 30 | | | | | 1 | 1 | 276 | 276 | | | | | | | 283 | 281 |
| From West | | 0 | 0 | 0 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 1210 | 1030 | 0 155 | 125 | | | | | 1 | 2 | 1366 | 1157 | | | | | | | 1376 | 1170 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | |
| To North | | 465 | 500 | 0 55 | 60 | | | | | 0 | 0 | 520 | 560 | | | | | | | 522 | 562 |
| To East | | 380 | 360 | 0 50 | 45 | | | | | 1 | 1 | 431 | 406 | | | | | | | 436 | 409 |
| To South | | 365 | 170 | 0 50 | 20 | | | | | 0 | 1 | 415 | 191 | | | | | | | 418 | 199 |
| To West | | 0 | 0 | 0 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 1210 | 1030 | 0 155 | 125 | | | | | 1 | 2 | 1366 | 1157 | | | | | | | 1376 | 1170 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | |
| North | | 1115 | 920 | 0 140 | 110 | | | | | 0 | 0 | 1255 | 1030 | | | | | | | 1258 | 1035 |
| East | | 695 | 725 | 0 90 | 90 | | | | | 1 | 2 | 786 | 817 | | | | | | | 793 | 825 |
| South | | 610 | 415 | 0 80 | 50 | | | | | 1 | 2 | 691 | 467 | | | | | | | 701 | 480 |
| West | | 0 | 0 | 0 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 2420 | 2060 | 0 310 | 250 | | | | | 2 | 4 | 2732 | 2314 | | | | | | | 2752 | 2340 |

Part 2.1

# Traffic Projection Worksheet

Waiehu Mauka
January 2009

INTERSECTION NO 4
INTERSECTION OF Kahekili Highway at Hale Mua North Driveway/MEO Best Driveway

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project PM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | N- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 2 | TH | 365 | 170 | | 45 | 20 | | | | | 0 | 0 | 410 | 190 | 1 | 1 | 2 | 7 | 3 | 8 | 413 | 198 |
| 3 | LT | | | | 0 | 0 | | | 0 | 1 | 0 | 1 | 0 | 1 | | | | | 0 | 0 | 0 | 1 |
| 4 | E- RT | | | | 0 | 0 | | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 0 | 0 | 1 | 1 |
| 5 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | | | | 0 | 0 | | | 3 | 2 | 3 | 2 | 3 | 2 | | | | | 0 | 0 | 3 | 2 |
| 7 | S- RT | | | | 0 | 0 | | | 2 | 4 | 2 | 4 | 2 | 4 | | | | | 0 | 0 | 2 | 4 |
| 8 | TH | 245 | 245 | | 30 | 30 | | | | | 0 | 0 | 275 | 275 | 0 | 1 | 7 | 4 | 7 | 5 | 282 | 280 |
| 9 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 10 | W- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 11 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 12 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 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 | 686 | 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 |

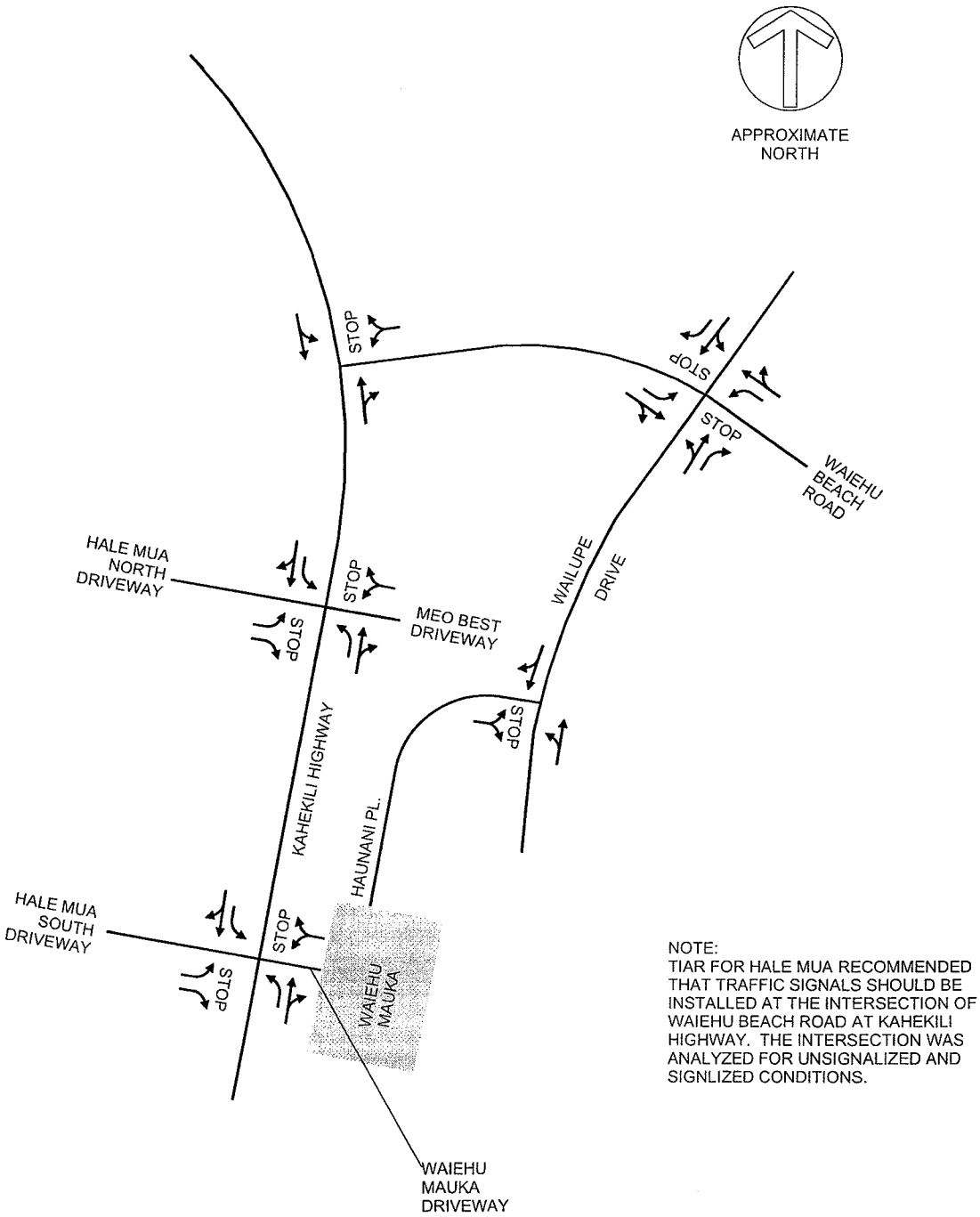
Part 2.1

# Traffic Projection Worksheet

Waiehu Mauka
January 2009

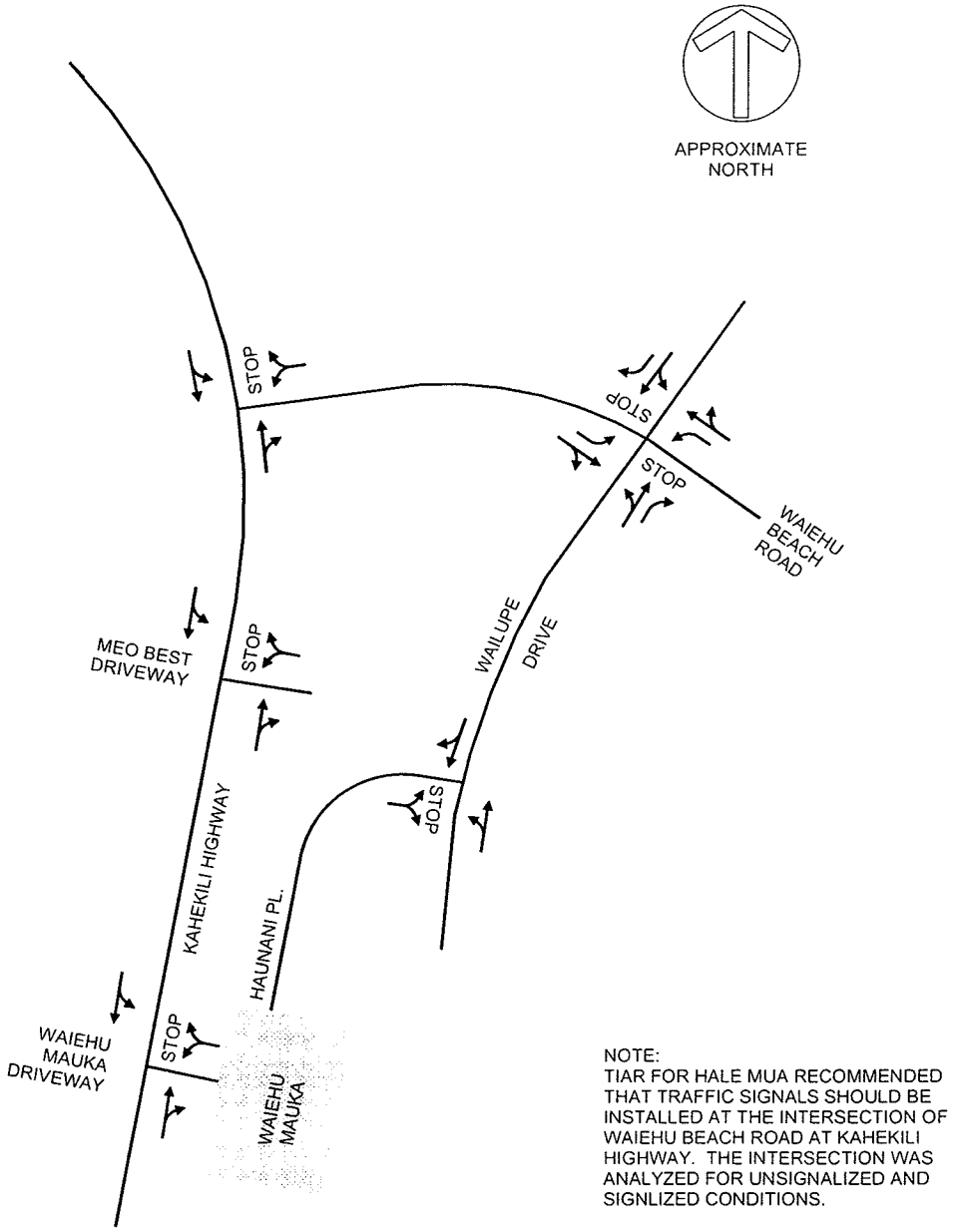
INTERSECTION NO 5
INTERSECTION OF Kahekili Highway at Hale Mua South Driveway/Waiehu Mauka Driveway

| No | Approach & Mvt | Case 1 Existing AM | Case 1 Existing PM | | Background Growth AM | Background Growth PM | Hale Mua Trips AM | Hale Mua Trips PM | MEO Best Trips AM | MEO Best Trips PM | Related Project Traffic AM | Related Project Traffic PM | Case 2 '015 Background AM | Case 2 '015 Background PM | Single Family Trips AM | Single Family Trips PM | Multi Family Trips AM | Multi Family Trips PM | Project Trips AM | Project Trips PM | Case 3 Background Plus Project AM | Case 3 Background Plus Project 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 | | | 1 | 1 | 414 | 193 |
| 3 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 2 | 7 | 2 | 7 | 2 | 7 |
| 4 | E- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 7 | 4 | 7 | 4 | 7 | 4 |
| 5 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 6 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| 7 | S- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | 10 | 29 | 10 | 29 | 10 | 29 |
| 8 | TH | 245 | 245 | | 30 | 30 | | | 2 | 4 | 2 | 4 | 277 | 279 | 0 | 1 | | | 0 | 1 | 277 | 280 |
| 9 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 10 | W- RT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 11 | TH | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| 12 | LT | | | | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 |
| TOTAL | | 610 | 415 | | 75 | 50 | | | | | 5 | 6 | 690 | 471 | | | | | 50 | 60 | 740 | 531 |
| Approach Totals | | | | | | | | | | | | | | | | | | | | | | |
| From North | | 365 | 170 | 0 | 45 | 20 | | | | | 3 | 2 | 413 | 192 | | | | | | | 416 | 200 |
| From East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 37 | 22 |
| From South | | 245 | 245 | 0 | 30 | 30 | | | | | 2 | 4 | 277 | 279 | | | | | | | 287 | 309 |
| From West | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 610 | 415 | 0 | 75 | 50 | | | | | 5 | 6 | 690 | 471 | | | | | | | 740 | 531 |
| Departure Totals | | | | | | | | | | | | | | | | | | | | | | |
| To North | | 245 | 245 | 0 | 30 | 30 | | | | | 2 | 4 | 277 | 279 | | | | | | | 284 | 284 |
| To East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 12 | 36 |
| To South | | 365 | 170 | 0 | 45 | 20 | | | | | 3 | 2 | 413 | 192 | | | | | | | 444 | 211 |
| To West | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 610 | 415 | 0 | 75 | 50 | | | | | 5 | 6 | 690 | 471 | | | | | | | 740 | 531 |
| Leg Totals | | | | | | | | | | | | | | | | | | | | | | |
| North | | 610 | 415 | 0 | 75 | 50 | | | | | 5 | 6 | 690 | 471 | | | | | | | 700 | 484 |
| East | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 49 | 58 |
| South | | 610 | 415 | 0 | 75 | 50 | | | | | 5 | 6 | 690 | 471 | | | | | | | 731 | 520 |
| West | | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 |
| Total | | 1220 | 830 | 0 | 150 | 100 | | | | | 10 | 12 | 1380 | 942 | | | | | | | 1480 | 1062 |




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 SIGNLIZED CONDITIONS.

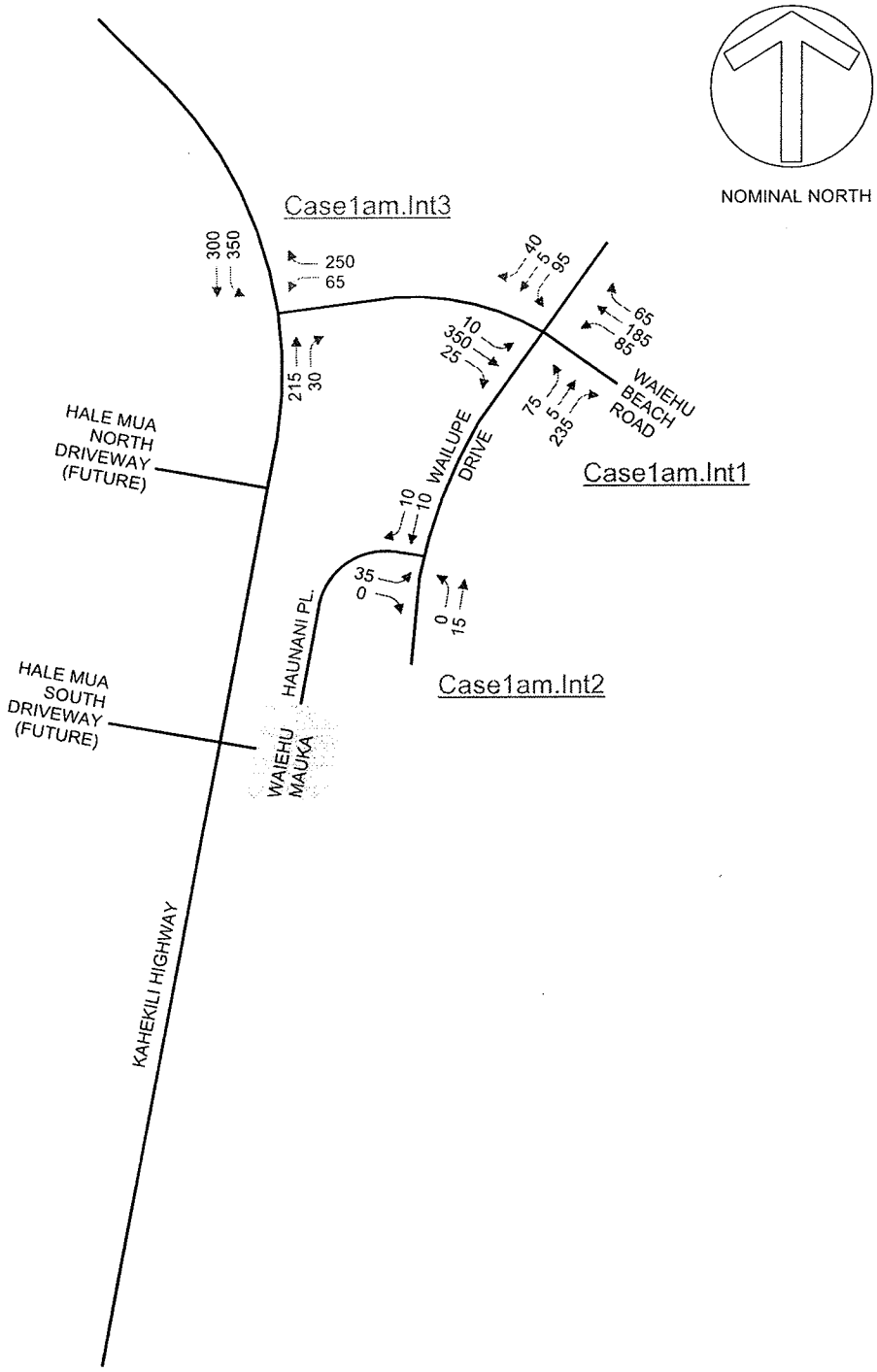
**Attachment O**
**2015 LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS WITH HALE MUA**




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 SIGNLIZED CONDITIONS.

**Attachment P**
**2015 LANE CONFIGURATIONS AND RIGHT-OF-WAY CONTROLS WITHOUT HALE MUA**

# Attachment Q
# LEVEL-OF-SERVICE WORKSHEETS




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 *Waiehu Mauka*

| | |
|---|---|
| East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd* |
| Intersection Orientation: *East-West* | Study Period (hrs): *0.25* |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Haunani Place | North/South Street: Wailupe Drive |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 |
| 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Wiehu Bch Rd* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | | | | |

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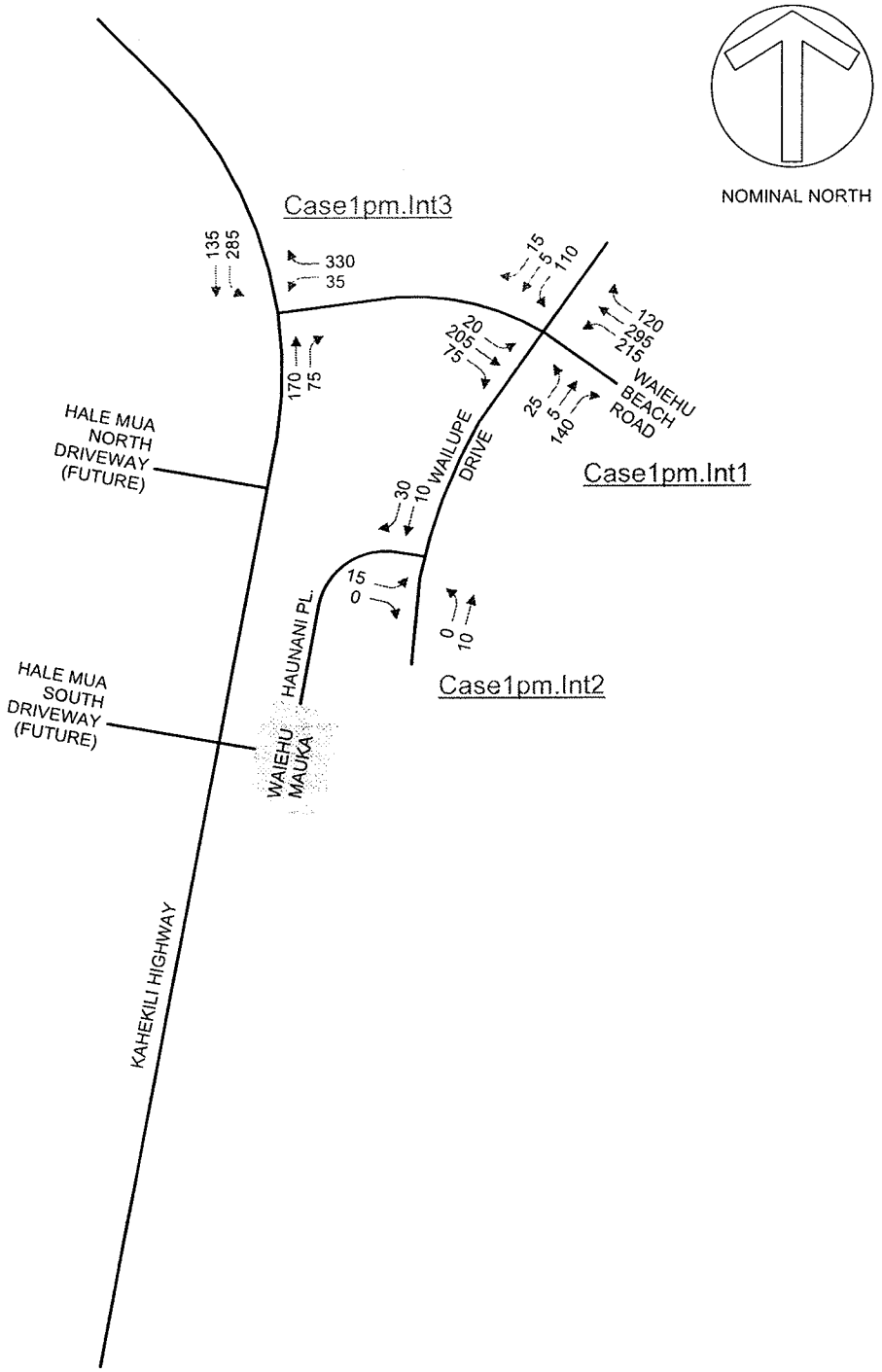


Case 1pm
EXISTING PM PEAK HOUR

# 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 *Waiehu Mauka*

East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Haunani Place | North/South Street: Wailupe Drive |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Wiehu Bch Rd* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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* | | | | | |

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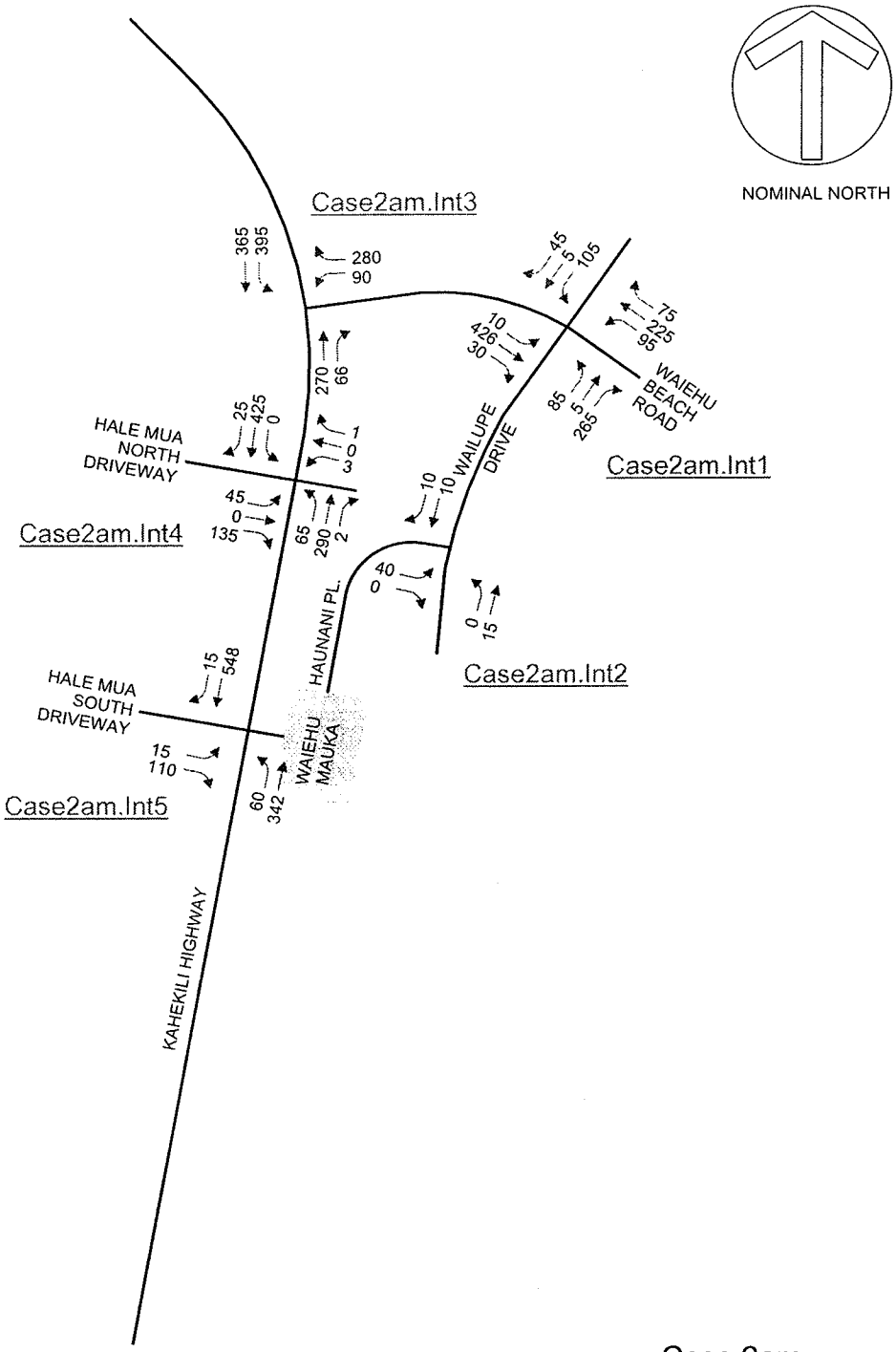


Case 2am
2015 BACKGROUND
WITH HALE MUA

# 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 *Waiehu Mauka*

East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Haunani Place* | North/South Street: *Wailupe Drive*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Wiehu Bch Rd | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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# 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 Waiehu Mauka Subdivision | |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Hael Mua South/Waiehu Mauka* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | |

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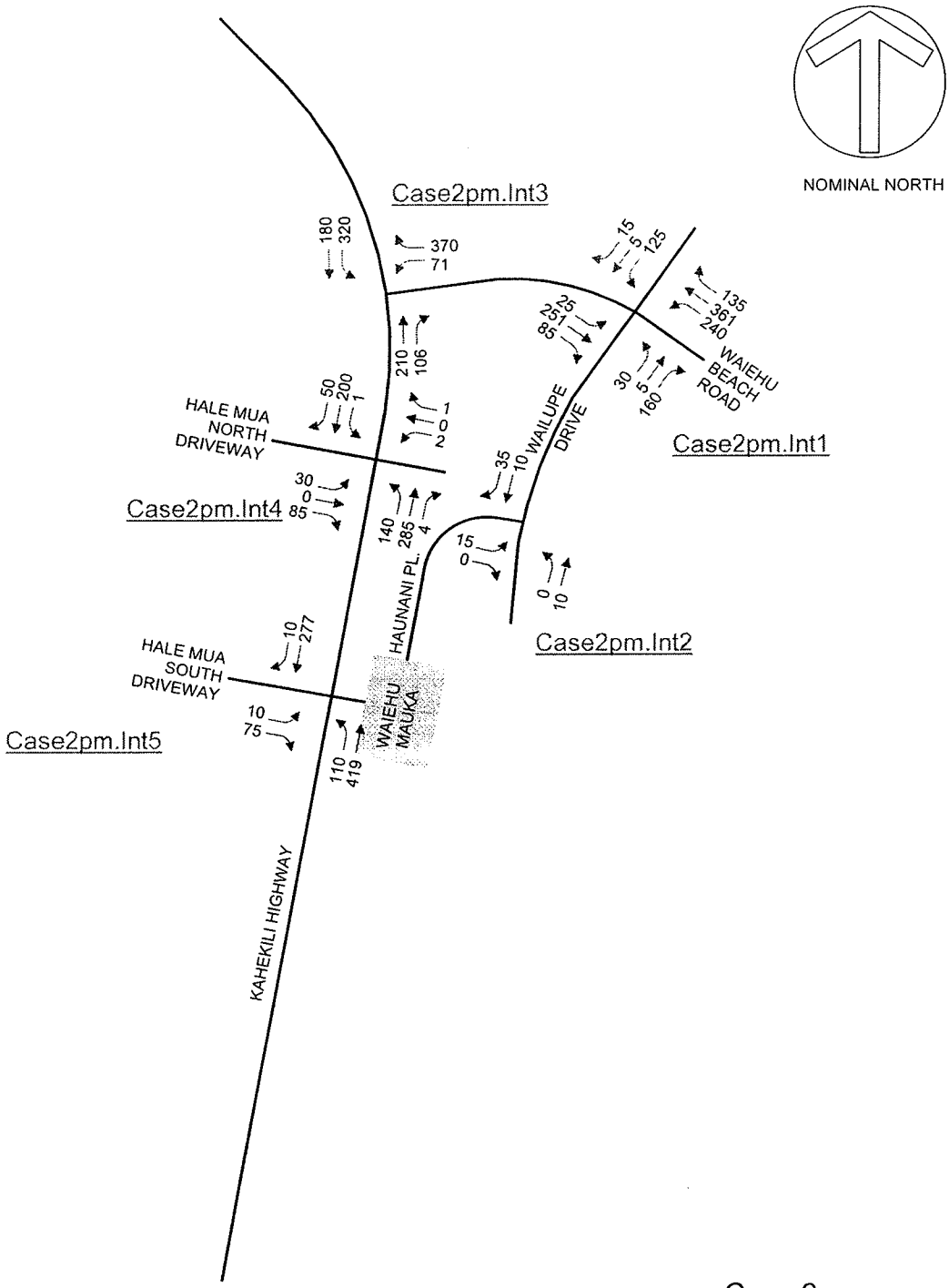


Case 2pm
2015 BACKGROUND
WITH HALE MUA

# 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 *Waiehu Mauka*

East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Haunani Place* | North/South Street: *Wailupe Drive*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Wiehu Bch Rd* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Hael Mua South/Waiehu Mauka* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | |

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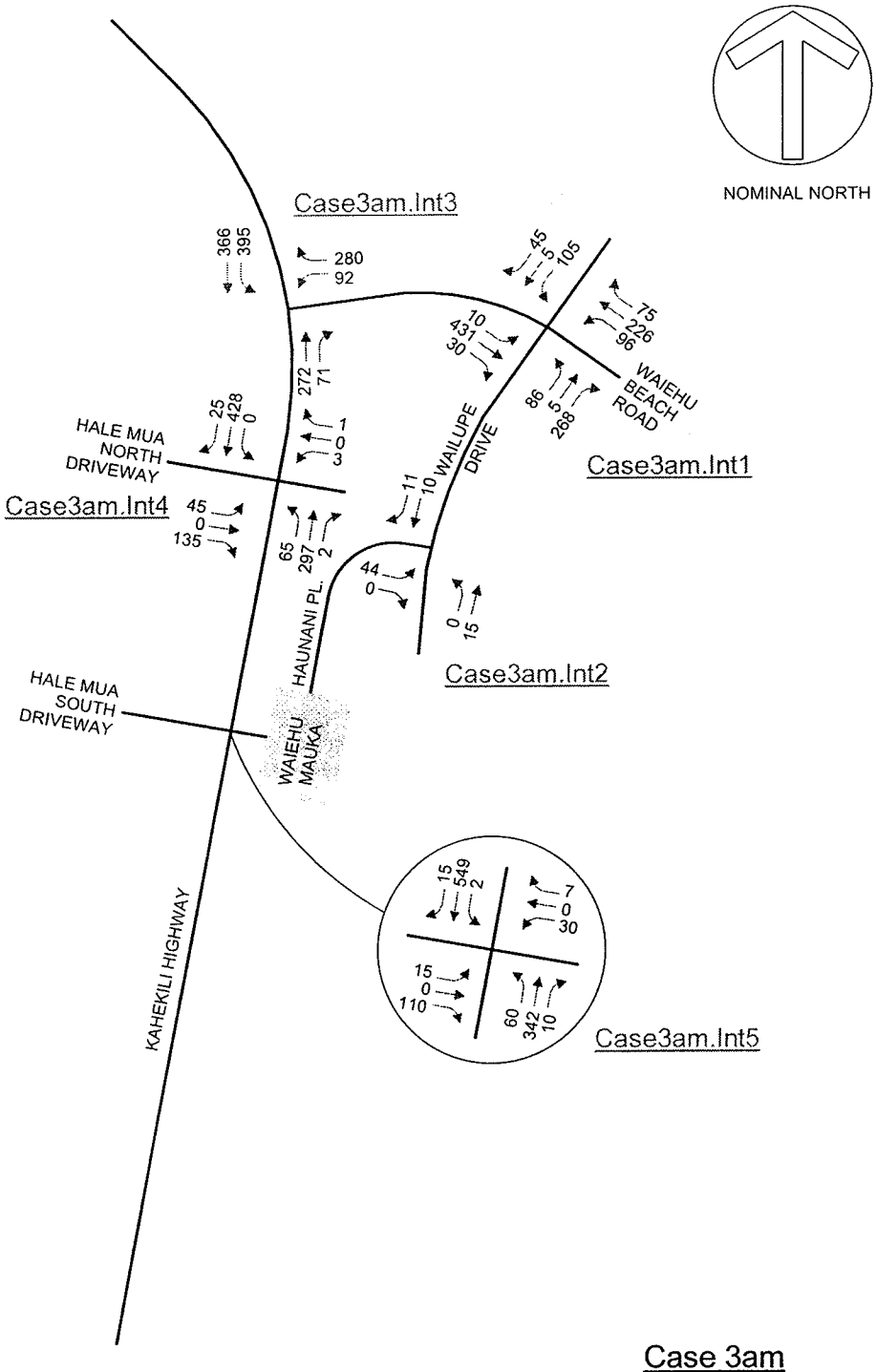


Case 3am
BACKGROUND PLUS PROJECT
WITH HALE MUA

# 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 *Waiehu Mauka*

| | |
|---|---|
| East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd* |
| Intersection Orientation: *East-West* | Study Period (hrs): *0.25* |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Haunani Place | North/South Street: Wailupe Drive |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Wiehu Bch Rd* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Hael Mua South/Waiehu Mauka* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | |

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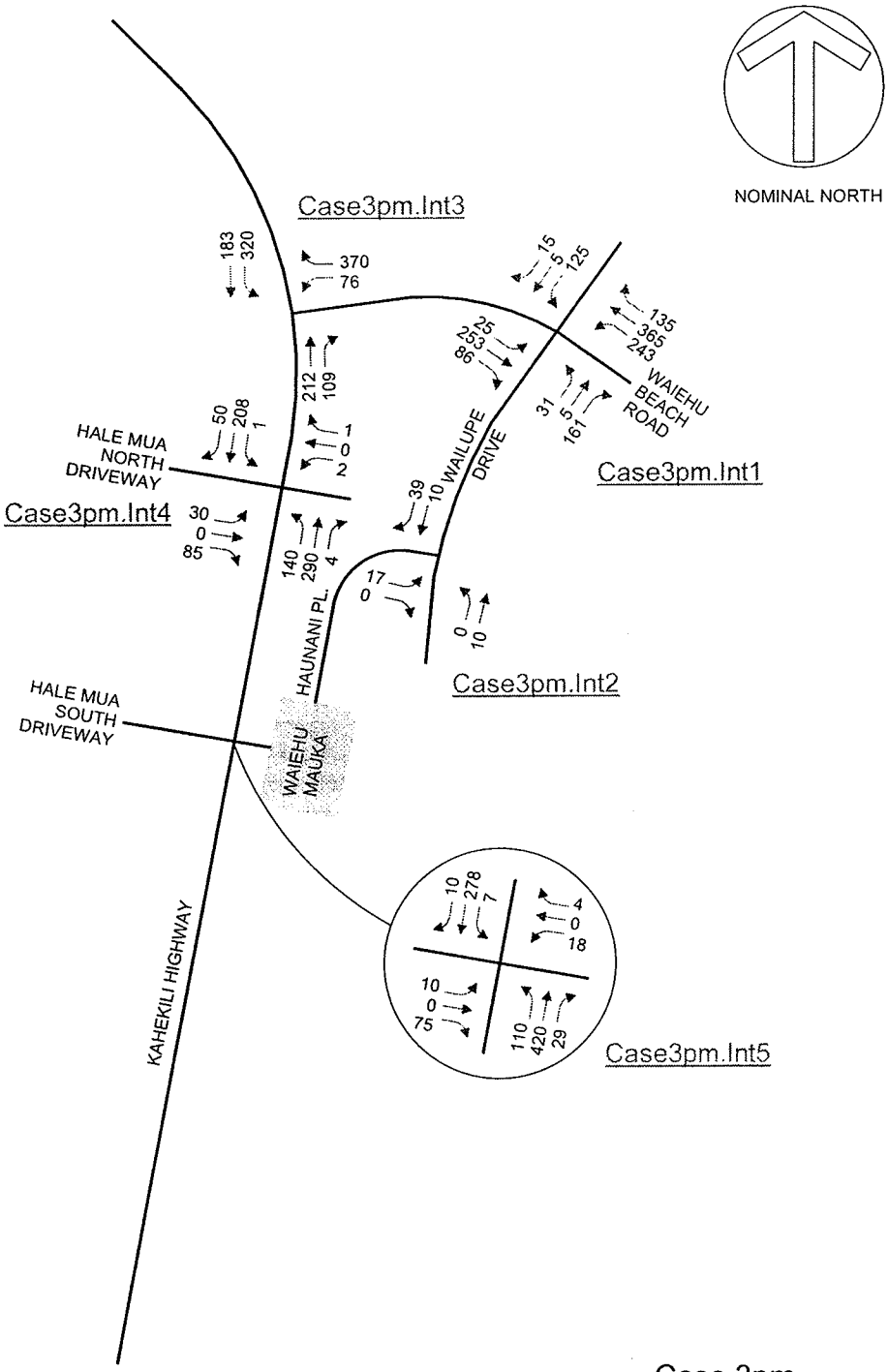


Case 3pm
BACKGROUND PLUS PROJECT
WITH HALE MUA

# 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 *Waiehu Mauka*

East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Haunani Place | North/South Street: Wailupe Drive |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Wiehu Bch Rd* | North/South Street: *Kahekili Highway*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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* | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hael Mua South/Waiehu Mauka | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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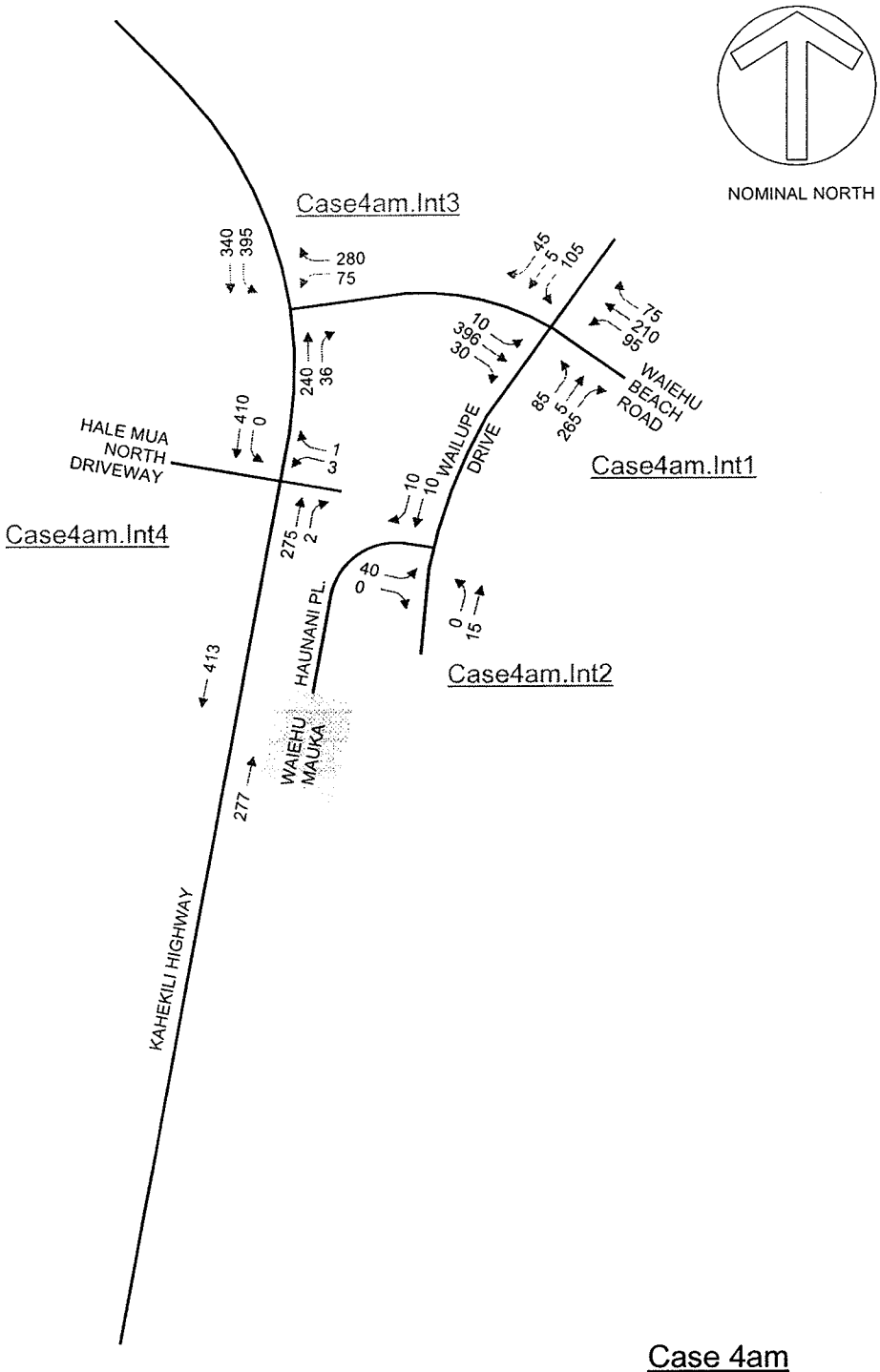


Case 4am
2015 BACKGROUND
WITHOUT HALE MUA

# 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 *Waiehu Mauka*

| | |
|---|---|
| East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd* |
| Intersection Orientation: *East-West* | Study Period (hrs): *0.25* |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Haunani Place | North/South Street: Wailupe Drive |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Wiehu Bch Rd | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | 12 |
| 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | 12 |
| 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 | | | | | |

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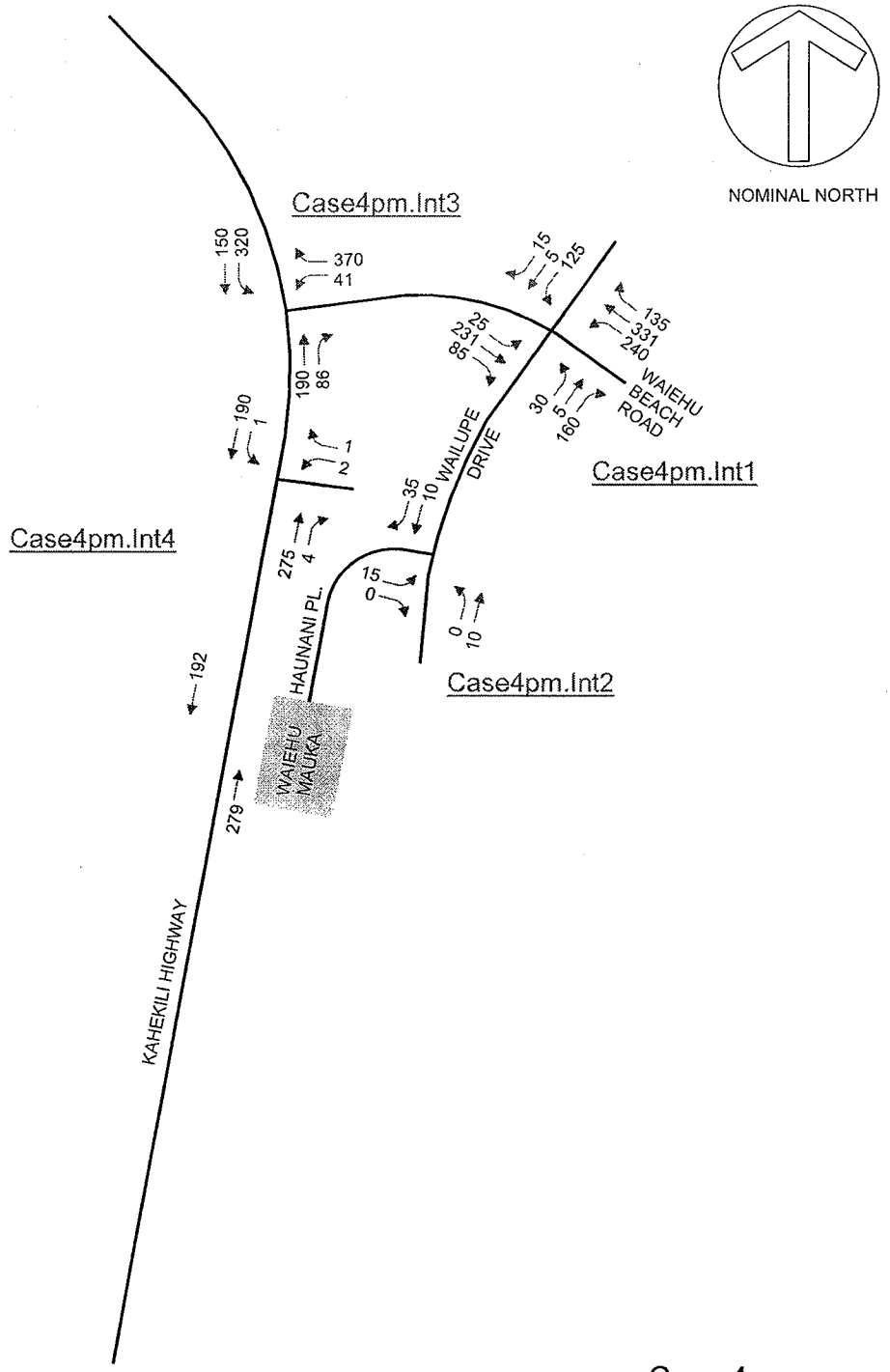


Case 4pm
2015 BACKGROUND
WITHOUT HALE MUA

# 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 *Waiehu Mauka*

East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 *Waiehu Mauka Subdivision*

East/West Street: *Haunani Place* | North/South Street: *Wailupe Drive*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Wiehu Bch Rd | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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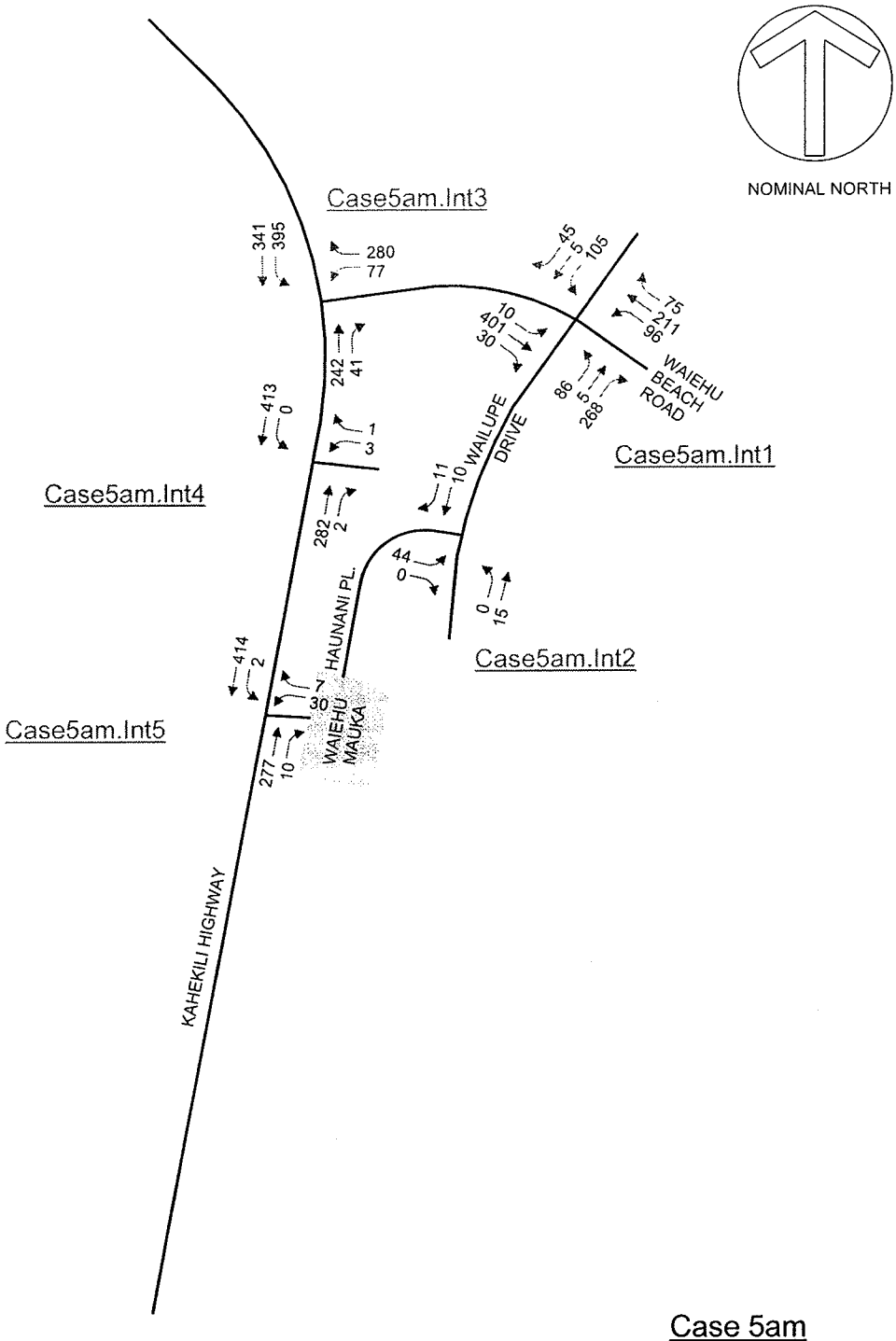


Case 5am
BACKGROUND PLUS PROJECT
WITHOUT HALE MUA

# 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 *Waiehu Mauka*

| | |
|---|---|
| East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd* |
| Intersection Orientation: *East-West* | Study Period (hrs): *0.25* |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Haunani Place | North/South Street: Wailupe Drive |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Wiehu Bch Rd | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hael Mua South/Waiehu Mauka | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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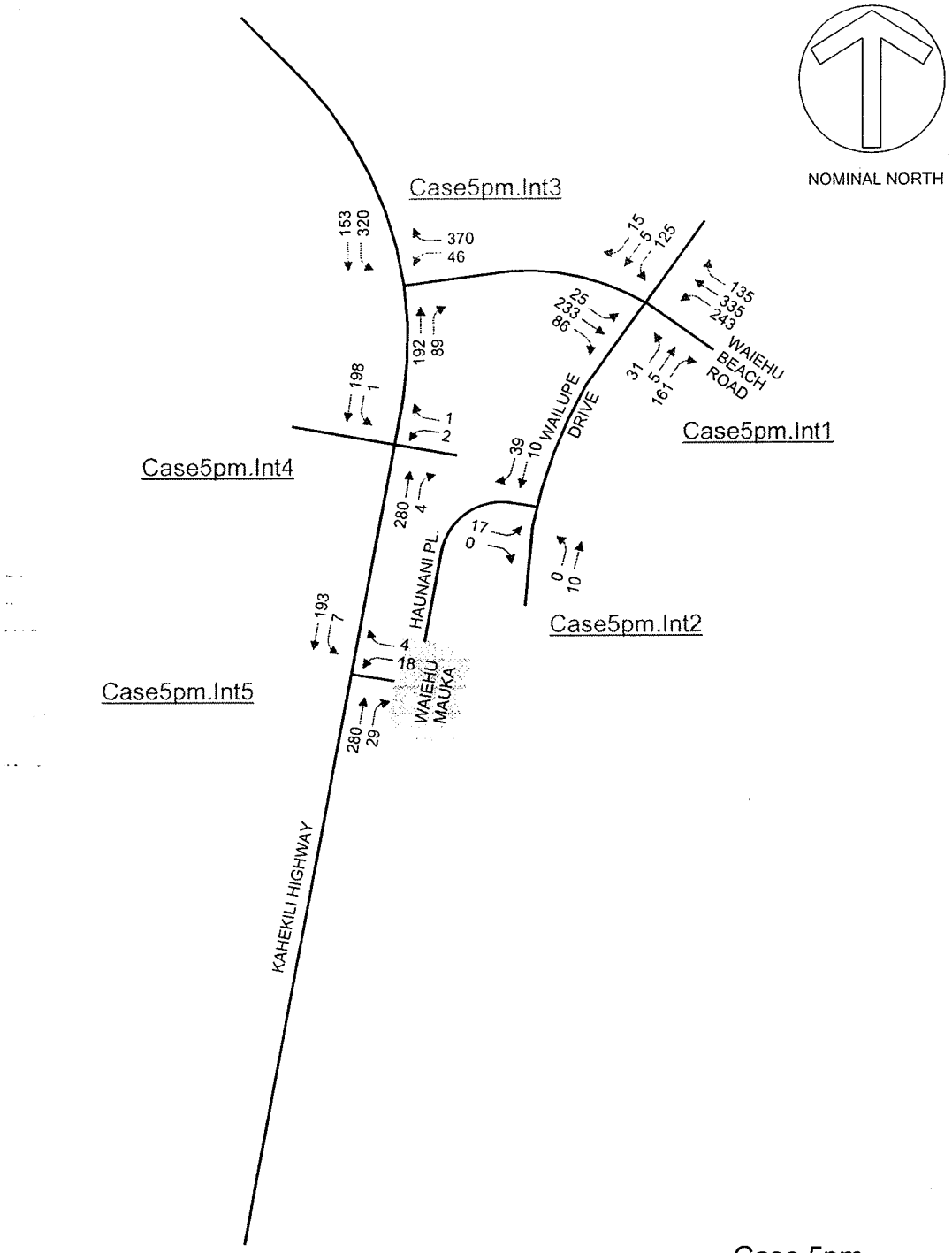


Case 5pm
BACKGROUND PLUS PROJECT
WITHOUT HALE MUA

# 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 *Waiehu Mauka*

East/West Street: *Waiehu Beach Road* | North/South Street: *Wailupe Dr/Lower Waiehu Bch Rd*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Haunani Place | North/South Street: Wailupe Drive |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Wiehu Bch Rd | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hale Mua North/MEO BEST | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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# 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 | Waiehu Mauka Subdivision |
| East/West Street: Hael Mua South/Waiehu Mauka | North/South Street: Kahekili Highway |
| Intersection Orientation: North-South | Study Period (hrs): 0.25 |

## 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 | | | | | |

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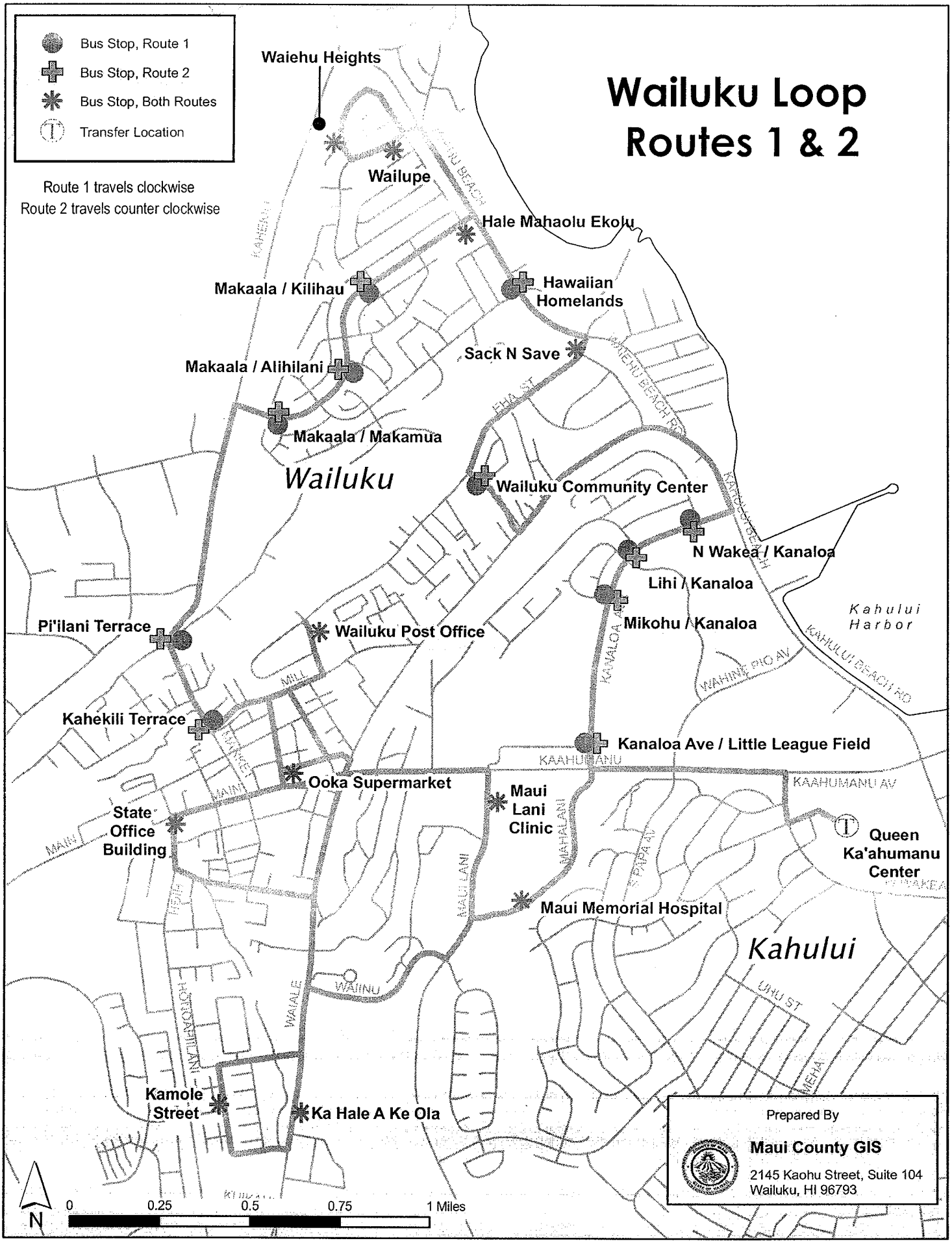
# Attachment R
# THE MAUI BUS SERVICE IN WAEHU HEIGHTS AREA




C:\Transportation\2008\MXDs\Wailuku_Loop.mxd -- 7/15/2008 -- RK

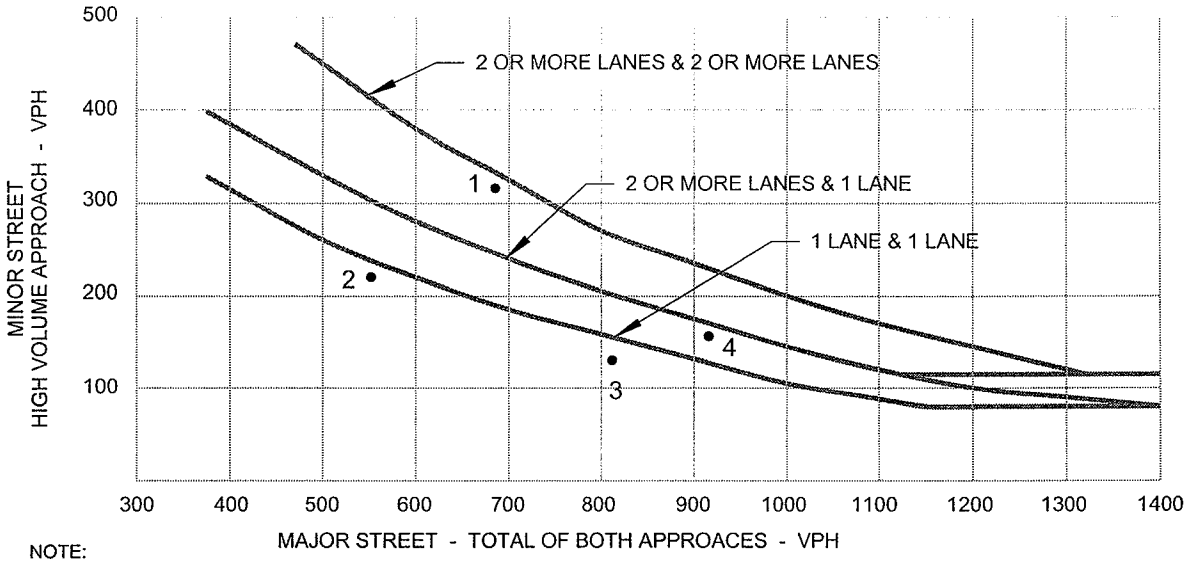
# Attachment S
# TRAFFIC SIGNAL WARRANT ANALYSIS WARRANT 2 - FOUR HOUR VEHICULAR WARRANT

## WARRANT 2 - FOUR HOUR VEHICULAR WARRANT

100% Satisfied YES☐ NO☑
70% Satisfied YES☑ NO☐

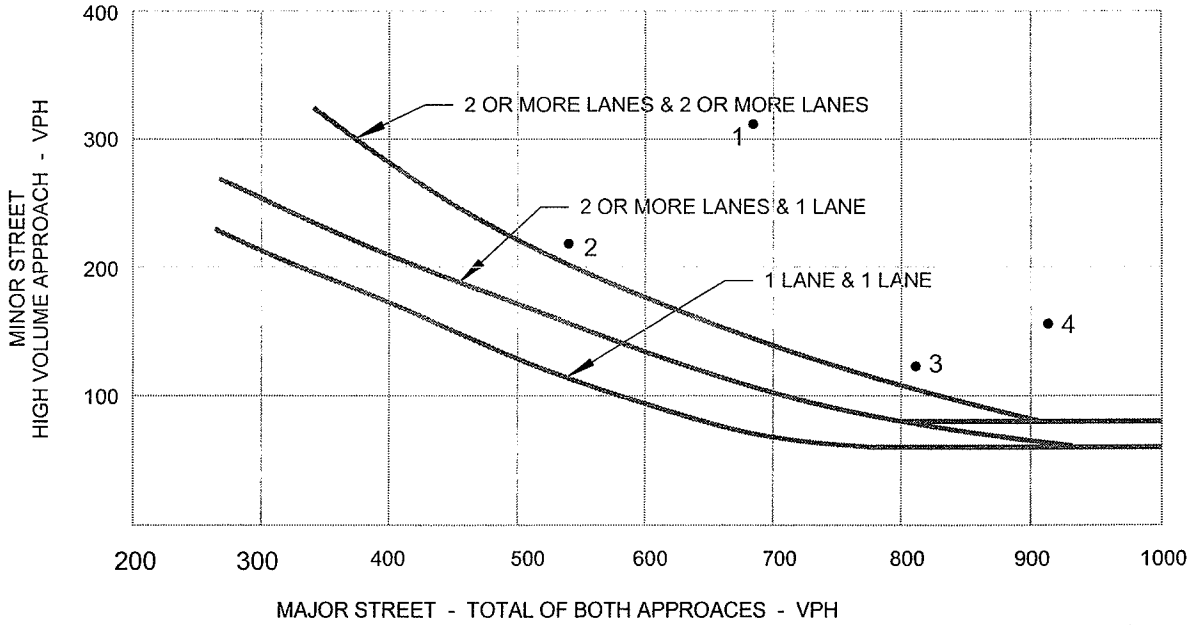
| | APPROACH LANES | | HOUR | | | |
|---|---|---|---|---|---|---|
| | one | more | 1 | 2 | 3 | 4 |
| Both approaches - Major Street | | X | 680 | 541 | 810 | 914 |
| Highest approach - Minor Street | | X | 307 | 215 | 127 | 159 |

*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 APPRAOCH 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 APPRAOCH WITH ONE LANE.

*Phillip Rowell and Associates*

# 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:


Tanaka
ENGINEERS, INC.
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**

## TABLE OF CONTENTS


I. INTRODUCTION

II. EXISTING SITE CONDITIONS AND INFRASTRUCTURE

- A. LOCATION
- B. SOIL
- C. FLOOD HAZARD
- D. ACCESS
- E. WATER
- F. SEWER
- G. TOPOGRAPHY

III. PROPOSED DEVELOPMENT AND INFRASTRUCTURE IMPROVEMENTS

- A. PROPOSED DEVELOPMENT
- B. ROADWAY
- C. WATER SYSTEM
- D. WASTEWATER SYSTEM

IV. DRAINAGE

- A. GENERAL
- B. DRAINAGE CONDITIONS
- C. ANTICIPATED IMPROVEMENTS
- D. OPERATION AND MAINTENANCE PLAN
- E. CONCLUSION

V. GRADING AND SOIL EROSION CONTROL

- A. GRADING CONCEPT
- B. BEST MANAGEMENT PRACTICES

VI. PROJECTED CONSTRUCTION COSTS

VII. CONSTRUCTION PLAN APPROVALS

VIII. REFERENCES

IX. EXHIBIT

EXHIBIT A - PRELIMINARY DRAINAGE CALCULATIONS

EXHIBIT B - PRELIMINARY WASTEWATER FLOWS AND WATER REQUIREMENTS

EXHIBIT C - PRELIMINARY ENGINEER'S ESTIMATE

X. FIGURES

FIGURE 1 - LOCATION MAP

FIGURE 2 - VICINITY MAP

FIGURE 3 - SOILS MAP

FIGURE 4 - FLOOD MAP

FIGURE 5 - EXISTING COUNTY WATER SYSTEM

FIGURE 6 - EXISTING OFFSITE WASTEWATER FACILITIES

FIGURE 7 - EXISTING TOPOGRAPHIC MAP

FIGURE 8 - PRELIMINARY SUBDIVISION PLAT MAP

FIGURE 9 - CONCEPTUAL SITE PLAN

FIGURE 10 - CONCEPTUAL WATER SYSTEM LAYOUT

FIGURE 11 - CONCEPTUAL ONSITE SEWER SYSTEM LAYOUT

FIGURE 12 - OPTIONS FOR OFFSITE WASTEWATER DISPOSAL SYSTEM

FIGURE 13 - PRELIMINARY HYDROLOGIC MAP - EXISTING CONDITIONS

FIGURE 14 - PRELIMINARY HYDROLOGIC MAP - POST DEVELOPMENT CONDITIONS

FIGURE 15 - CONCEPTUAL DRAINAGE SYSTEM LAYOUT

FIGURE 16 - CONCEPTUAL GRADING PLAN

FIGURE 17 - CONCEPTUAL SOIL EROSION CONTROL PLAN

FIGURE 18 - MISCELLANEOUS DRAINAGE AND BMP DETAILS

## 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 an 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-feet wide access easement across Lot 1-B. This access will be improved to County standards with at least 20-feet 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<br>= 62 gpm |
| c. | Peak Hour Demand | = 178,800 gals./day<br>= 124 gpm |
| d. | Fire Flow Demand | = 1,000 gpm (single family)<br>= 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 waste-water 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:

| | | 10-Yr. | 50-Yr. |
|---|---|---|---|
| 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 (Unimproved) (Table 2)

Future Condition:

C = 0.55 (Residential) (Table 3)

= 0.70 (Apartment)

Table A shows the runoff coefficients of the different drain areas.

3. Time of Concentration, Tc:

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

| | | |
|---|---|---|
| Unimproved | = | 8.0 cfs (Area 1E) |
| Post Development | = | 15.0 cfs (Area A) |
| Increase | = | 7.0 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)<br>Paved Area = 0.11 (C = 0.95)<br>Total Area = 0.85 Ac.<br>$C_w = \frac{0.74 \times 0.30 + 0.11 \times 0.95}{0.85} = \frac{0.327}{0.85} = 0.38$ |
| 3E | 0.30 | Unimproved |
| A | 0.62 | Unimproved Area = 1.15 (C = 0.30)<br>Multi-Family = 5.14 (C = 0.70)<br>Single Family = 0.88 (C = 0.55)<br>Total Area = 7.17 Ac.<br>$C_w = \frac{1.15 \times 0.30 + 5.14 \times 0.70 + 0.88 \times 0.55}{7.17} = \frac{4.427}{7.17} = 0.62$ |
| B | 0.55 | Single Family Residential Area |
| C | 0.30 | Unimproved |

## TABLE B

### TIME OF CONCENTRATION, Tc

| Drain Area Designation | Length of Overland Flow, Ft. | Average Slope, % | Character of Ground | Tc (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 |

〉24

## 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 |

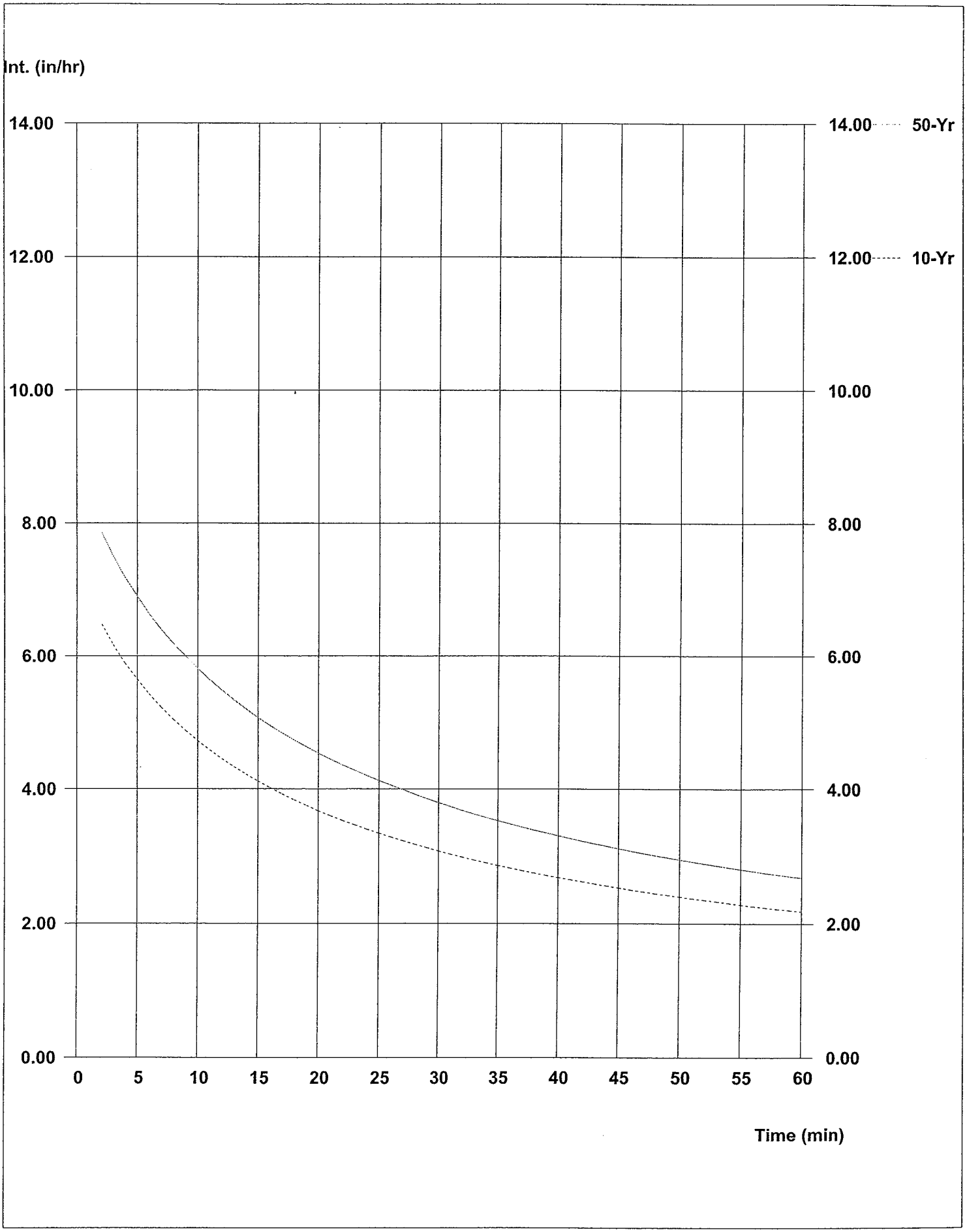
$I_{10} = 2.2''$

$I_{50} = 2.7''$

Tc = time in minutes

# 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) |
| | | | | | | --- | ----- | ----- | |
| | | | | | | --- | ----- | ----- | |
| | | | | | | --- | ----- | ----- | |
| | | | | | | --- | ----- | ----- | |

# 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) |

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

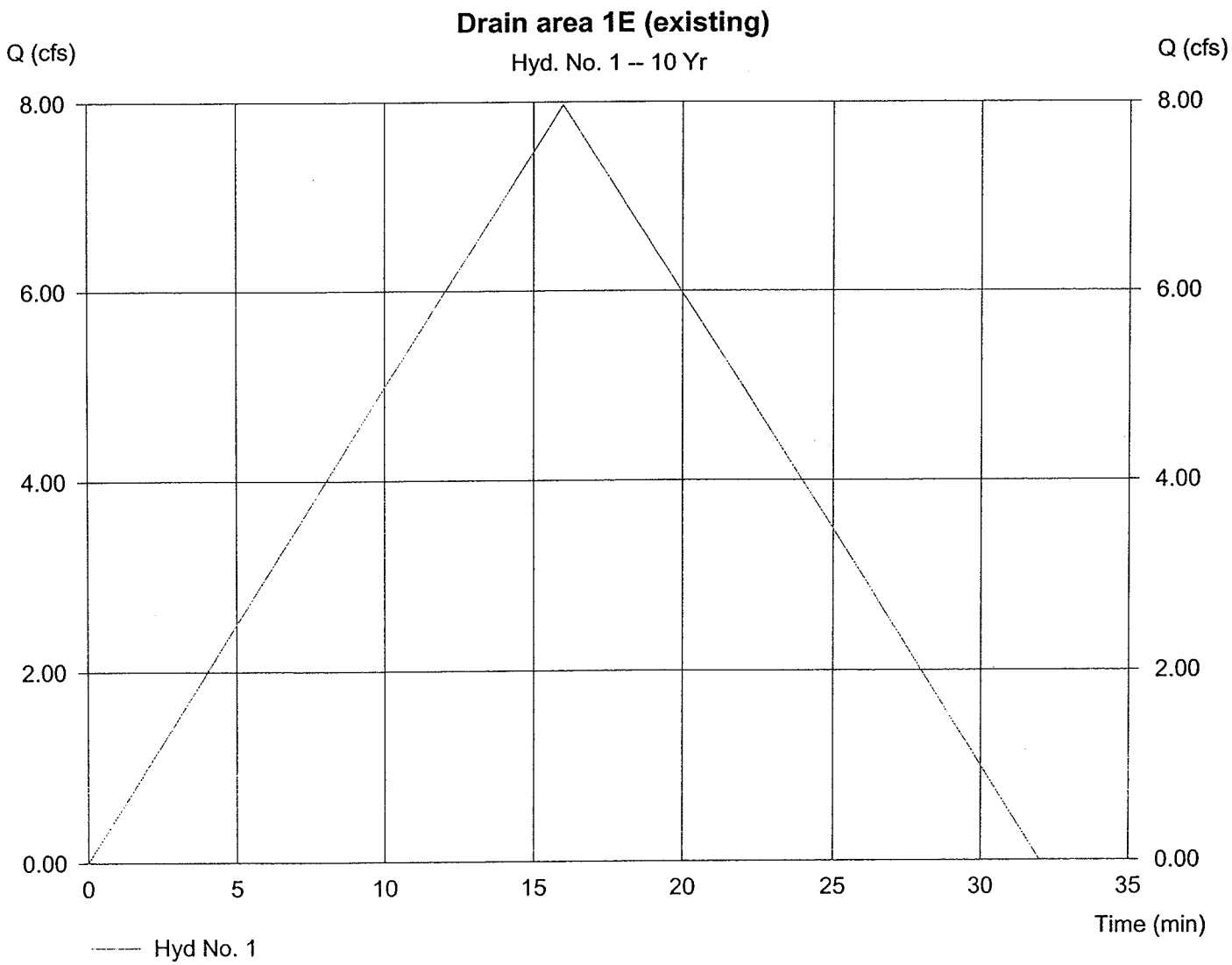
Wednesday, Jan 21 2009, 7:49 AM

## Hyd. No. 1

Drain area 1E (existing)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 7.97 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 6.610 ac | Runoff coeff. | = 0.3 |
| Intensity | = 4.019 in/hr | Tc by User | = 16.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 7,650 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

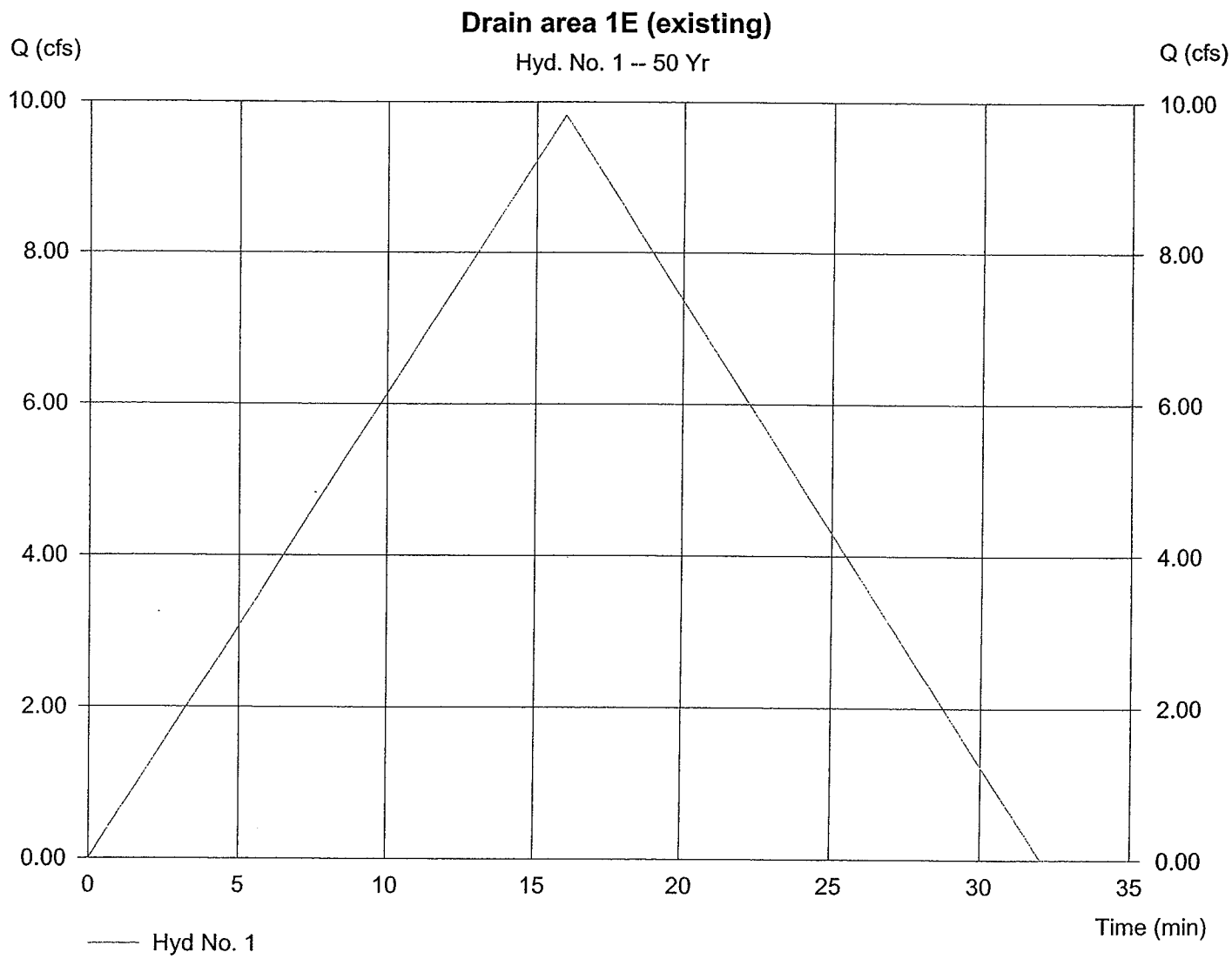
Wednesday, Jan 21 2009, 7:49 AM

## Hyd. No. 1

Drain area 1E (existing)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 9.82 cfs |
| Storm frequency | = 50 yrs | Time interval | = 1 min |
| Drainage area | = 6.610 ac | Runoff coeff. | = 0.3 |
| Intensity | = 4.953 in/hr | Tc by User | = 16.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 9,429 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

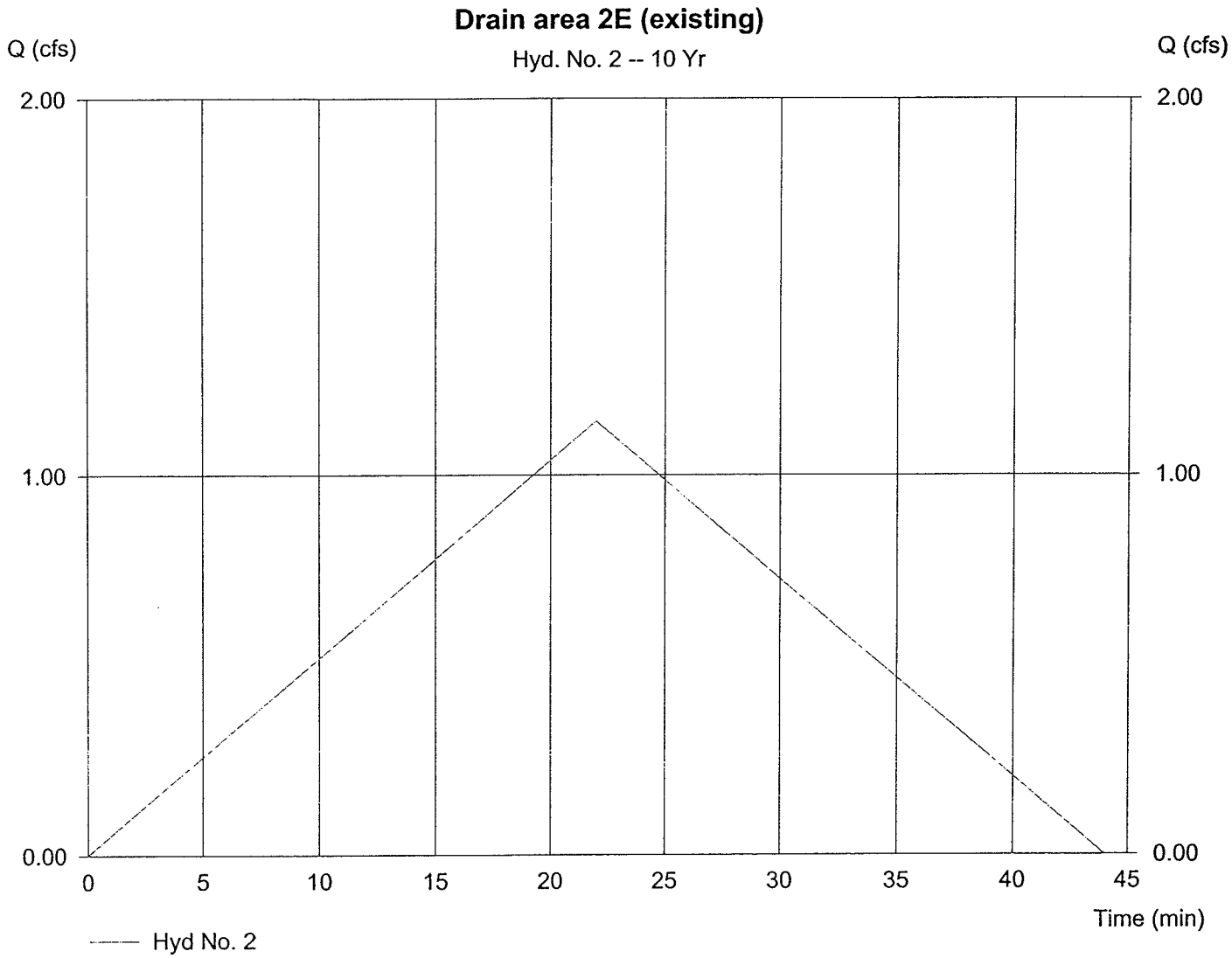
Wednesday, Jan 21 2009, 7:50 AM

## Hyd. No. 2

Drain area 2E (existing)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 1.14 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 0.850 ac | Runoff coeff. | = 0.38 |
| Intensity | = 3.535 in/hr | Tc by User | = 22.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 1,507 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

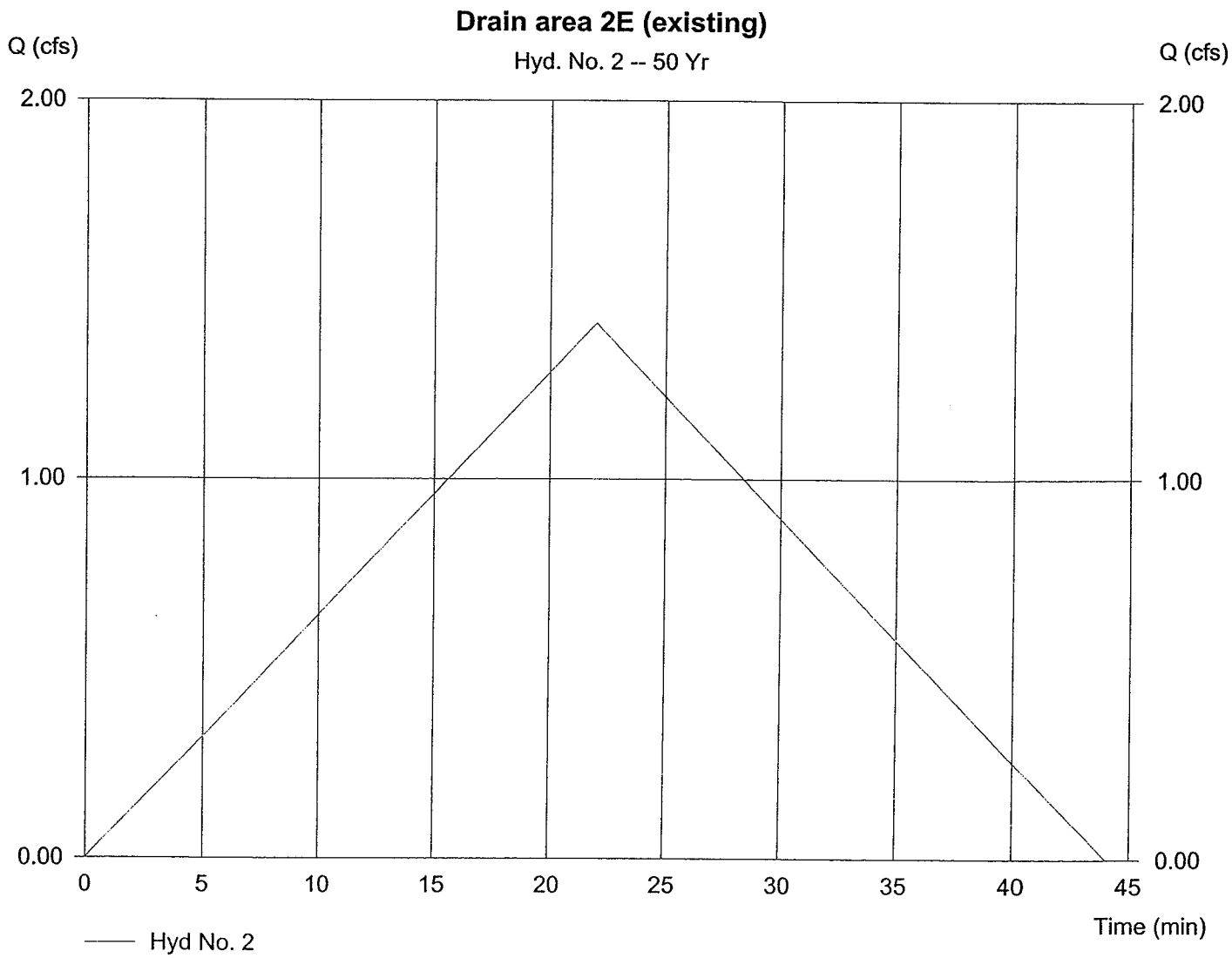
Wednesday, Jan 21 2009, 7:50 AM

## Hyd. No. 2

Drain area 2E (existing)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 1.41 cfs |
| Storm frequency | = 50 yrs | Time interval | = 1 min |
| Drainage area | = 0.850 ac | Runoff coeff. | = 0.38 |
| Intensity | = 4.361 in/hr | Tc by User | = 22.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 1,860 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

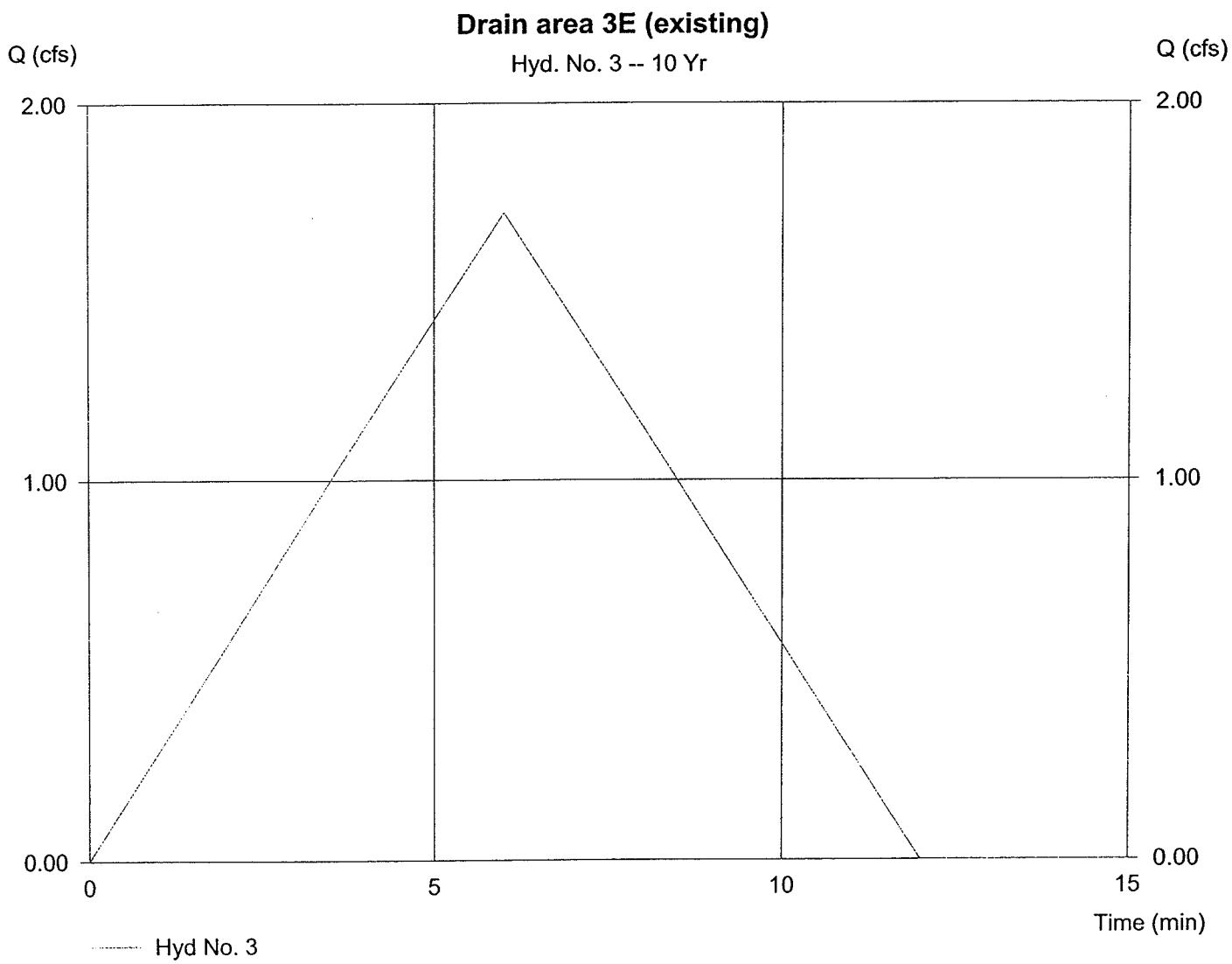
Wednesday, Jan 21 2009, 7:51 AM

## Hyd. No. 3

Drain area 3E (existing)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 1.71 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 1.050 ac | Runoff coeff. | = 0.3 |
| Intensity | = 5.424 in/hr | Tc by User | = 6.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 615 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

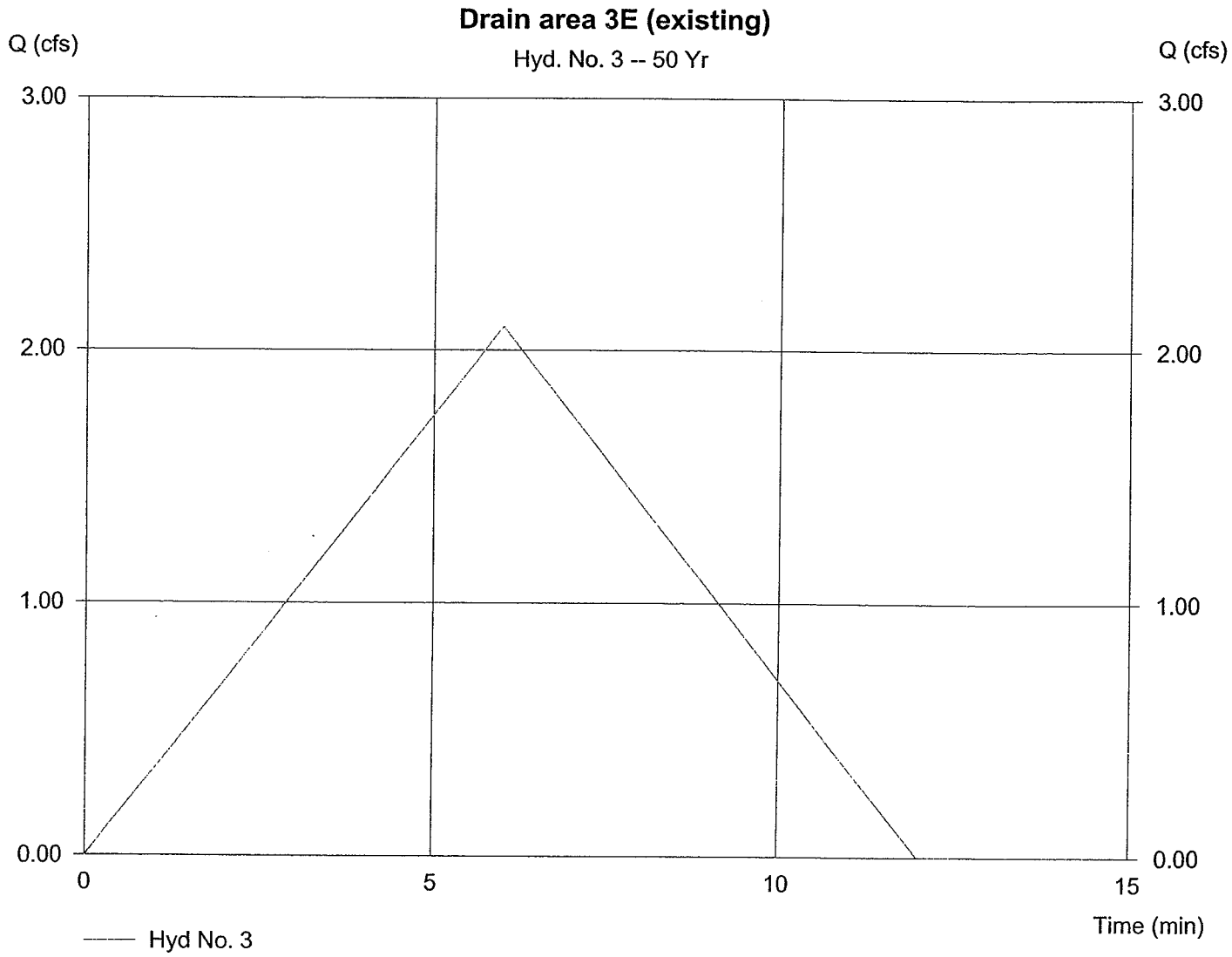
Wednesday, Jan 21 2009, 7:51 AM

## 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

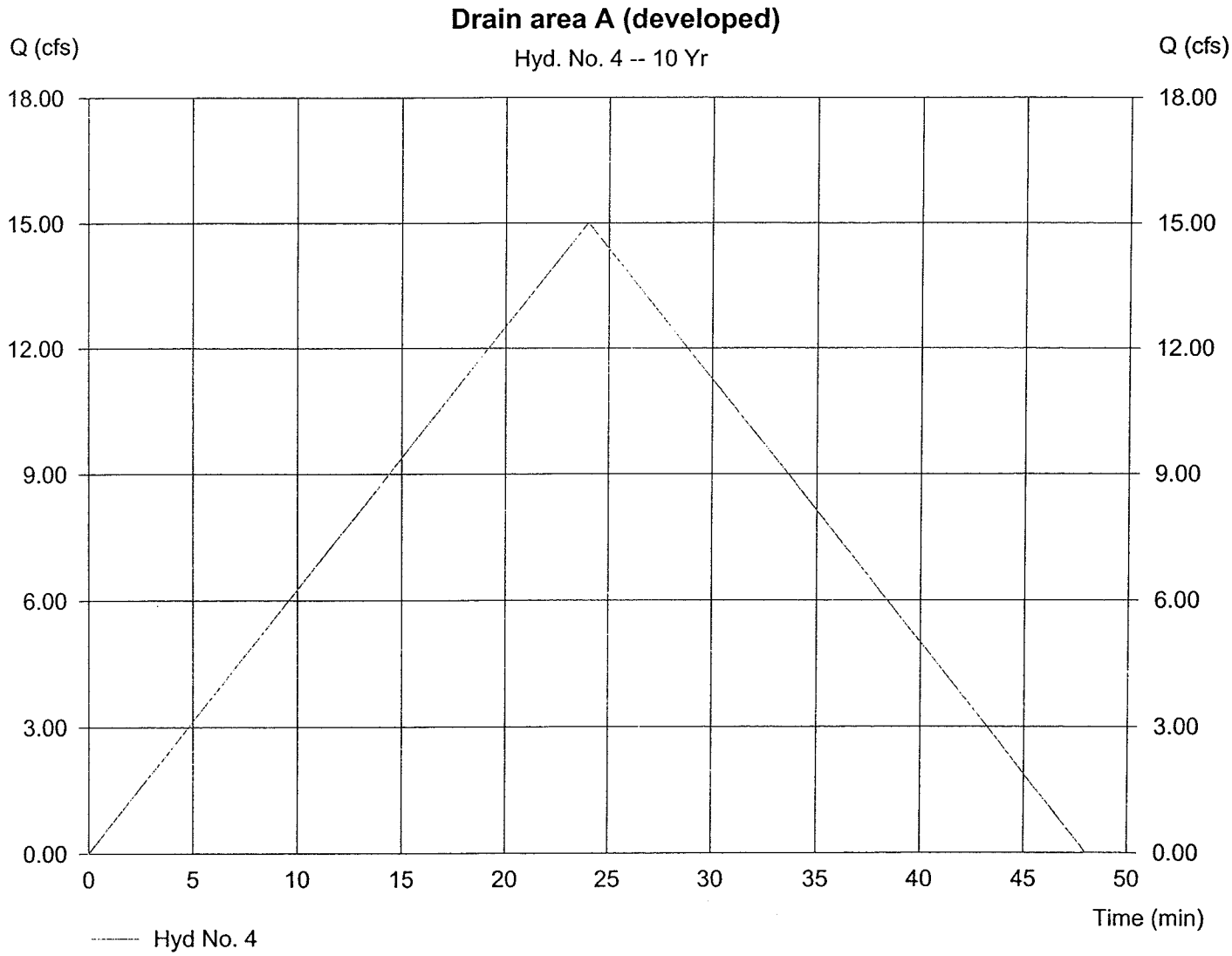
Wednesday, Jan 21 2009, 7:51 AM

## Hyd. No. 4

Drain area A (developed)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 15.01 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 7.110 ac | Runoff coeff. | = 0.62 |
| Intensity | = 3.405 in/hr | Tc by User | = 24.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 21,615 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

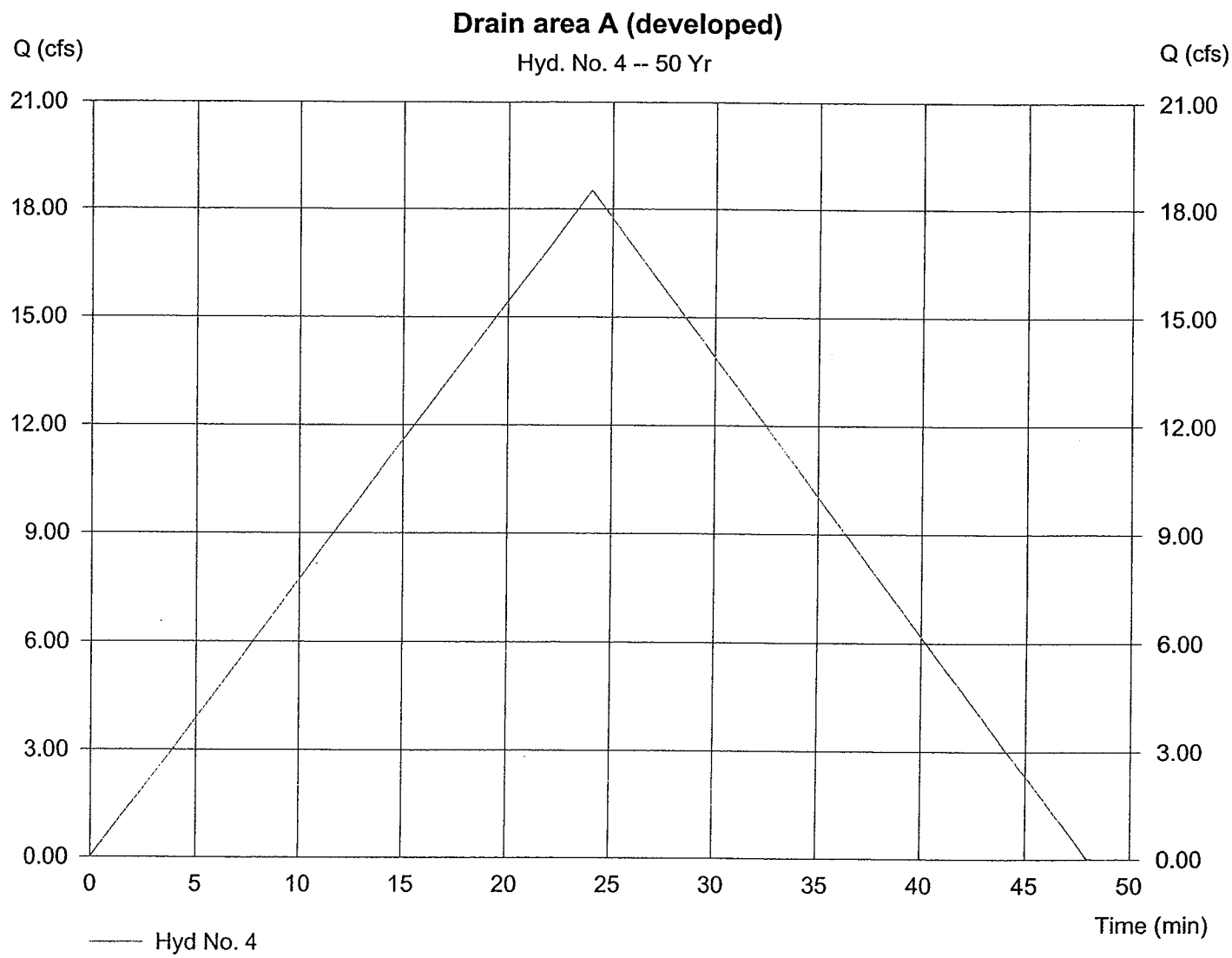
Wednesday, Jan 21 2009, 7:51 AM

## 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

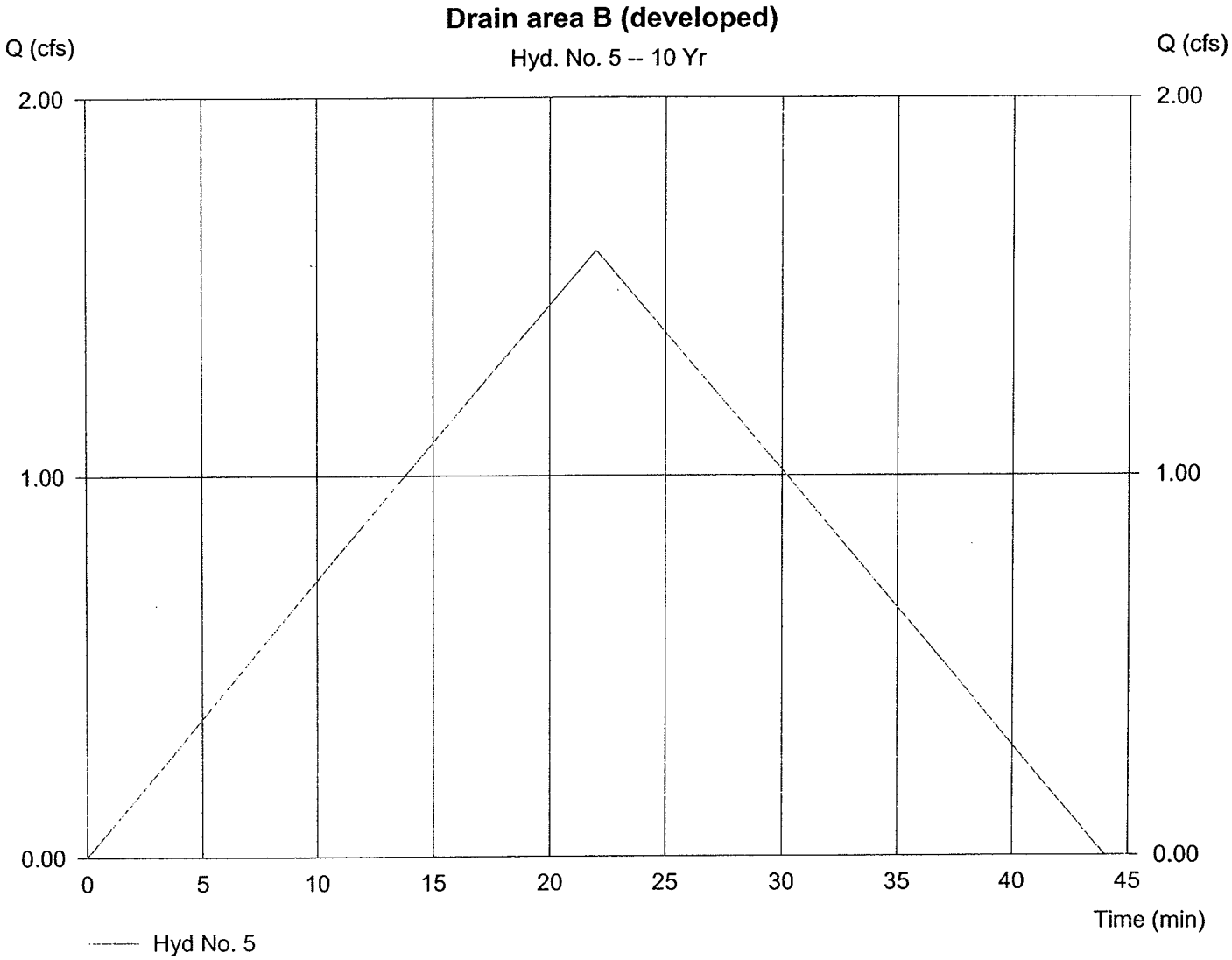
Wednesday, Jan 21 2009, 7:51 AM

## Hyd. No. 5

Drain area B (developed)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 1.59 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 0.820 ac | Runoff coeff. | = 0.55 |
| Intensity | = 3.535 in/hr | Tc by User | = 22.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 2,105 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

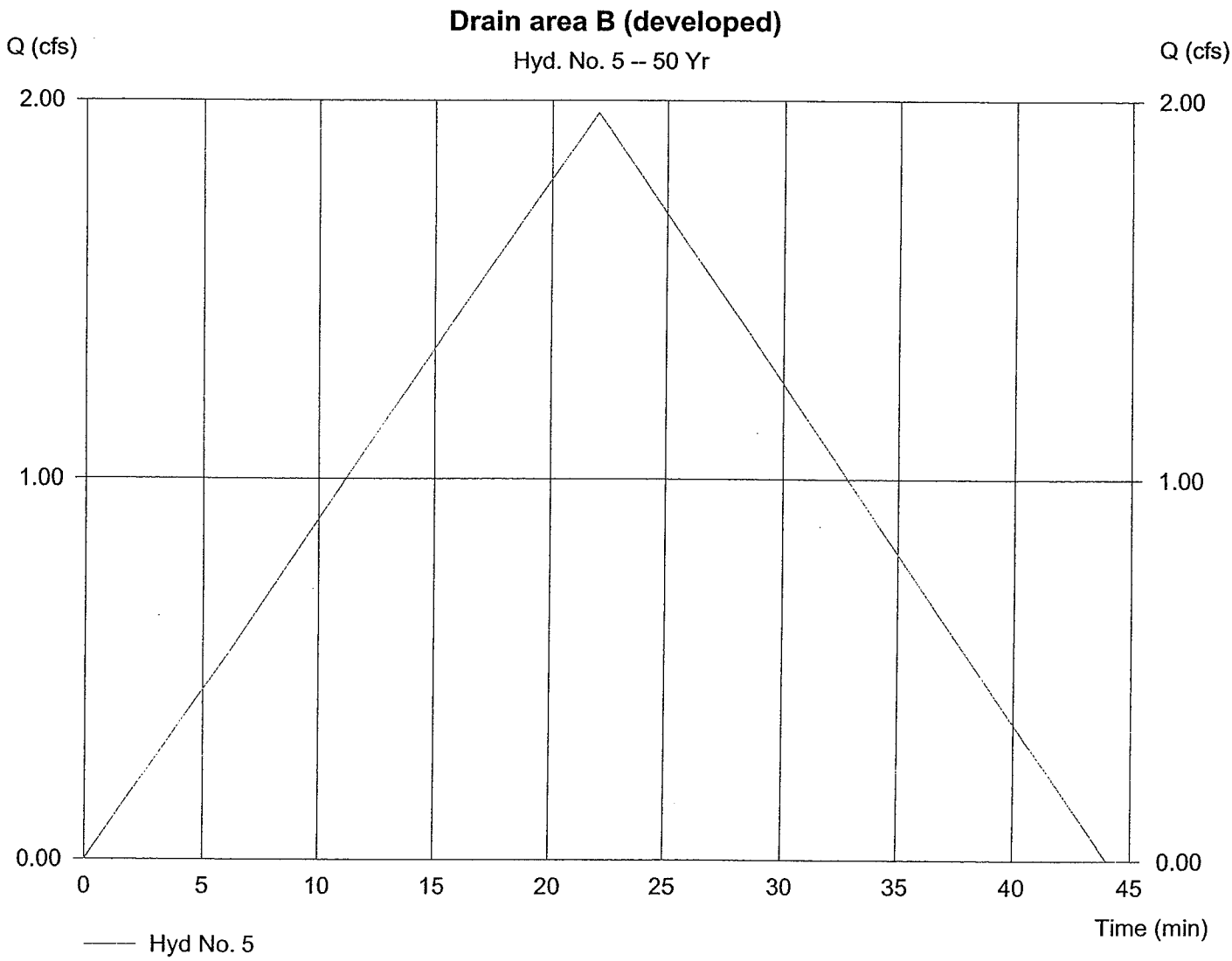
Wednesday, Jan 21 2009, 7:51 AM

## Hyd. No. 5

Drain area B (developed)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 1.97 cfs |
| Storm frequency | = 50 yrs | Time interval | = 1 min |
| Drainage area | = 0.820 ac | Runoff coeff. | = 0.55 |
| Intensity | = 4.361 in/hr | Tc by User | = 22.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 2,596 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

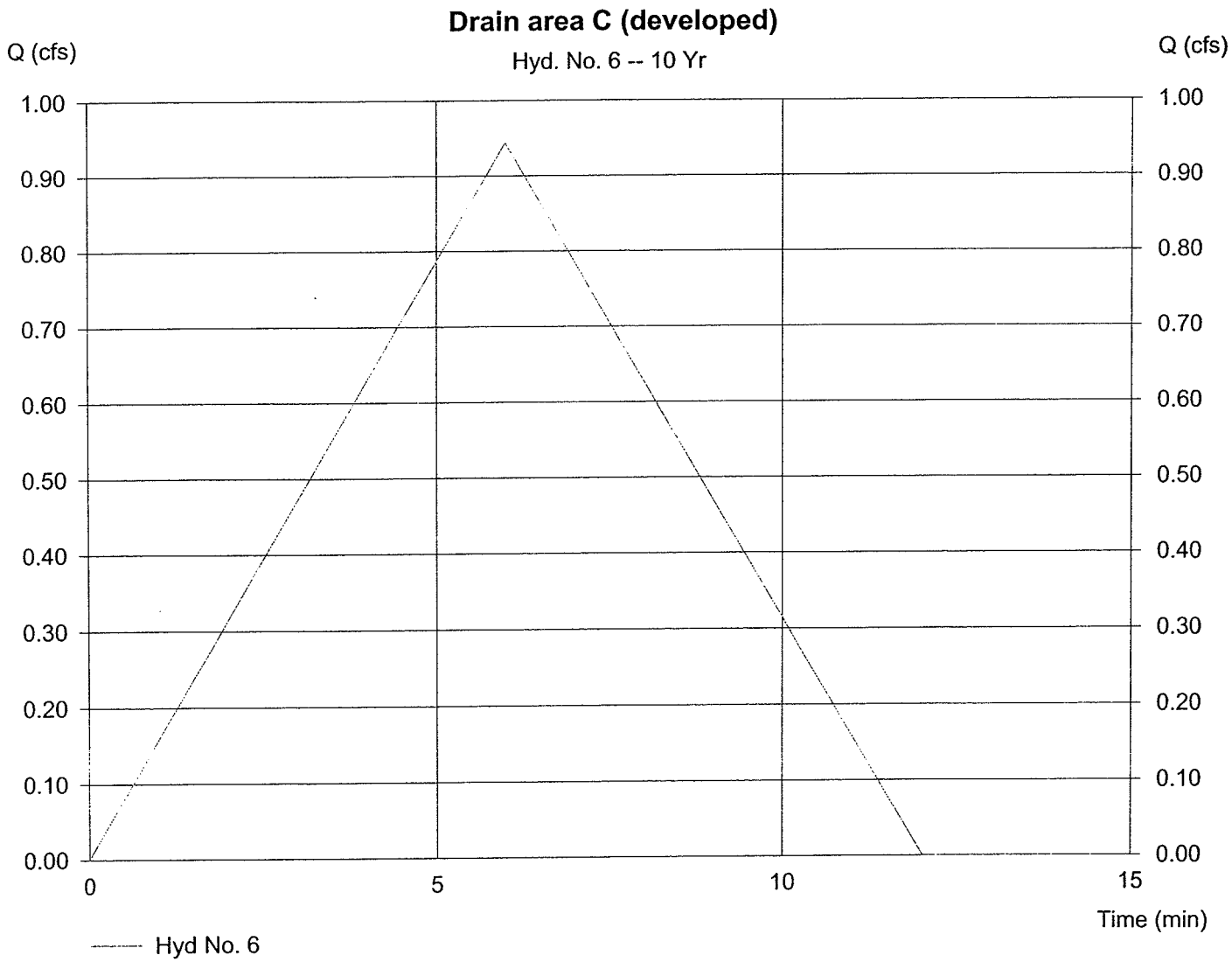
Wednesday, Jan 21 2009, 7:52 AM

## Hyd. No. 6

Drain area C (developed)

| | | | |
|---|---|---|---|
| Hydrograph type | = Rational | Peak discharge | = 0.94 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 0.580 ac | Runoff coeff. | = 0.3 |
| Intensity | = 5.424 in/hr | Tc by User | = 6.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Asc/Rec limb fact | = 1/1 |

Hydrograph Volume = 340 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

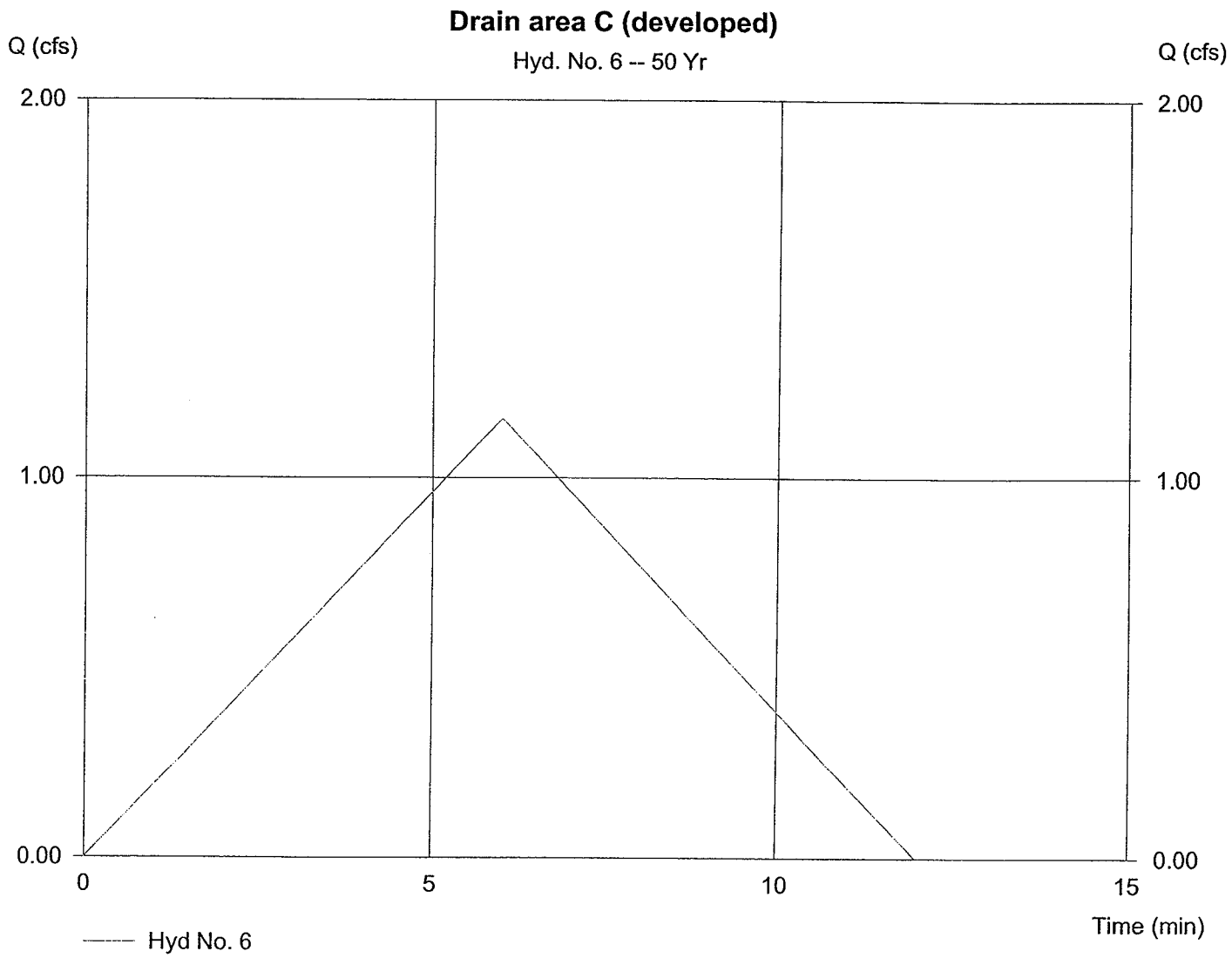
Wednesday, Jan 21 2009, 7:52 AM

## 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

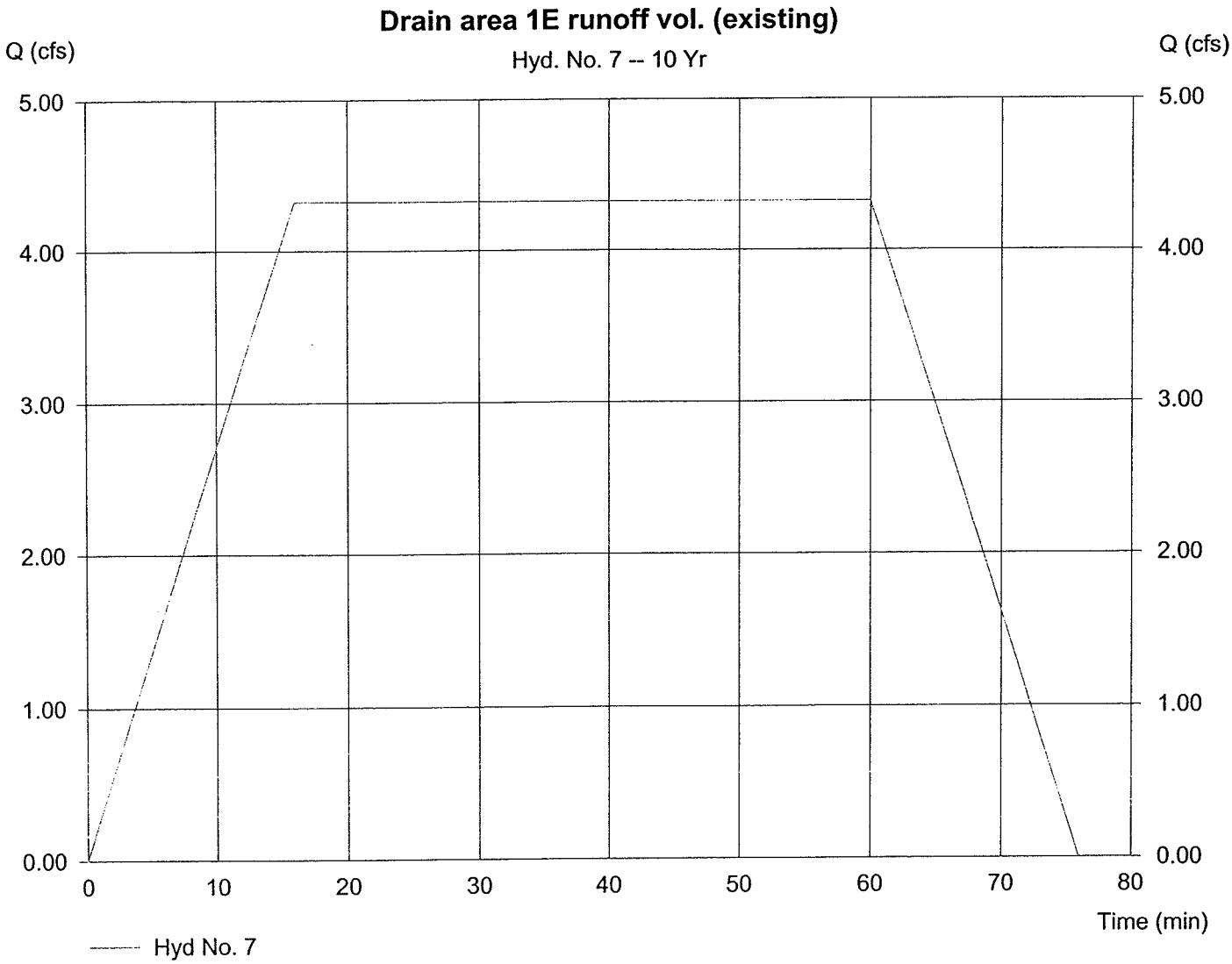
Wednesday, Jan 21 2009, 7:52 AM

## 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



# Hydrograph Plot

Hydraflow Hydrographs by intelisolve

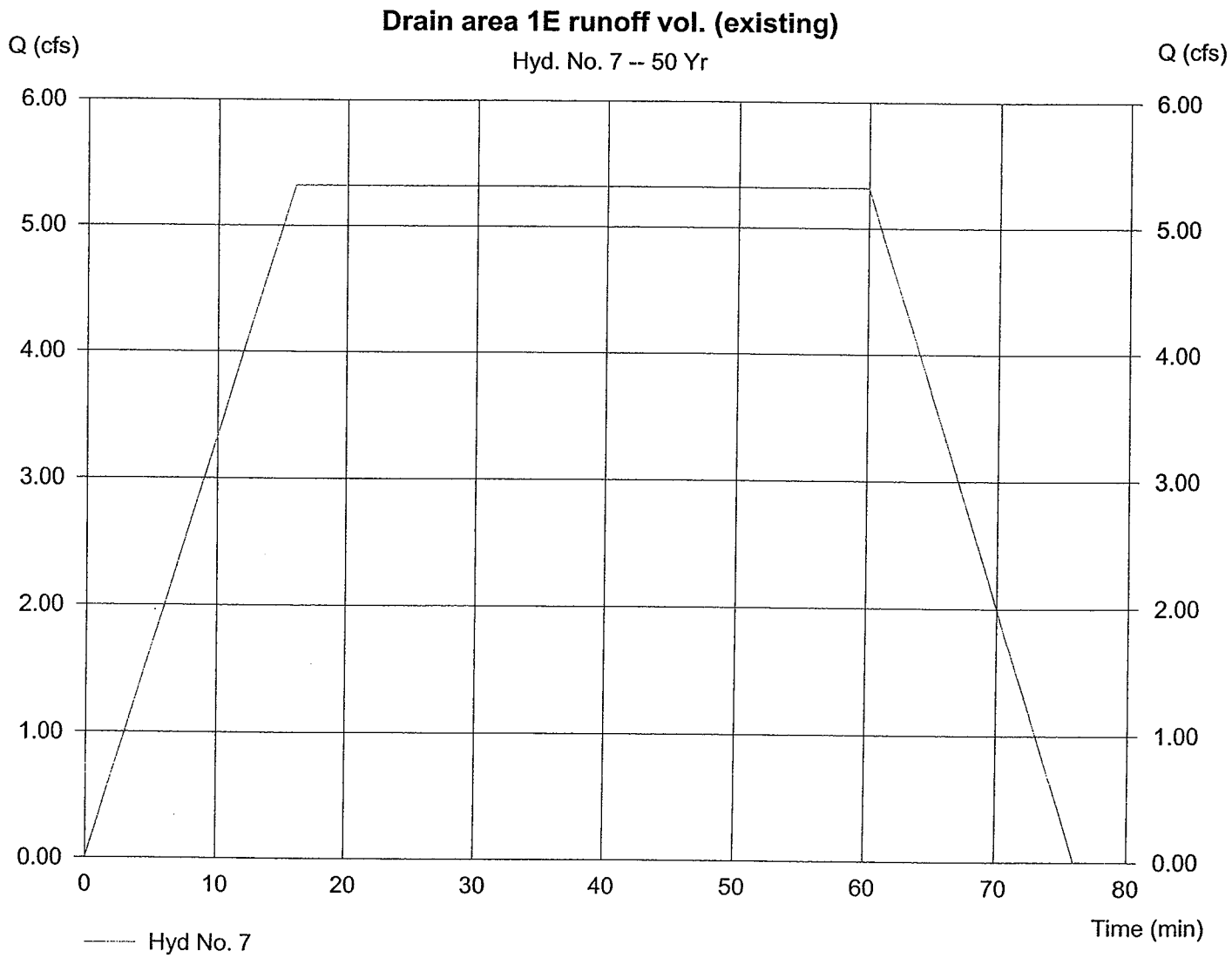
Wednesday, Jan 21 2009, 7:52 AM

## Hyd. No. 7

Drain area 1E runoff vol. (existing)

| | | | |
|---|---|---|---|
| Hydrograph type | = Mod. Rational | Peak discharge | = 5.31 cfs |
| Storm frequency | = 50 yrs | Time interval | = 1 min |
| Drainage area | = 6.610 ac | Runoff coeff. | = 0.3 |
| Intensity | = 2.680 in/hr | Tc by User | = 16.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | Storm duration | = 3.75 x Tc |

Hydrograph Volume = 19,132 cuft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

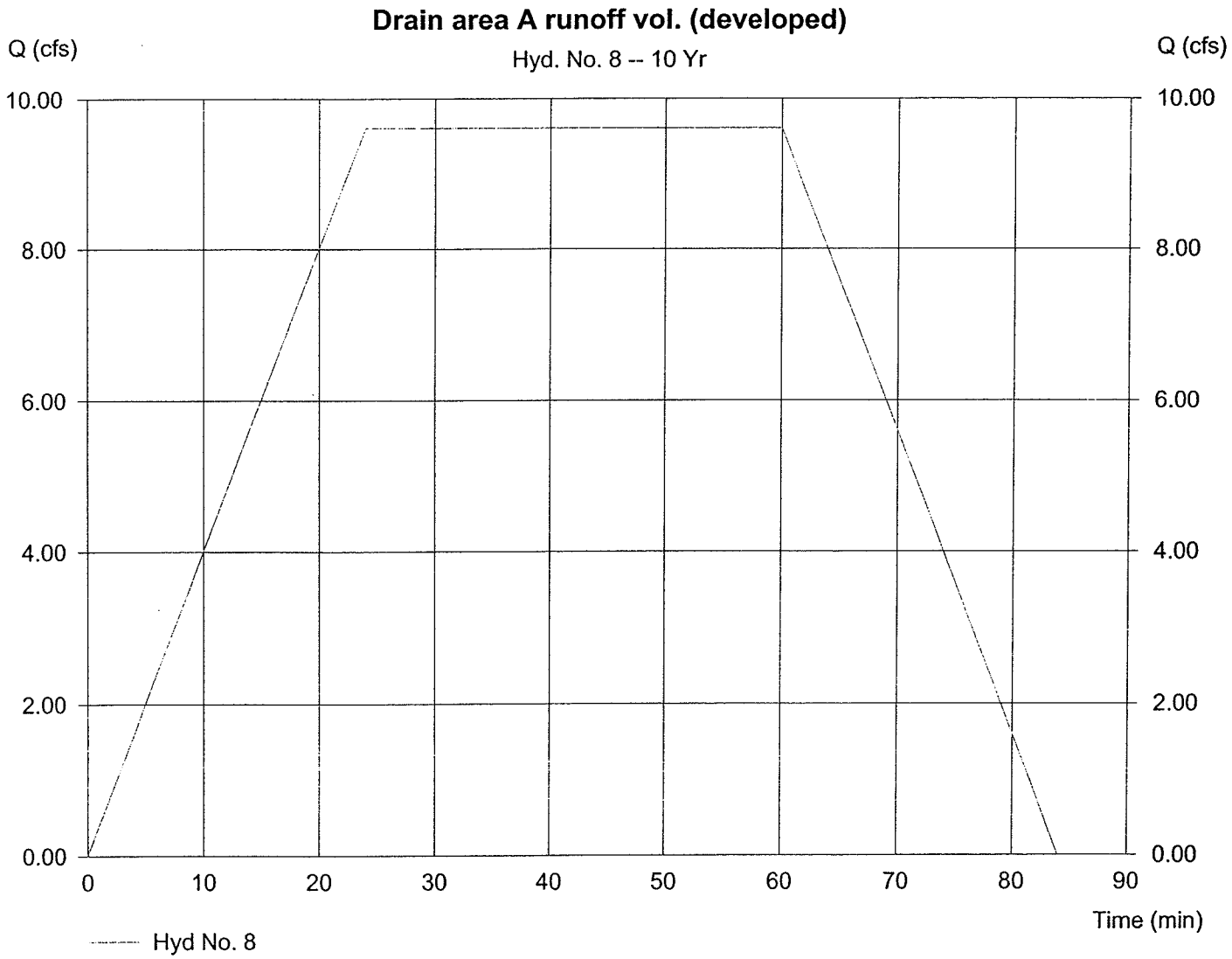
Wednesday, Jan 21 2009, 7:53 AM

## Hyd. No. 8

Drain area A runoff vol. (developed)

| | | | |
|---|---|---|---|
| Hydrograph type | = Mod. Rational | Peak discharge | = 9.61 cfs |
| Storm frequency | = 10 yrs | Time interval | = 1 min |
| Drainage area | = 7.110 ac | Runoff coeff. | = 0.62 |
| Intensity | = 2.180 in/hr | Tc by User | = 24.00 min |
| IDF Curve | = Waiehu Mauka 08-040.IDF | 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

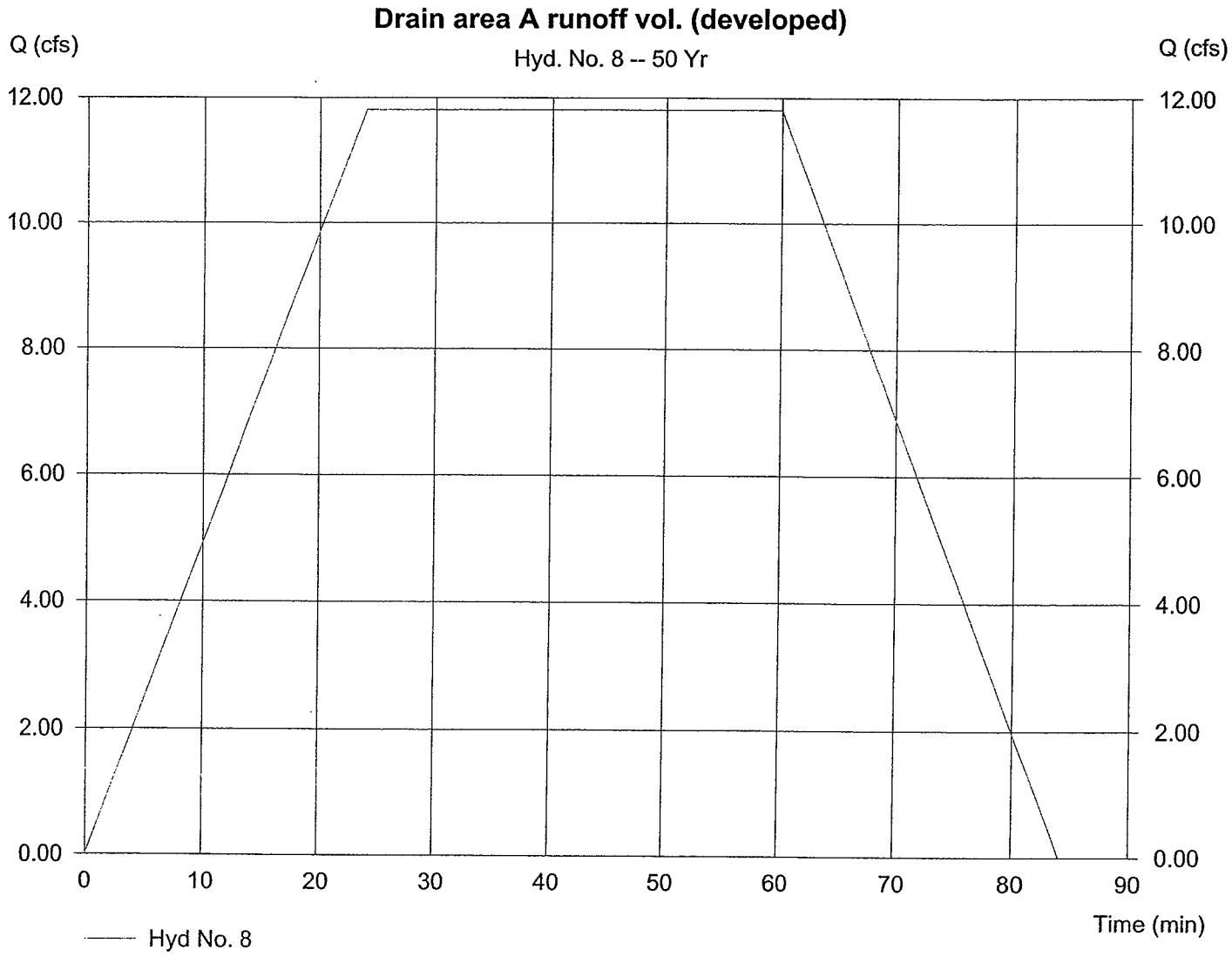


Table 1

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 |

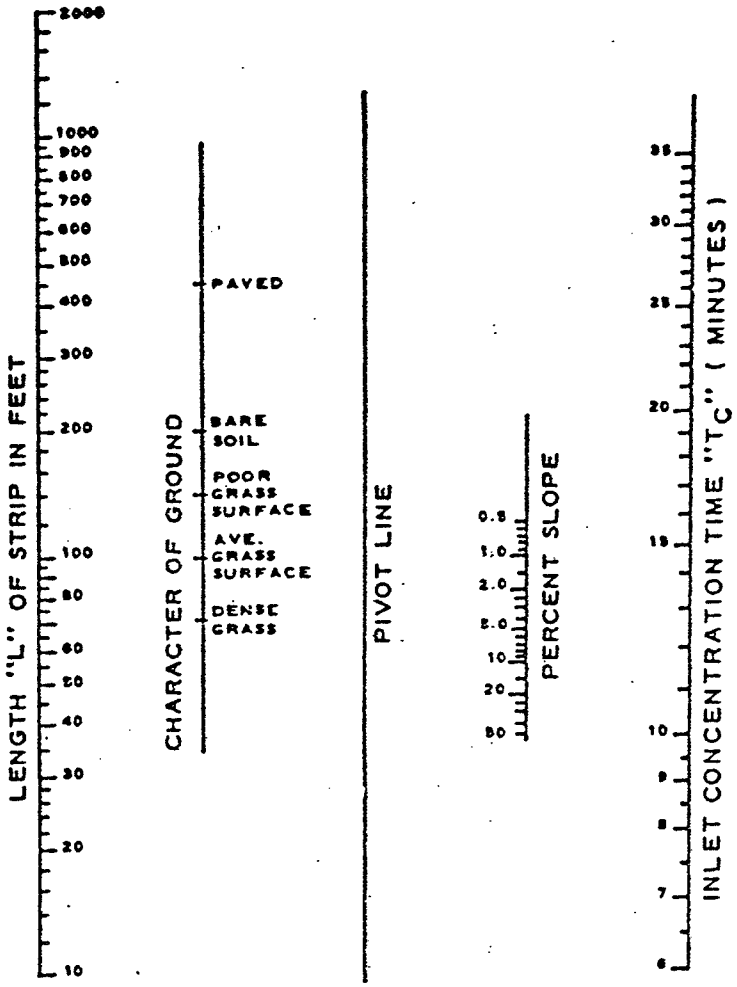
The type of soil, the type of open space and ground cover and the slope of the ground shall be considered in arriving at reasonable and acceptable runoff coefficients.

Table 4

APPROXIMATE AVERAGE VELOCITIES OF RUNOFF FOR CALCULATING TIME OF CONCENTRATION

| TYPE OF FLOW | VELOCITY IN FPS FOR SLOPES (in percent) INDICATED | | | |
|---|---|---|---|---|
| OVERLAND FLOW: | 0–3% | 4–7% | 8–11% | 12–15% |
| 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 |

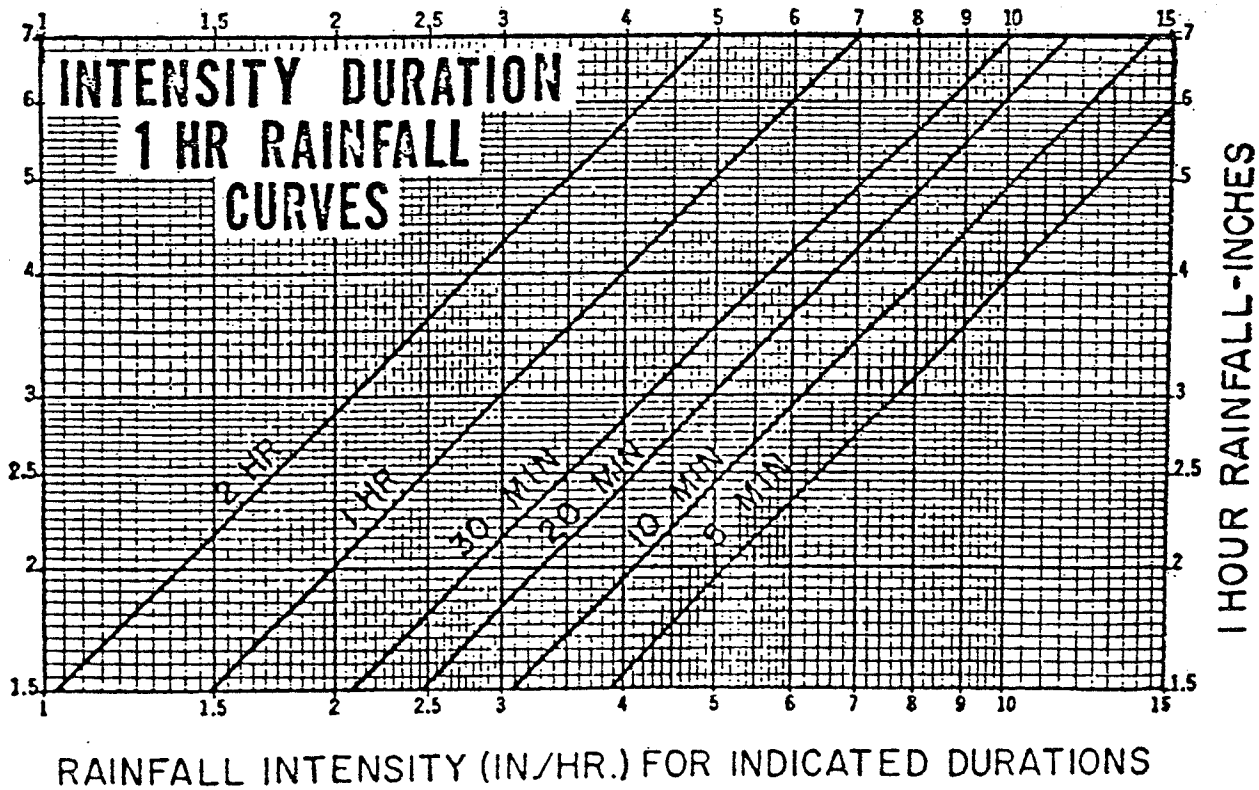
**These values vary with the channel size and other conditions so that the ones given are the averages of a wide range. Wherever possible, more accurate determinations should be made for particular conditions by Manning's formula.*




# Plate 1

# Overland Flow Chart

## Plate 2



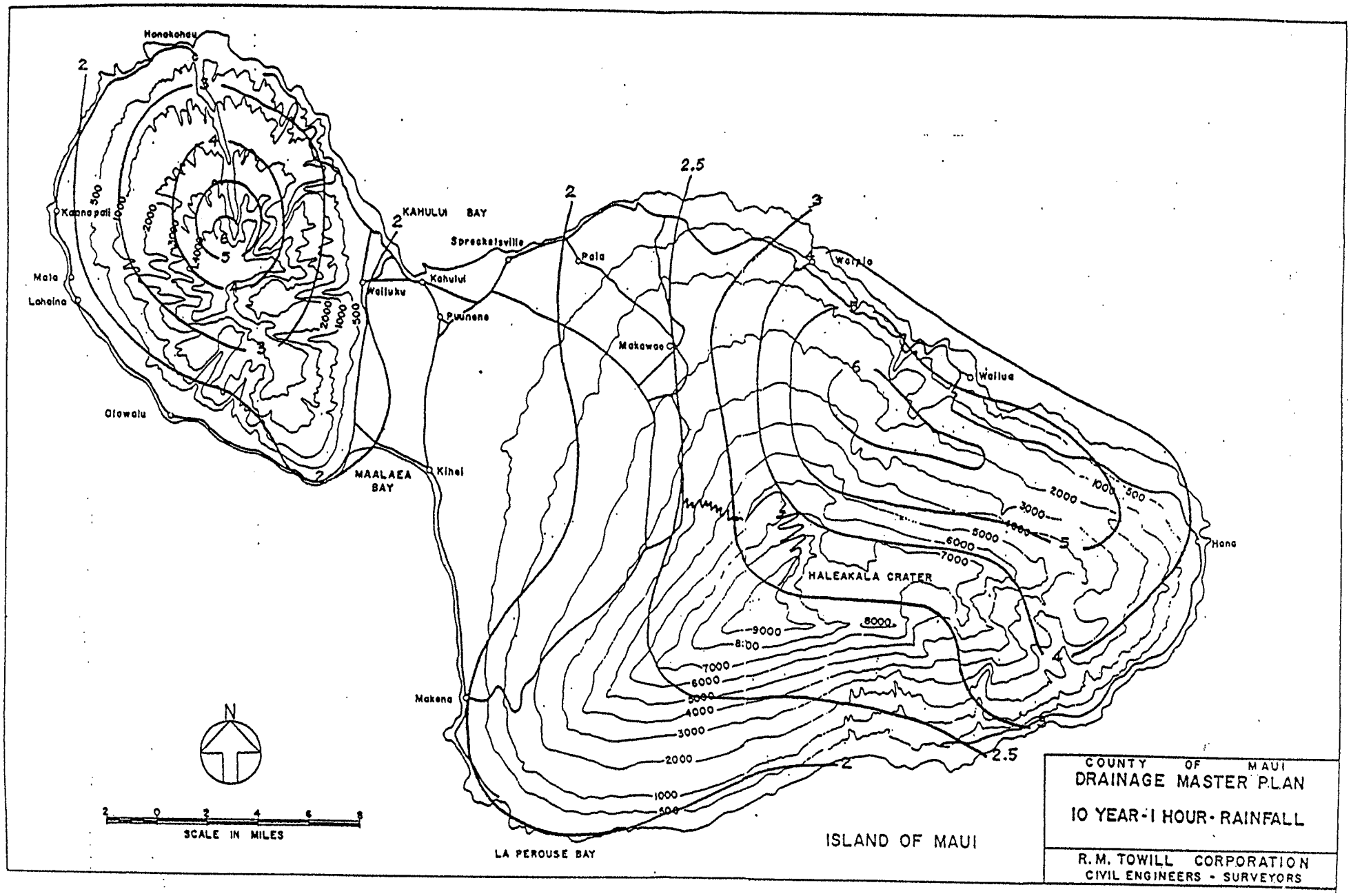

Honokohau
Kaanapali
Mala
Lahaina
Olowalu
KAHULUI BAY
Spreckelsville
Kahului
Wailuku
Puunene
Pala
Makawao
Waiohu
Waiiua
MAALAEA BAY
Kihei
Makena
LA PEROUSE BAY
HALEAKALA CRATER
Hana
N
SCALE IN MILES
ISLAND OF MAUI
COUNTY OF MAUI
DRAINAGE MASTER PLAN
10 YEAR-1 HOUR-RAINFALL
R.M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

Plate 2

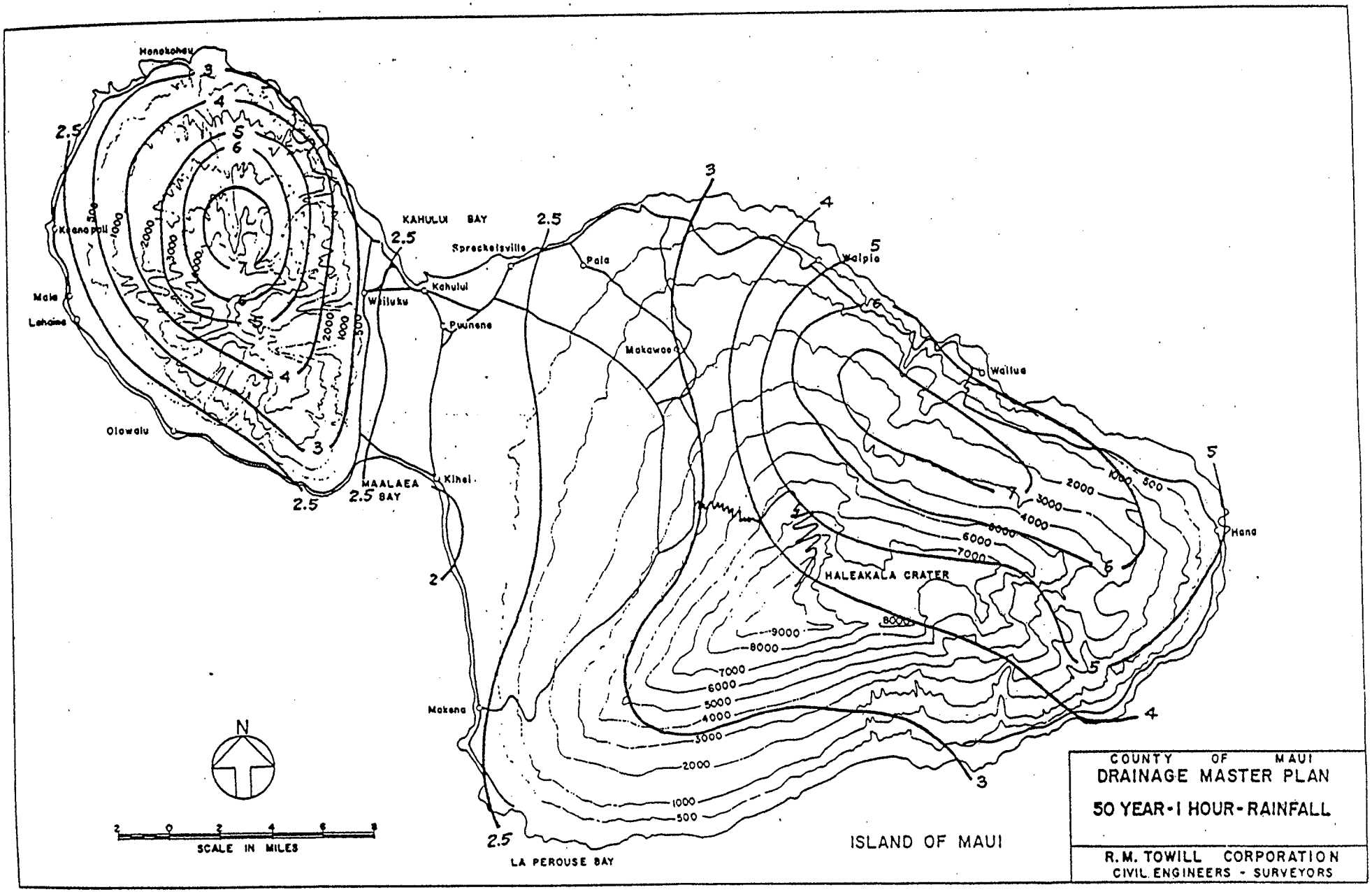

Honokohau
Kaanapali
Mala
Lahaina
Olowalu
KAHULUI BAY
Spreckelsville
Kahului
Wailuku
Puunene
Pala
Makawao
Waipio
Wailua
Hana
MAALAEA BAY
Kihei
Makena
LA PEROUSE BAY
HALEAKALA CRATER
ISLAND OF MAUI
N
SCALE IN MILES
COUNTY OF MAUI
DRAINAGE MASTER PLAN
50 YEAR-1 HOUR-RAINFALL
R.M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS

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:

= Ave. Daily Demand x 1.5 (Table 100-20)

= 32,480 x 1.5

= 48,720 gals./day

= 34 gpm

c. Anticipated Peak Hour Demand:

= Ave. Daily Demand x 3.0 (Table 100-20)

= 32,480 x 3.0

= 97,440 gals./day

= 68 gpm

3. <u>Low Rise Multi-Family Rental Units (Lot 9)</u>:

No. of Units = 42

Average Demand = 560 gals./unit (Table 100-18)

a. Anticipated Average Daily Domestic Demand:

= 560 x 42

= 23,520 gals./day

b. Anticipated Max. Daily Demand:

= Ave. Daily Demand x 1.5 (Table 100-20)

= 23,520 x 1.5

= 35,280 gals./day

= 25 gpm

c. Anticipated Peak Hour Demand:

= Ave. Daily Demand x 3.0 (Table 100-20)

= 23,520 x 3.0

= 70,560 gals./day

= 49 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.

SITEWORK:

| | | |
|---|---|---|
| General Grading, Roadway and Parking | = | $4,963,000 |
| Water System | = | $690,000 |
| Drainage System | = | $581,000 |
| Wastewater System | = | $252,000 |
| Projected Total Construction Cost | = | $6,486,000 |

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 | = | $86,832 | |

Wastewater Assessment Fees

| | | | | |
|---|---|---|---|---|
| 1. | Single Family | = | $9,597 | (6 lots x $1,599.50/lot) |
| 2. | Multi-Family | = | $118,866 | (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 |
|---|---|---|---|---|---|
| GENERAL GRADING, ROADWAY & PARKING: | | | | | |
| 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 | Acs. | $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 |

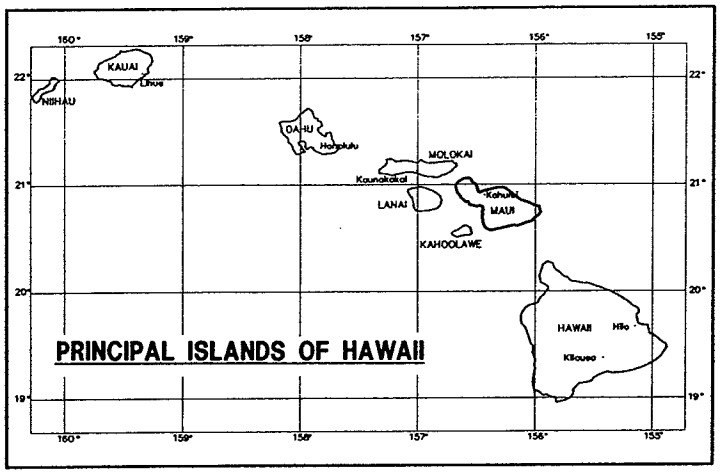
Note: Projected Cost does not include retaining walls and any required offsite improvements on existing County roads.

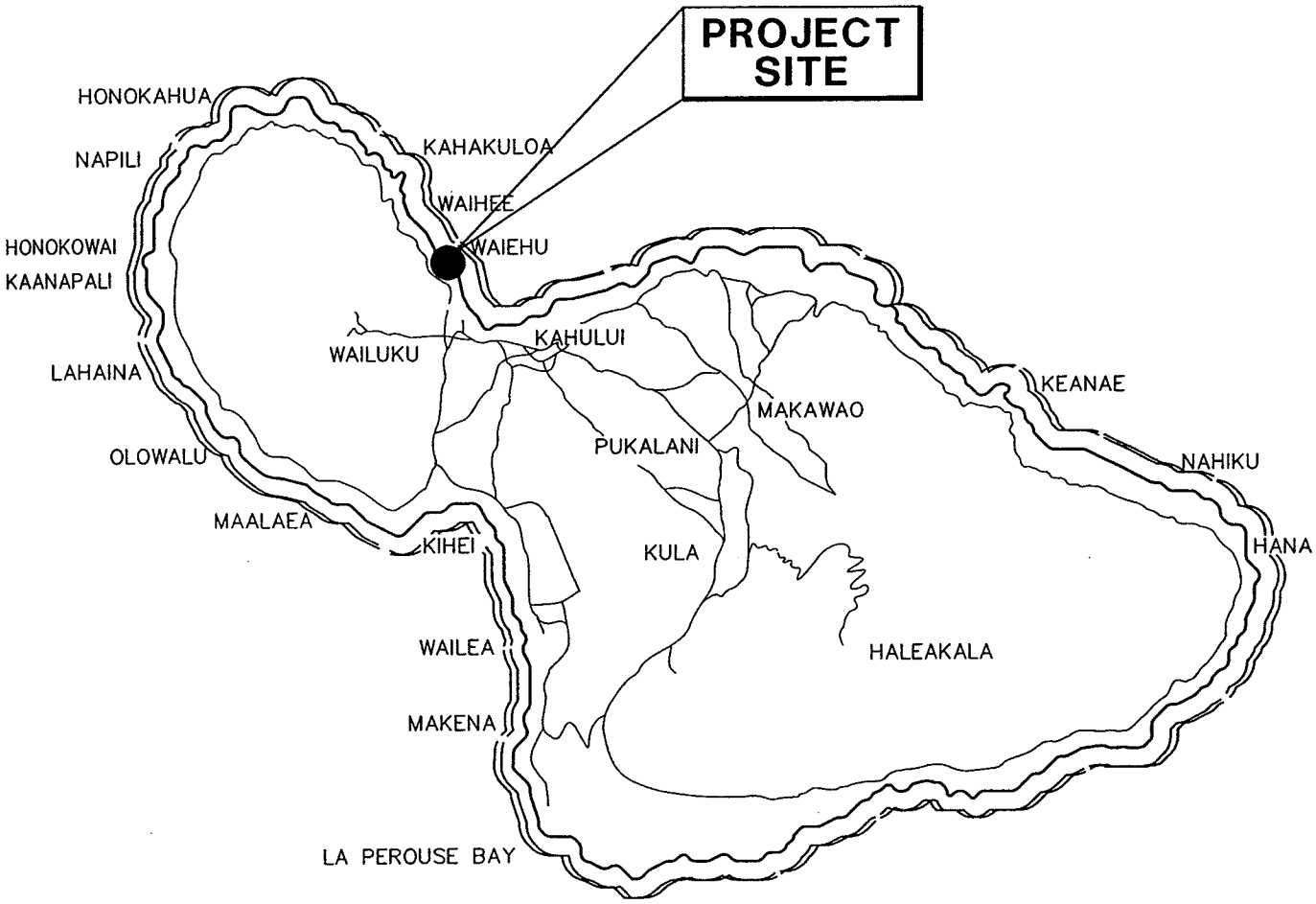
| Item No. | Description | Approx. Quantity | Unit | Unit Cost | Total |
|---|---|---|---|---|---|
| WATER SYSTEM: | | | | | |
| 1. | 6" DI Pipe, Class 52 w/Polywrap | 980 | L.F. | $160 | $156,800 |
| 2. | 8" DI Pipe, Class 52 w/Polywrap | 270 | L.F. | $175 | $47,250 |
| 3. | 12" DI Pipe, Class 52 w/Polywrap | 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 |
|---|---|---|---|---|---|
| DRAINAGE SYSTEM: | | | | | |
| 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 |
|---|---|---|---|---|---|
| WASTEWATER SYSTEM: | | | | | |
| 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.




N

LOCATION MAP

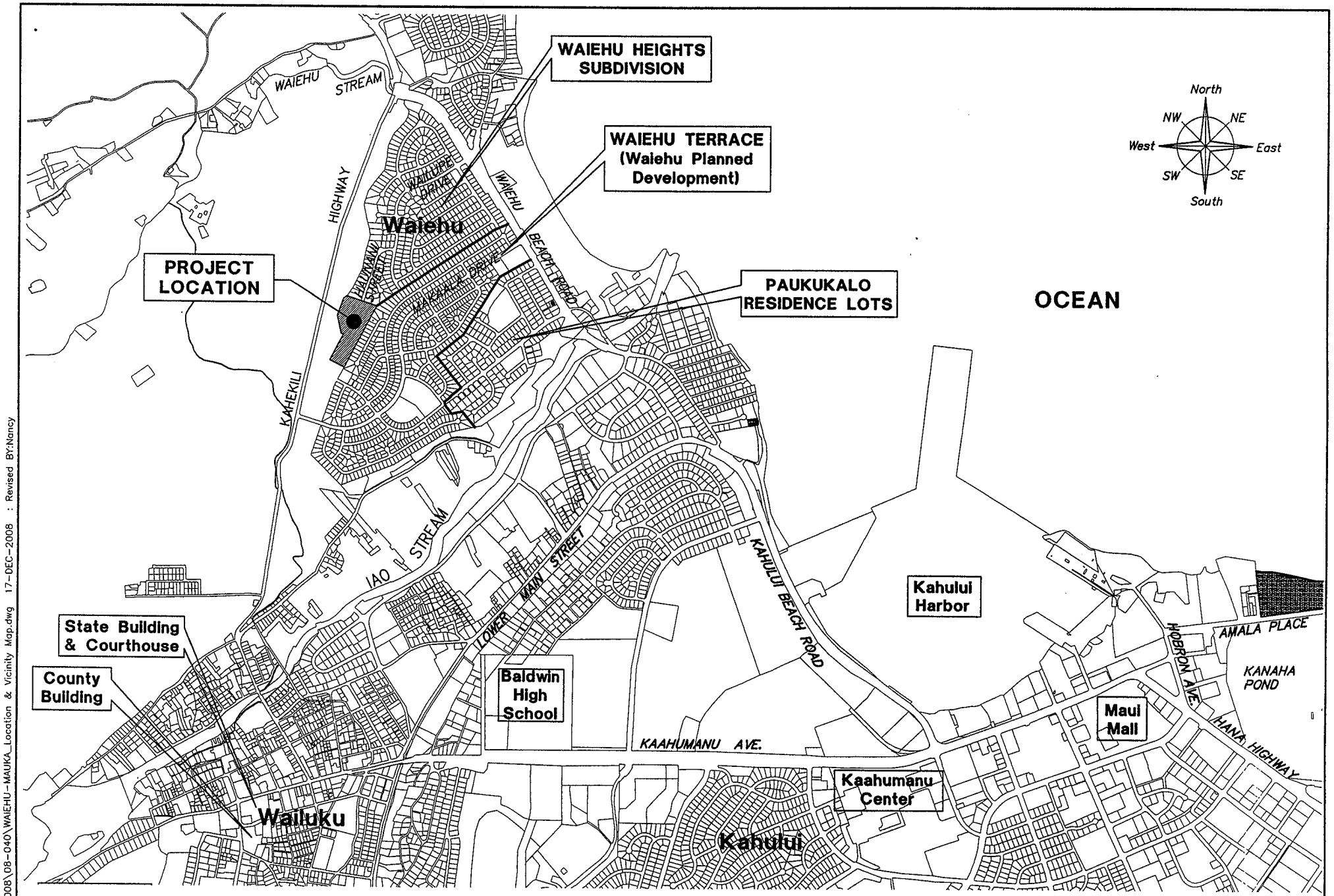
**ISLAND OF MAUI**

**FIGURE 1**

Z:\2008\08-040\WAIEHU-MAUKA_Location & Vicinity Map.dwg : 15-DEC-2008 : Drawn BY: JOY E.

**R. T. TANAKA ENGINEERS, INC.**

LAND SURVEYORS – CIVIL & STRUCTURAL ENGINEERS




# VICINITY MAP

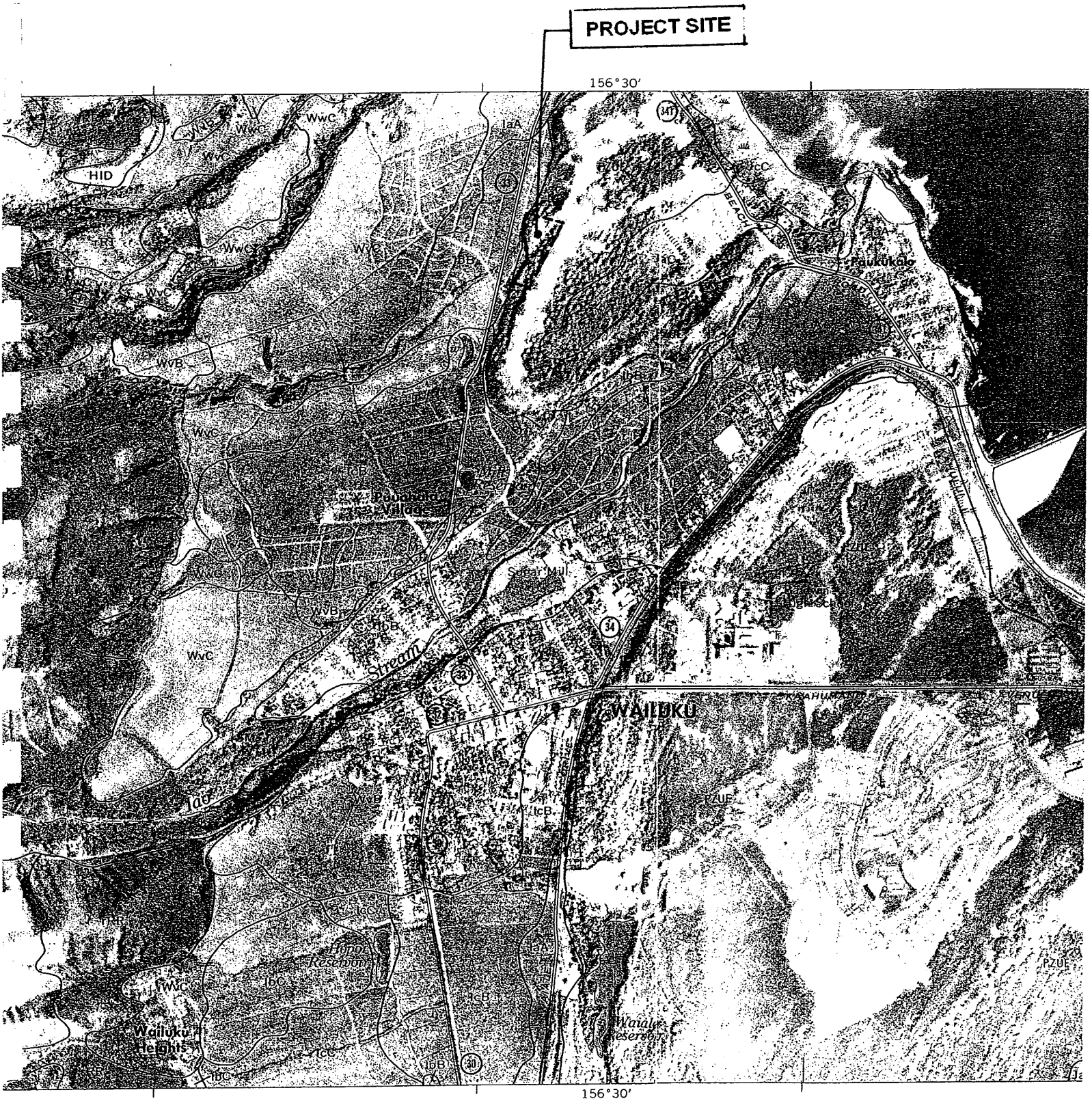
SCALE 1" = 2000'

FIGURE 2

R. T. TANAKA ENGINEERS, INC.

Z:\DRAW1\2008\08-040\WAIEHU-MAUKA_Location & Vicinity Map.dwg 17-DEC-2008 : Revised BY:Nancy

SHEET NUMBER 99




# SOILS MAP

Scale: 1" = 2,000'

FIGURE 3

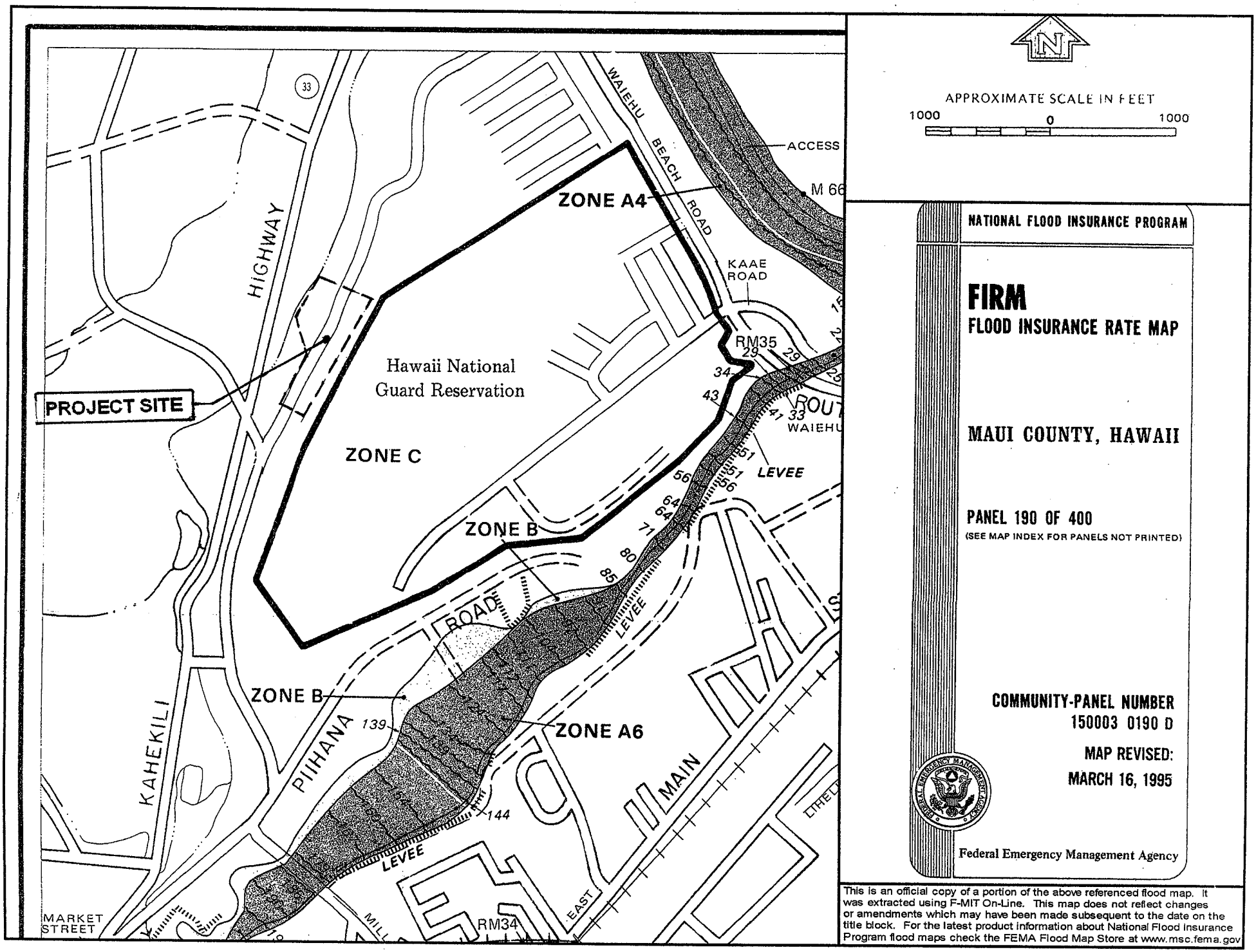
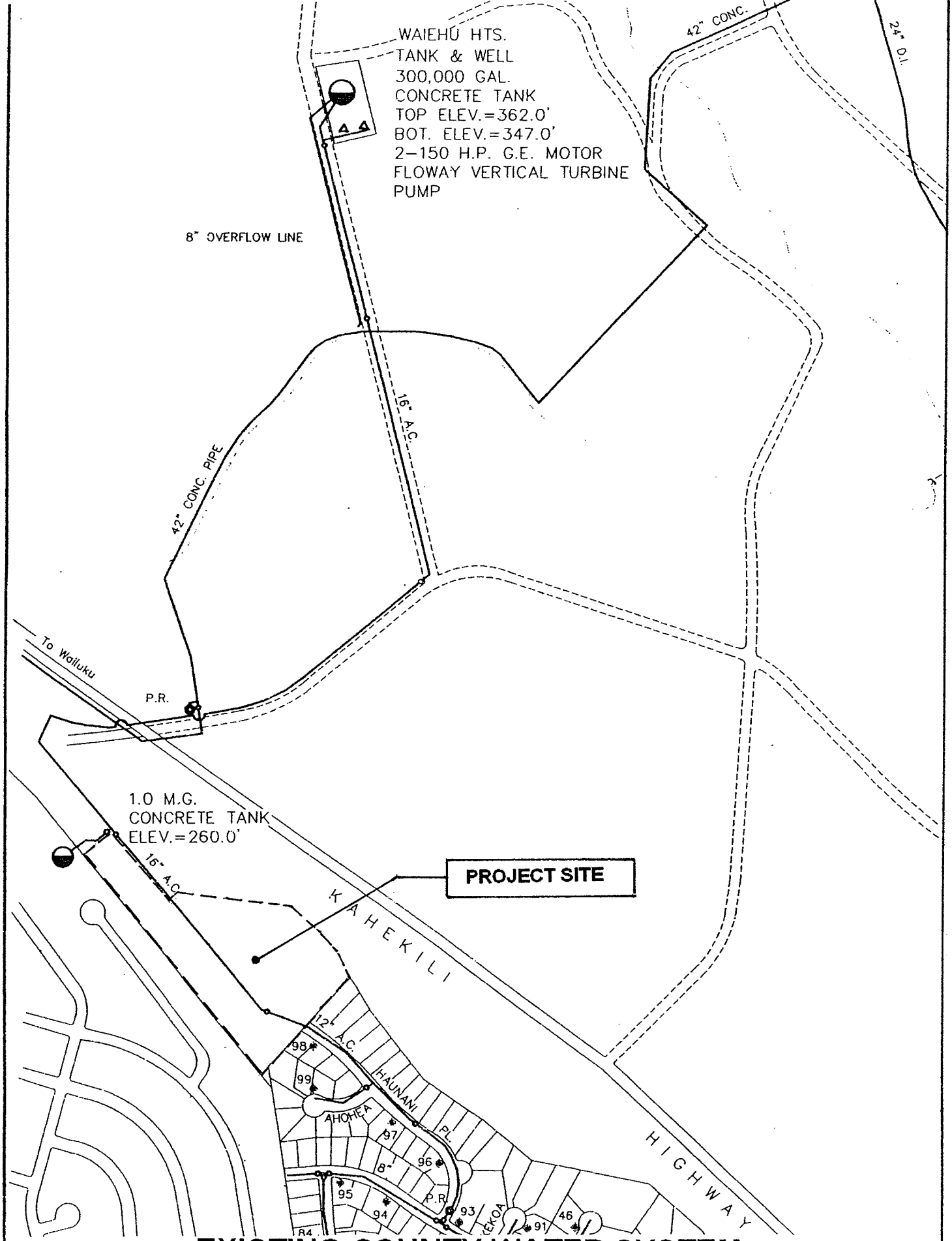

APPROXIMATE SCALE IN FEET
1000
0
1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MAUI COUNTY, HAWAII
PANEL 190 OF 400
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
150003 0190 D
MAP REVISED:
MARCH 16, 1995
Federal Emergency Management Agency
This is an official copy 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
ZONE A4
ZONE C
ZONE B
ZONE B
ZONE A6
PROJECT SITE
Hawaii National
Guard Reservation
HIGHWAY
KAHEKILI
PIIHANA
ROAD
WAIEHU BEACH ROAD
KAAE ROAD
ACCESS
M 66
RM35
RM34
LEVEE
LEVEE
LEVEE
MAIN
EAST
MARKET STREET
33
29
34
43
41
33
51
56
64
71
80
85
139
144

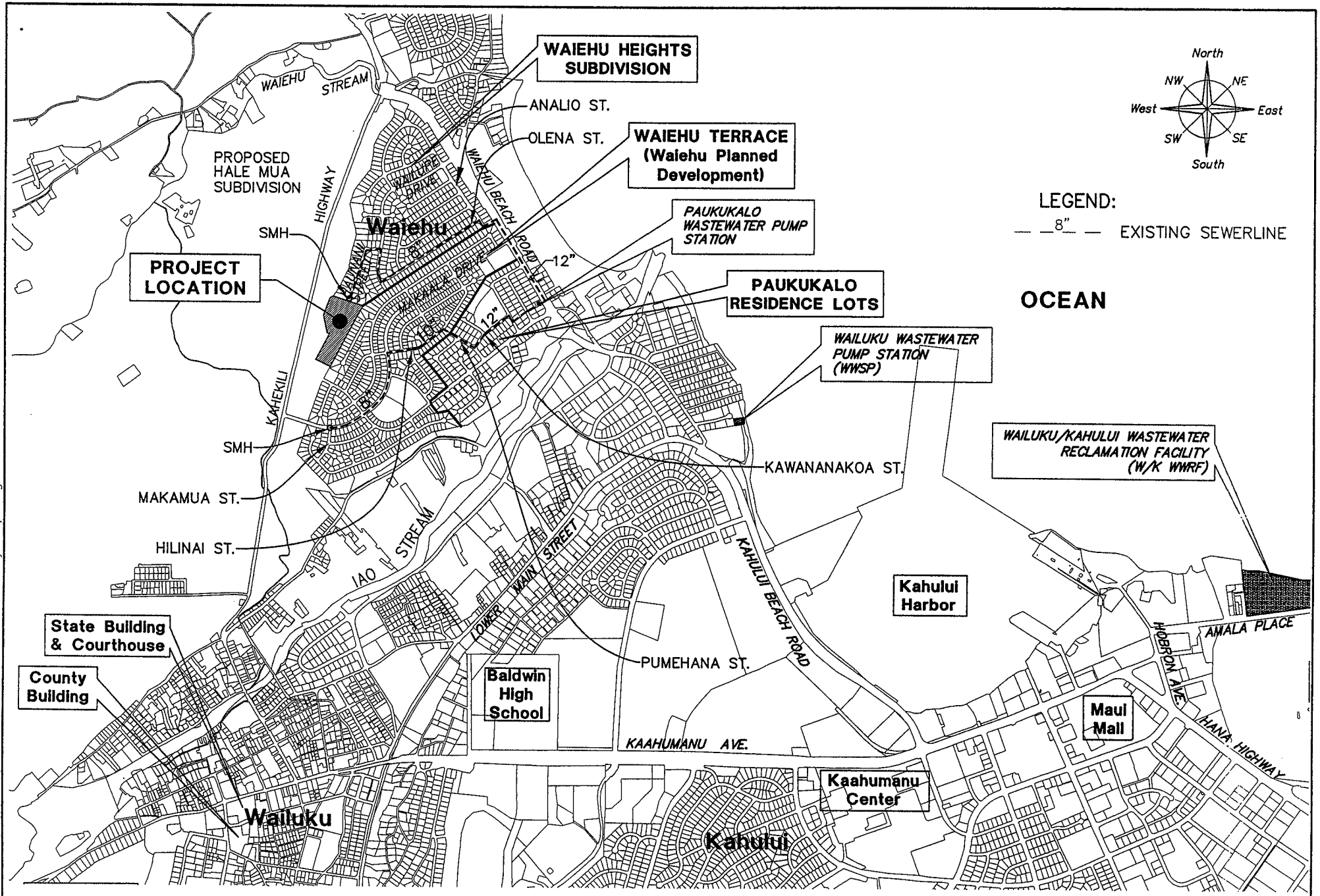
FIGURE 1




# EXISTING COUNTY WATER SYSTEM

Scale: 1" = 500'

FIGURE 5




# EXISTING OFFSITE WASTEWATER FACILITIES

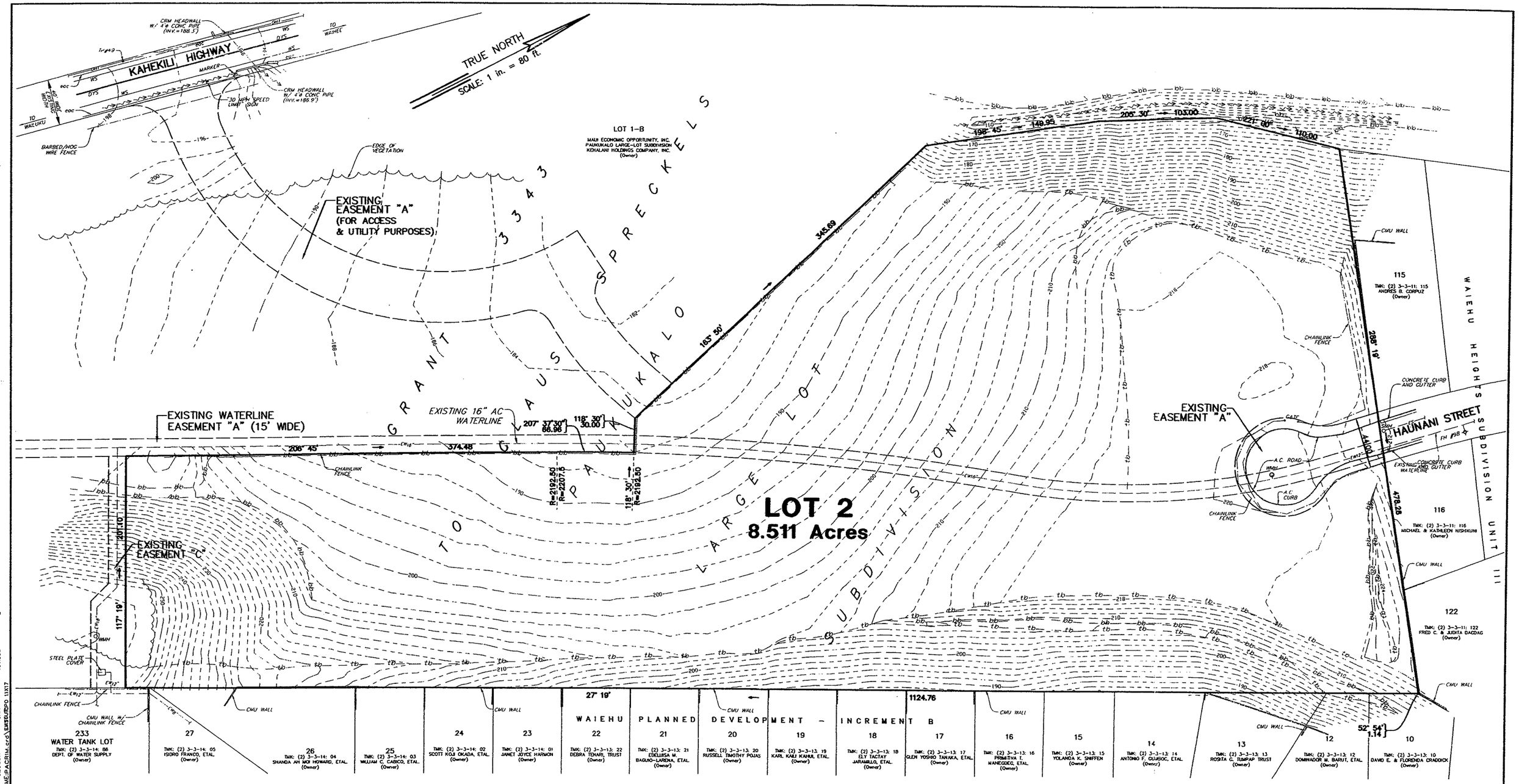
SCALE 1" = 2000'

FIGURE 6

R. T. TANAKA ENGINEERS, INC.

S ORS CI : ST RAL GINEE

Z:\2008\08-040\WAIEHU-MAUKA_Location & Vicinity Map.dwg : 20-JAN-2009 : Drawn BY: JOY E




## LEGEND AND ABBREVIATIONS:

| | |
|---|---|
| 220 | CONTOUR |
| 246.8 | EXISTING SPOT ELEVATION |
| eoc | EDGE AC PAVEMENT |
| WS | WHITE STRIPE |
| DYS | DOUBLE YELLOW STRIPING |
| TP | TELEPHONE POLE |
| WV | WATER VALVE |
| SMH | SEWER MANHOLE |
| WMH | WATER MANHOLE |
| tb | TOP BANK |
| bb | BOTTOM BANK |
| OHT | EXISTING OVERHEAD TELEPHONE LINE |
| | MACADAMIA NUT TREE |
| CW16" | WATERLINE AND SIZE |
| SS | SEWERLINE |
| CO 48" | DRAINLINE AND SIZE |

# EXISTING TOPOGRAPHIC MAP

## FOR

# WAIEHU MAUKA

## AT PAUKUKALO, WAILUKU, MAUI, HAWAII

40 20 0 40 80
GRAPHIC SCALE IN FEET

## NOTES FOR TOPOGRAPHIC FEATURES:

1. ELEVATION DATUM = MEAN SEA LEVEL.
2. 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.

Tax Map Key (2) 3-3-01: 102 & 16 (PORTION)

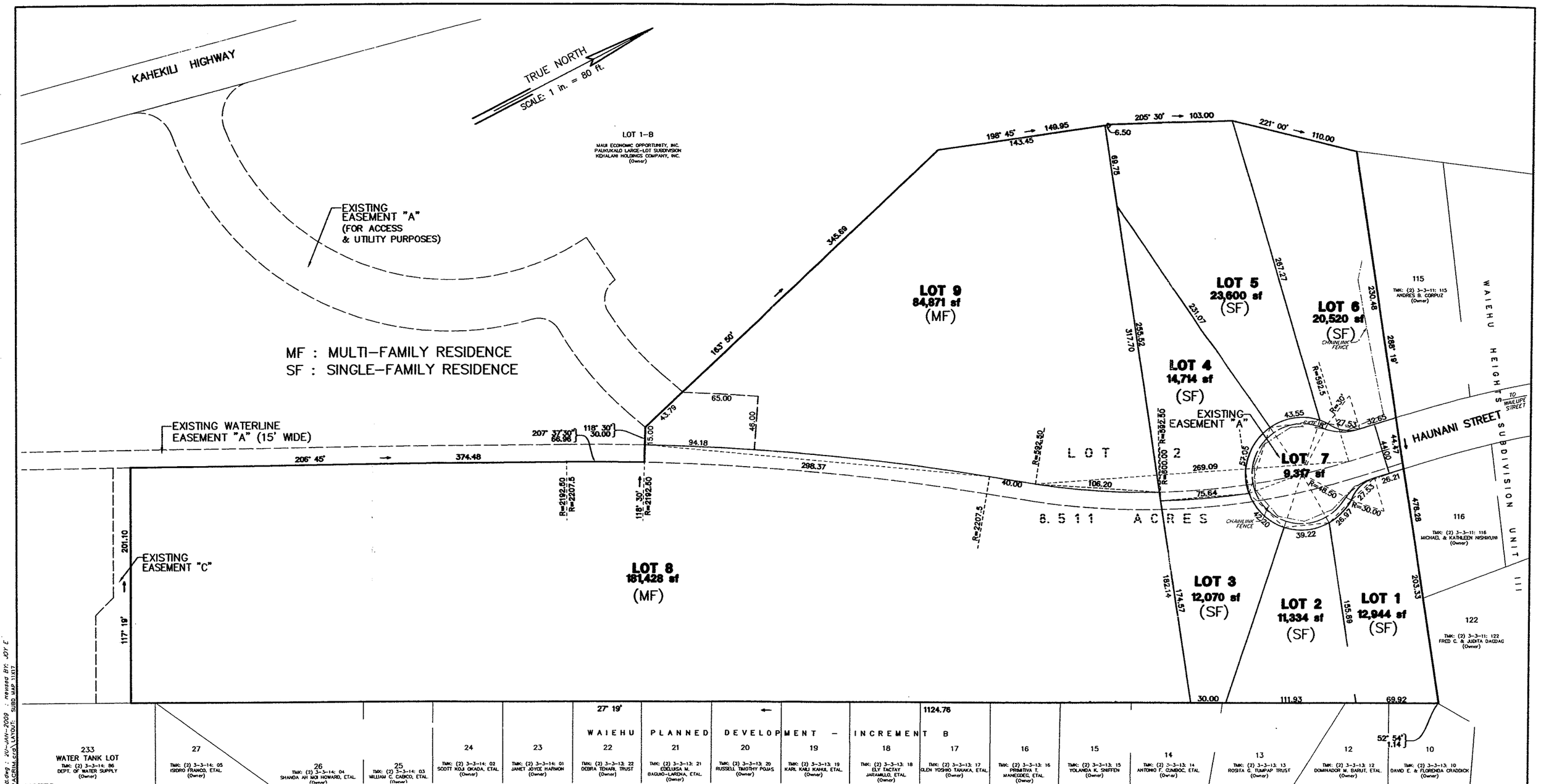
FIGURE 7


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS


JANUARY 07, 2009
JOB NO. 08-040


JOB\08-IEHU-M JNST_P C2008-JAN-
DRAWN BY: JOY, E.\F.B. No.#897p25-40\CRD FILENAME:PACRIM.crd\EXISTUTOPO 11X17
Revised




**NOTES:**

1. ADJOINING OWNERS AS SHOWN TAKEN FROM TAX MAP.
2. ALL WATER SERVICE FROM COUNTY SYSTEM.
3. SEWER SERVICE TO BE CONNECTED TO THE COUNTY SEWERAGE SYSTEM.
4. ALL BOUNDARY CORNERS MARKED WITH 1/2-INCH PIPE UNLESS OTHERWISE NOTED.
5. ALL AZIMUTHS AND RECORD COORDINATES AS SHOWN REFERRED TO GOVERNMENT SURVEY TRIANGULATION STATION "LUKE".
6. LOT 7 (44.00 FT. WIDE) IS A ROADWAY LOT TO BE DEDICATED TO THE COUNTY OF MAUI.
7. 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.
8. 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 WAIEHU HEIGHTS ASSOCIATES (RECORDED IN BOOK 15119, PAGE 401).
9. 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.

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

# P R E L I M I N A R Y

# WAIEHU MAUKA SUBDIVISION

## AT PAUKUKALO, WAILUKU, MAUI, HAWAII

40 20 0 40 80
GRAPHIC SCALE IN FEET

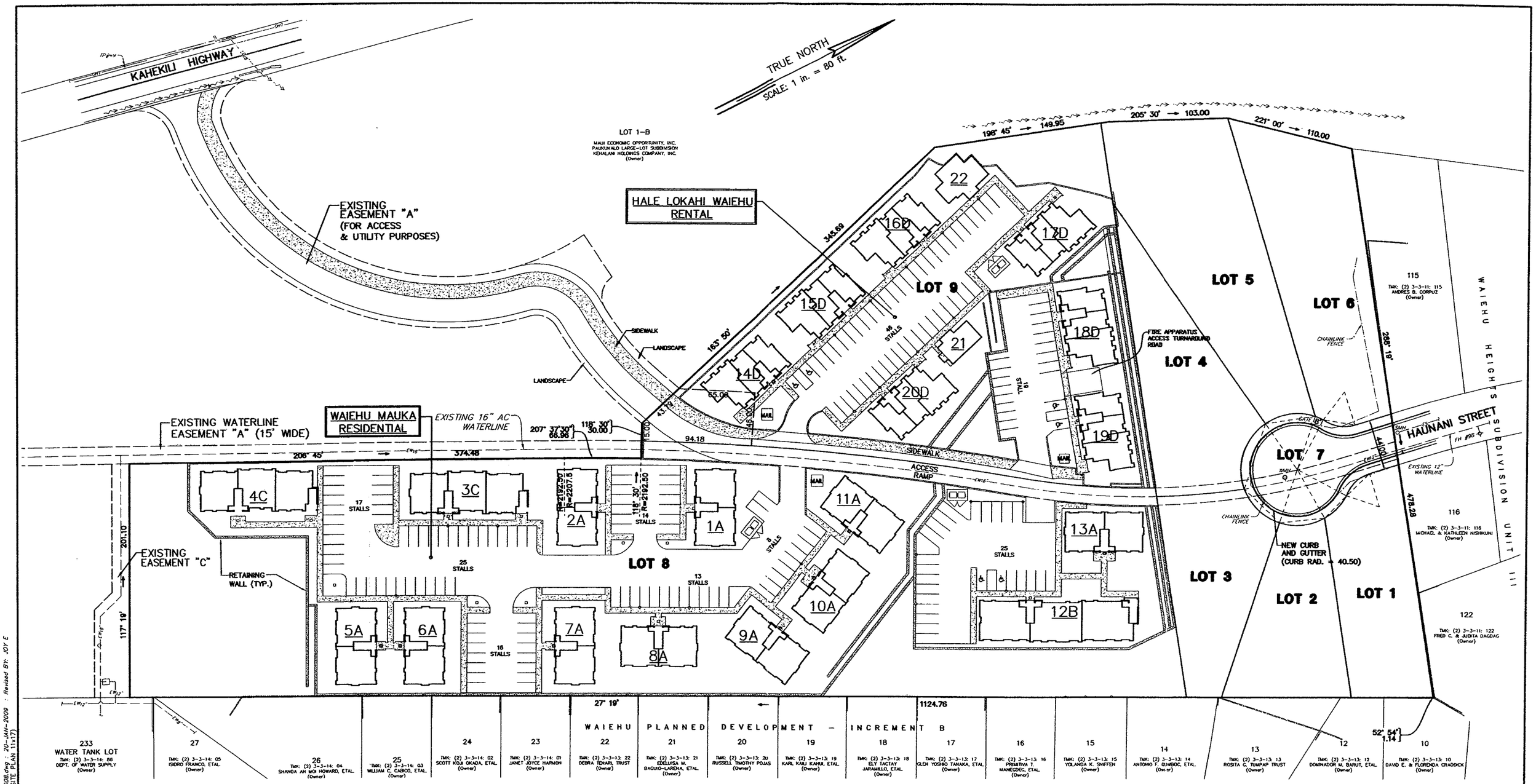
FIGURE 8

Z:\2008\08-040\WAIEHU-MAUKA_CONST_PLANS_JAN2009.dwg : 20-JAN-2009 : revised BY: JOY E
DRAWN BY: JOY E.V.B. No. 8972-25-40 CRD FILENAME:P-AGRIM.crd LAYOUT: SUBD MAP 11817


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.


JANUARY 07, 2009
JOB NO. 08-040




SOURCE : MAUI ARCHITECTURAL GROUP, INC.

# CONCEPTUAL SITE PLAN
## FOR
# WAIEHU MAUKA
## AT WAIEHU, MAUI, HAWAII

40 20 0 40 80
GRAPHIC SCALE IN FEET

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

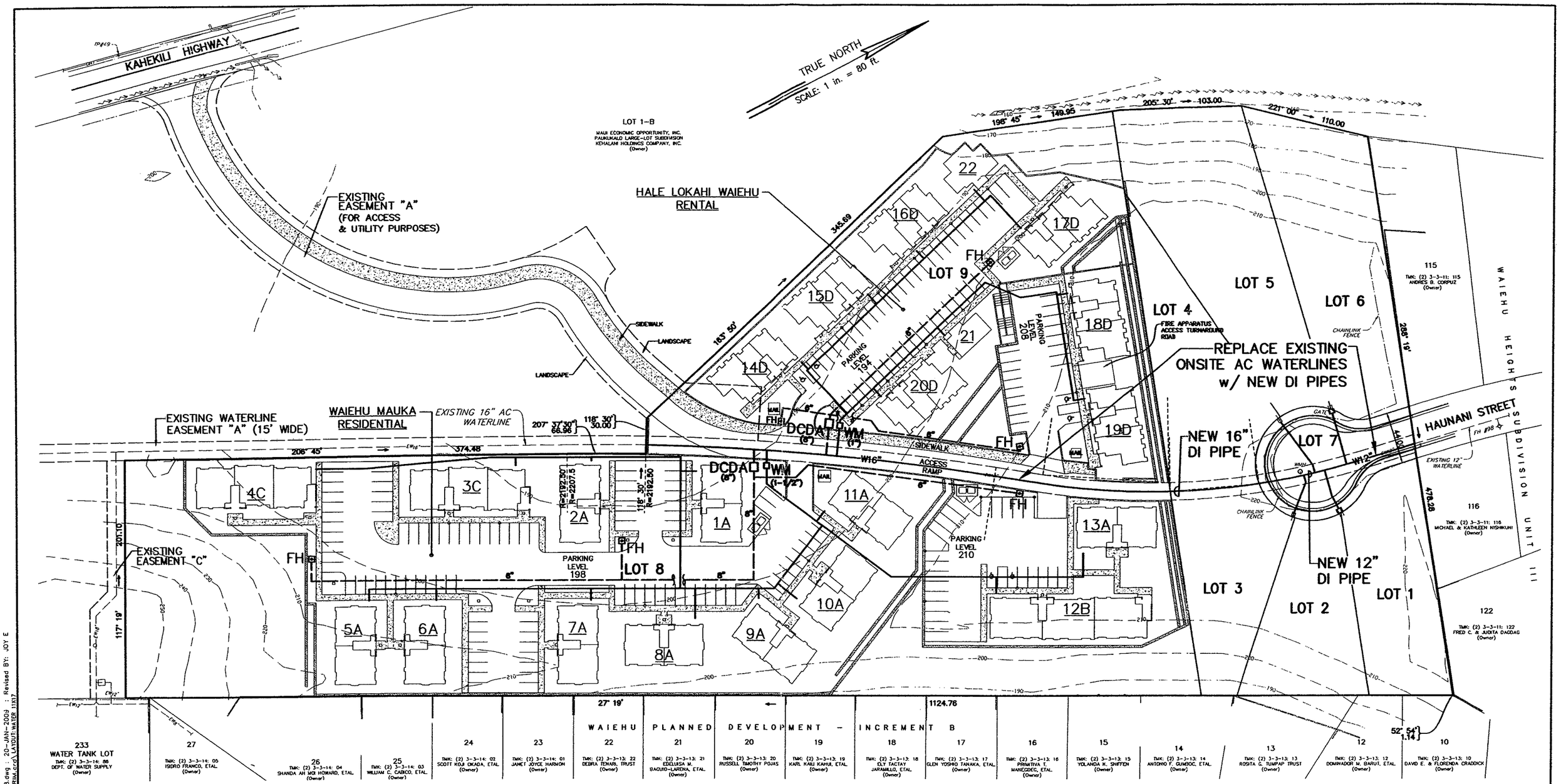
FIGURE 9

Z:\2008\08-040\WAIEHU-MAUKA_CONST_PLANS_JEC2008.dwg : 20-JAN-2009 : Revised BY: JOY E
Drawn by: J.E. FB#897/25-40 "PACRIM.CRD" (SITE PLAN 11x17)


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS


JANUARY 07, 2009
JOB NO. 08-040




**LEGEND AND ABBREVIATIONS:**

| | |
|---|---|
| WMH | EXISTING WATER MANHOLE |
| EWS | EXISTING WATERLINE |
| WV | EXISTING WATER VALVE |
| FH | PROPOSED FIRE HYDRANT |
| 8" | PROPOSED FIRELINE |
| W12" | PROPOSED WATERLINE |

# CONCEPTUAL WATER SYSTEM LAYOUT

## FOR

# WAIEHU MAUKA

## AT WAIEHU, MAUI, HAWAII

40 20 0 40 80
GRAPHIC SCALE IN FEET

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

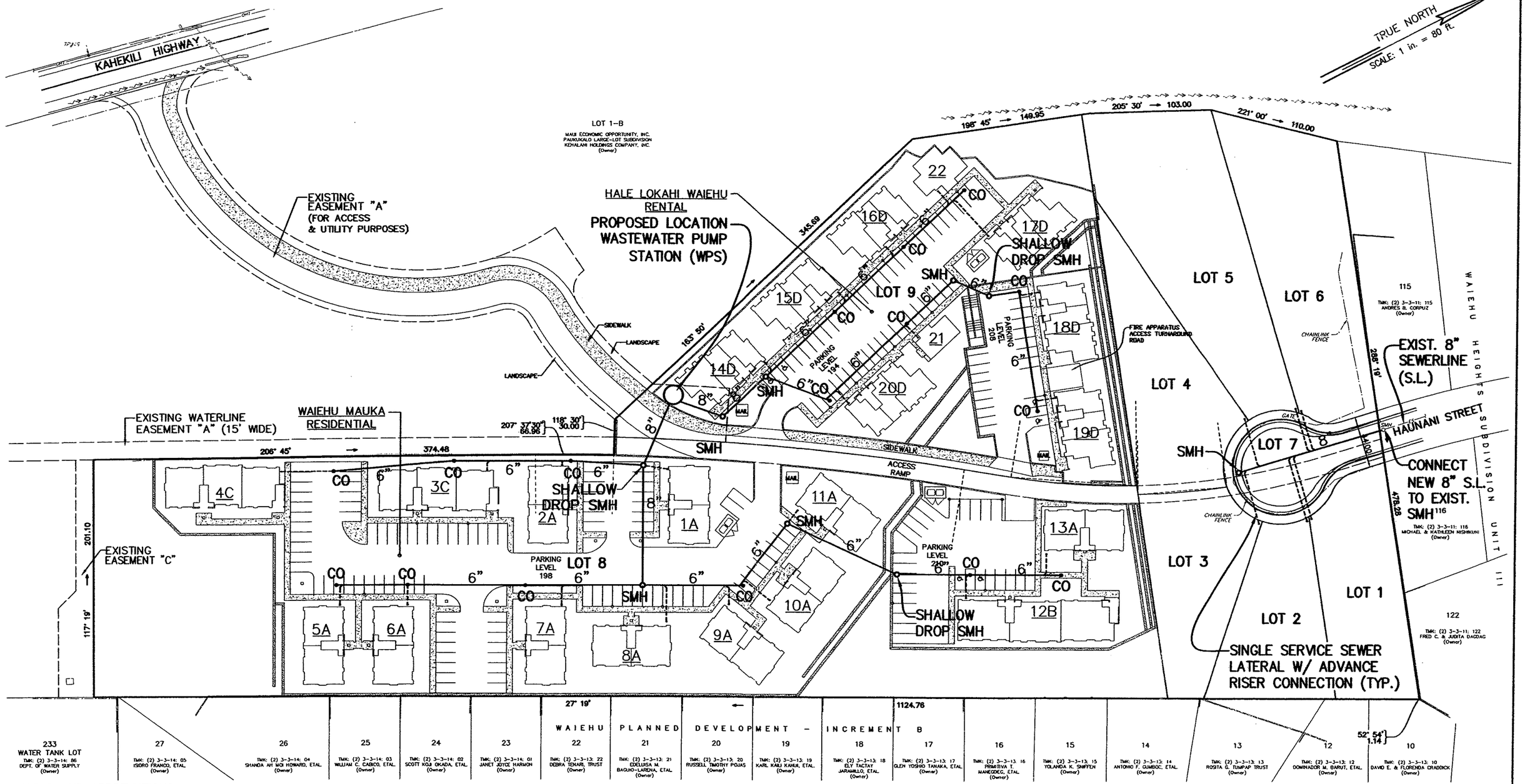
FIGURE 10

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

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: JOY. E.V.F.B. No.#897a25-40\CRD FILENAME:P-ACRIM.crd\LAYOUT:WATER 11517




# CONCEPTUAL ONSITE SEWER SYSTEM LAYOUT

## FOR

# WAIEHU MAUKA

## AT WAIEHU, MAUI, HAWAII

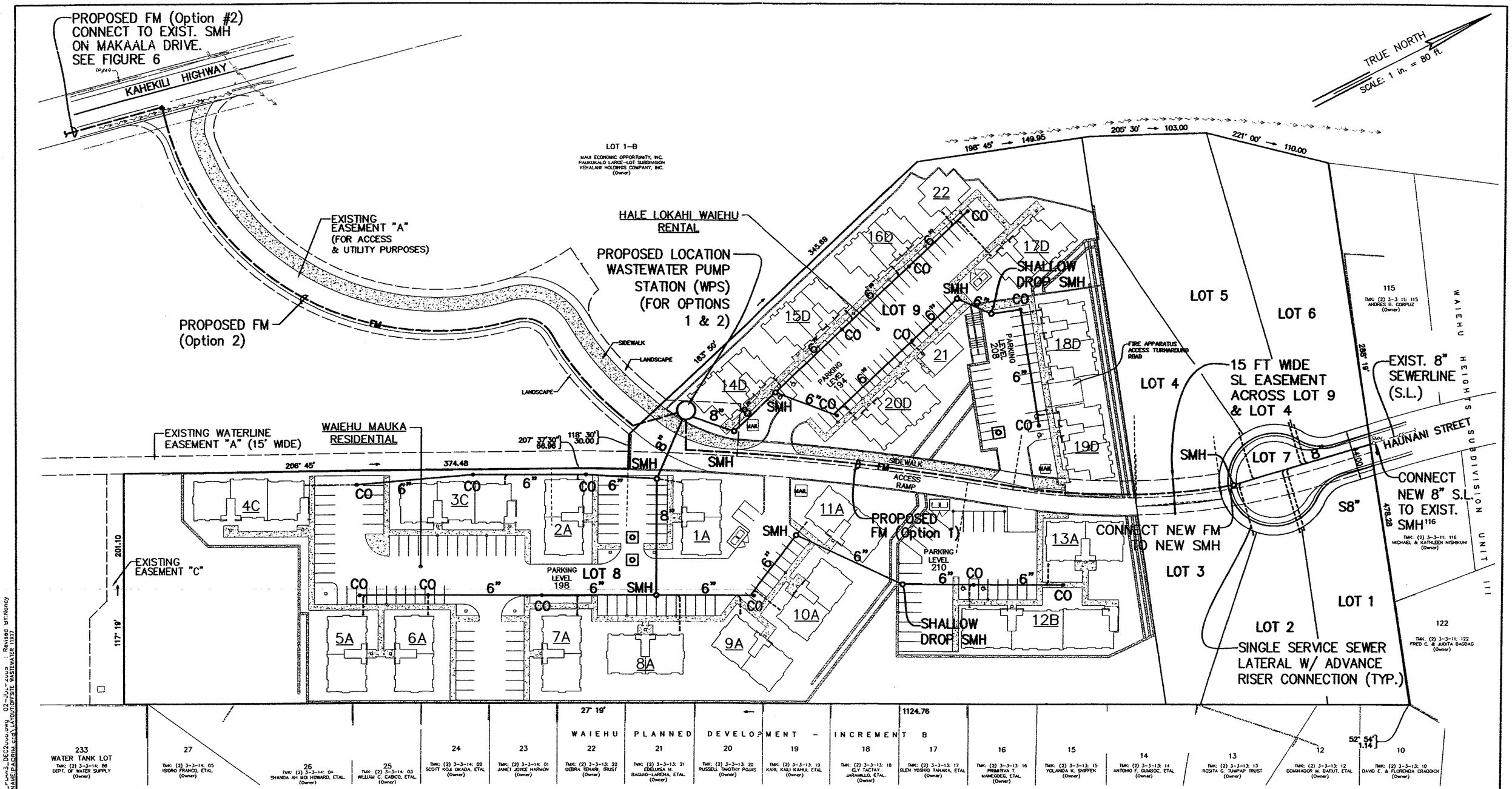
Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

FIGURE 11


671 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS


JANUARY 07, 2009
JOB NO. 08-040




**LEGEND AND ABBREVIATIONS:**

| | |
|---|---|
| SMH | EXISTING SEWER MANHOLE |
| ES8 | EXISTING SEWERLINE |
| o 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

# WAIEHU MAUKA

## AT WAIEHU, MAUI, HAWAII

GRAPHIC SCALE IN FEET (40 20 0 40 80)

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

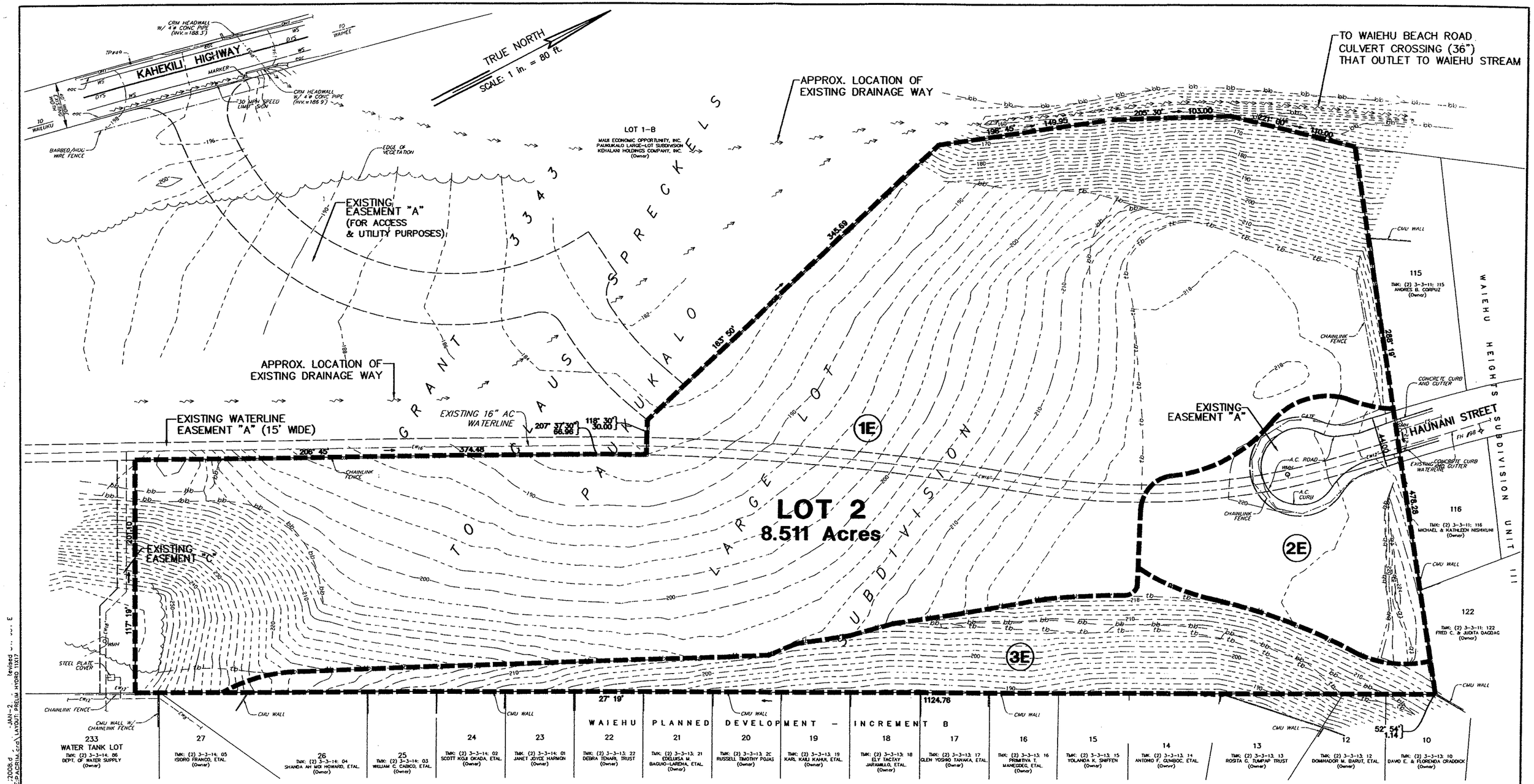
FIGURE 12


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS



JANUARY 07, 2009
JOB NO. 08-040
REVISED: JULY 01, 2009




# PRELIMINARY HYDROLOGIC MAP - EXISTING CONDITION

## FOR

# WAIEHU MAUKA

## AT PAUKUKALO, WAILUKU, MAUI, HAWAII

LEGEND:

(2E) DRAIN AREA DESIGNATION

40 20 0 40 80
GRAPHIC SCALE IN FEET

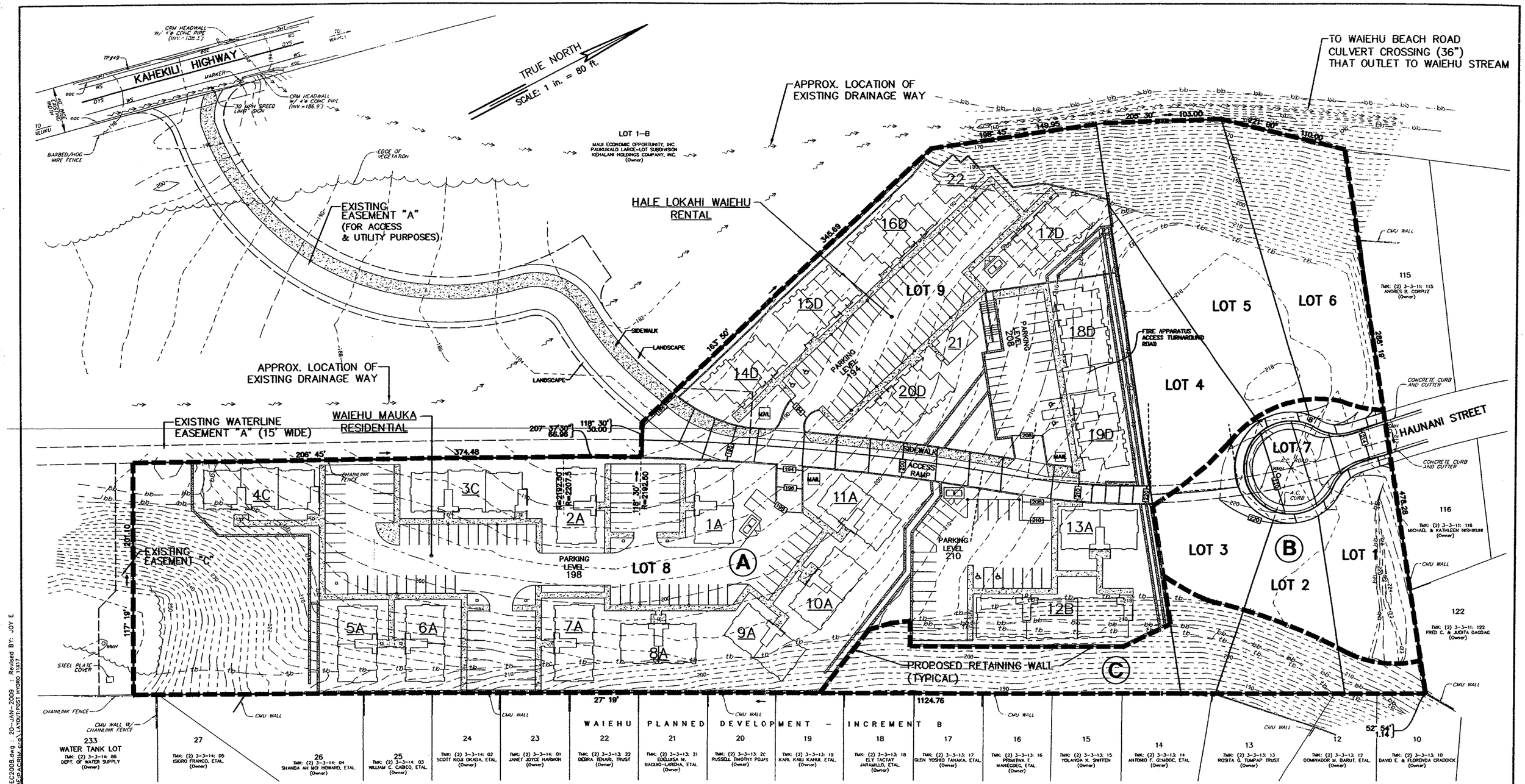
Tax Map Key (2) 3-3-01: 102 & 16 (PORTION)

FIGURE 13


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS


JANUARY 07, 2009
JOB NO. 08-040




LEGEND:

(A) DRAIN AREA DESIGNATION

# PRELIMINARY HYDROLOGIC MAP - POST DEVELOPMENT CONDITION

## FOR

# WAIEHU MAUKA

## AT WAIEHU, MAUI, HAWAII

40 20 0 40 80

GRAPHIC SCALE IN FEET

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

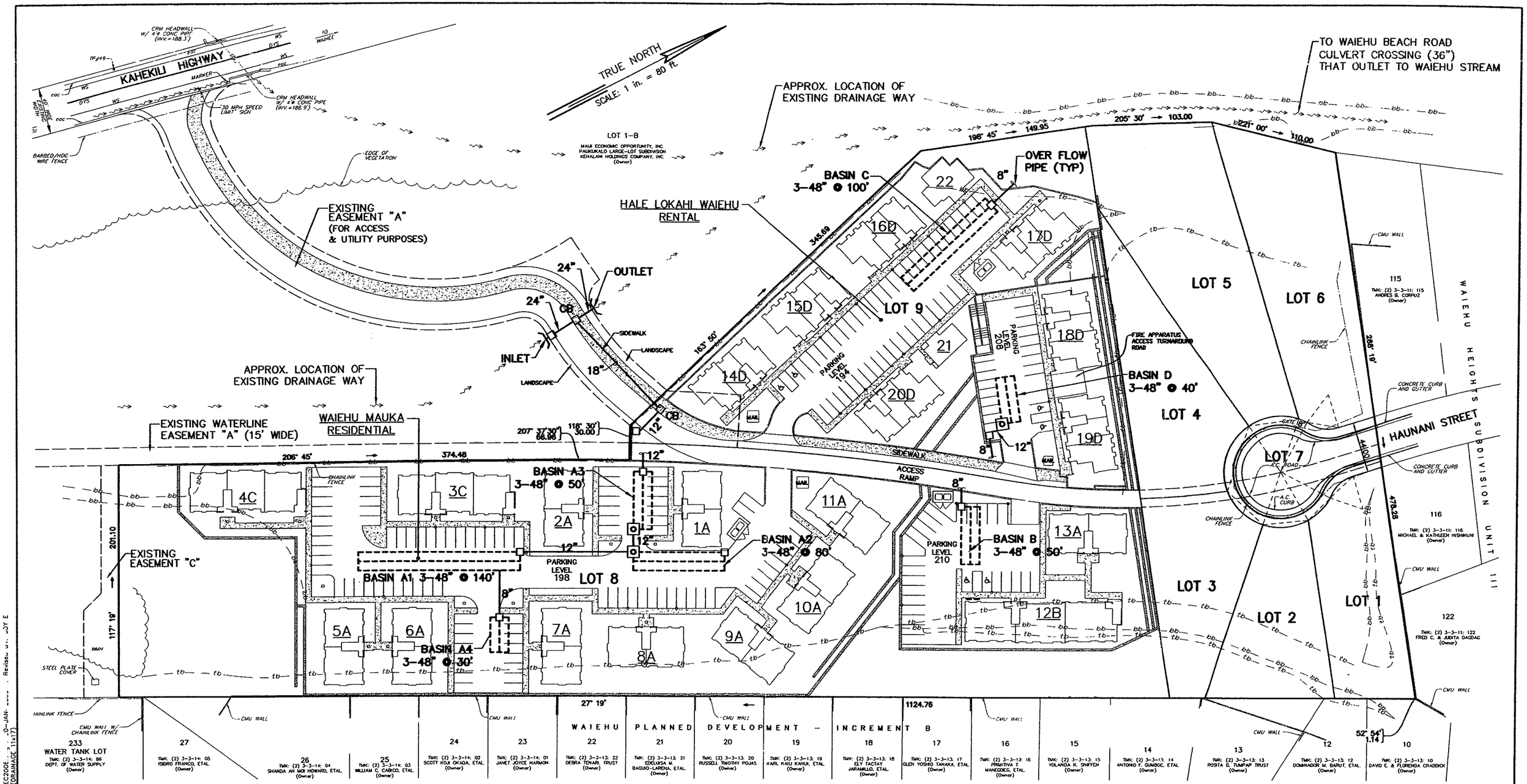
FIGURE 14

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.

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: JOY E.V.B. No. # 8972623-40\CRD. FILENAME:PACRIM.pc3 LAYOUT:POST HYDRO 11X17




## LEGEND AND ABBREVIATIONS:

| | |
|---|---|
| DMH | EXISTING DRAIN MANHOLE |
| ED | EXISTING DRAINLINE |
| O | PROPOSED DRAIN MANHOLE |
| □ | PROPOSED DRAIN INLET UNLESS NOTED (CB-CATCH BASIN) |
| 8" | PROPOSED DRAINLINE |
| - - - - - | PROPOSED SUBSURFACE PERFORATED PIPE |

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

# CONCEPTUAL DRAINAGE SYSTEM LAYOUT
## FOR
# WAIEHU MAUKA
## AT WAIEHU, MAUI, HAWAII

40 20 0 40 80
GRAPHIC SCALE IN FEET

**NOTE:**

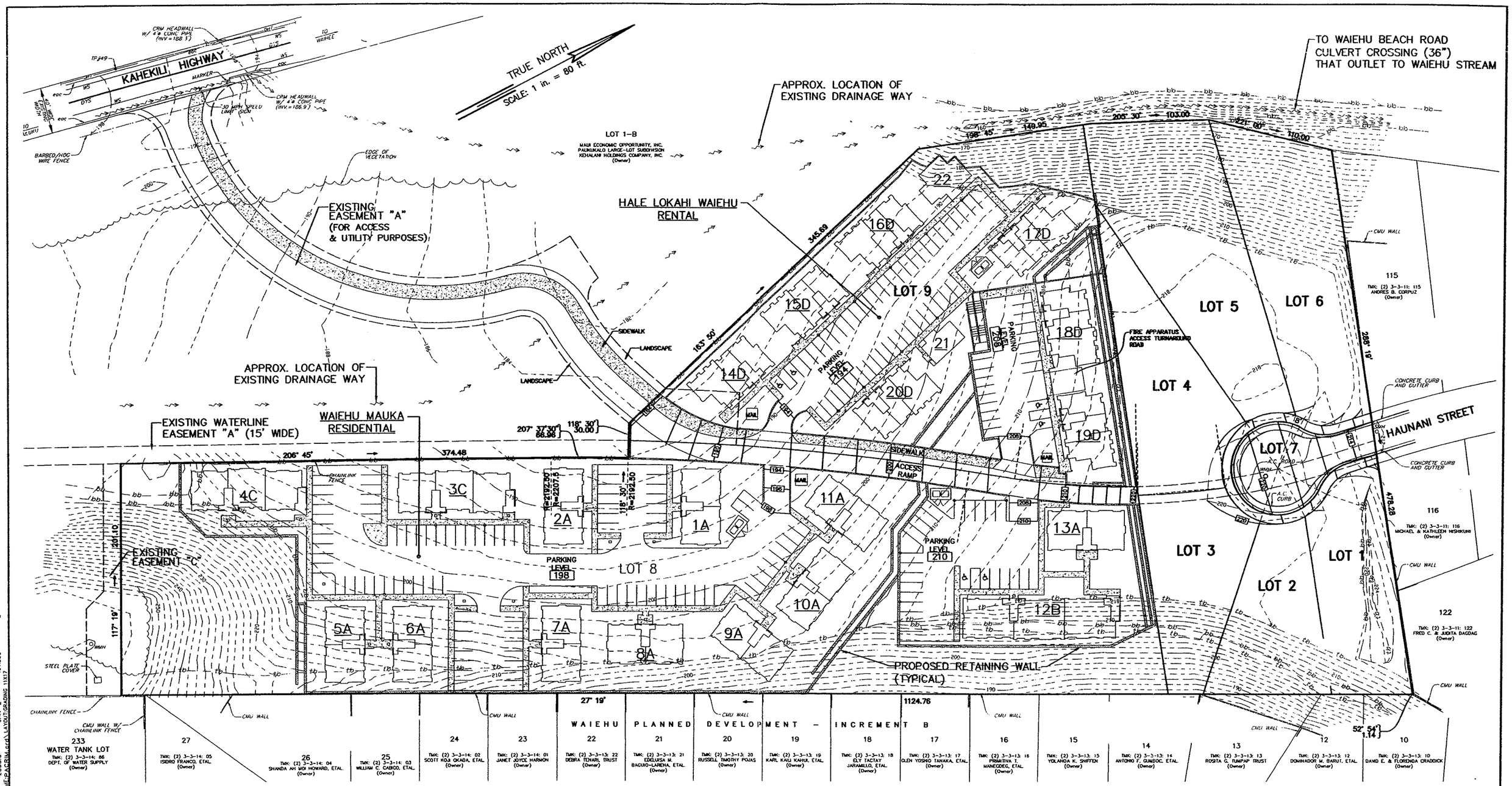
SEE FIGURE 16 FOR TYPICAL SECTION OF SUBSURFACE RETENSION BASIN.

FIGURE 15


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS


JANUARY 07, 2009
JOB NO. 08-040




## LEGEND AND ABBREVIATIONS:

- 220 — EXISTING CONTOUR
- tb — EXISTING TOP BANK
- 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

40 20 0 40 80

GRAPHIC SCALE IN FEET

Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

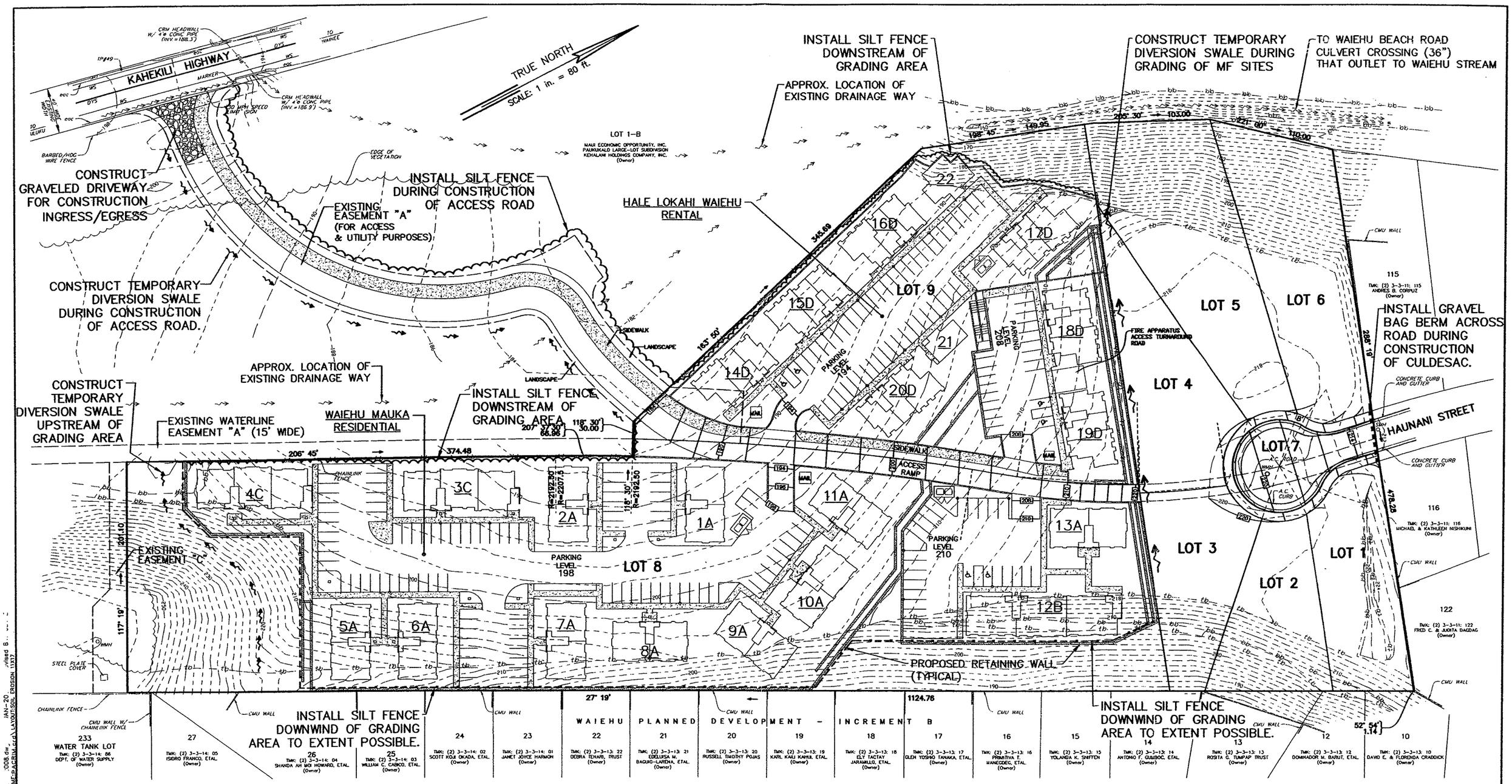
FIGURE 16


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS



JANUARY 07, 2009
JOB NO. 08-040




**LEGEND AND ABBREVIATIONS:**

- 220 — EXISTING CONTOUR
- 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

40 20 0 40 80
GRAPHIC SCALE IN FEET

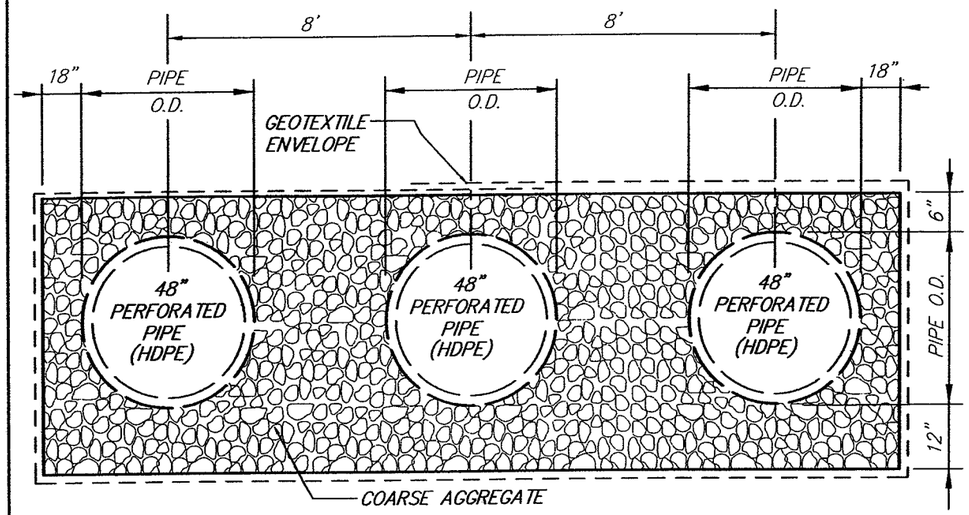
Tax Map Key (2)3-3-01: 102 & 16 (PORTION)

FIGURE 17


871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS


JANUARY 07, 2009
JOB NO. 08-040




## DETERMINE HOLDING CAPACITY:

**Stone Void Ratio = 40%**

**Capacity per Linear Foot:**

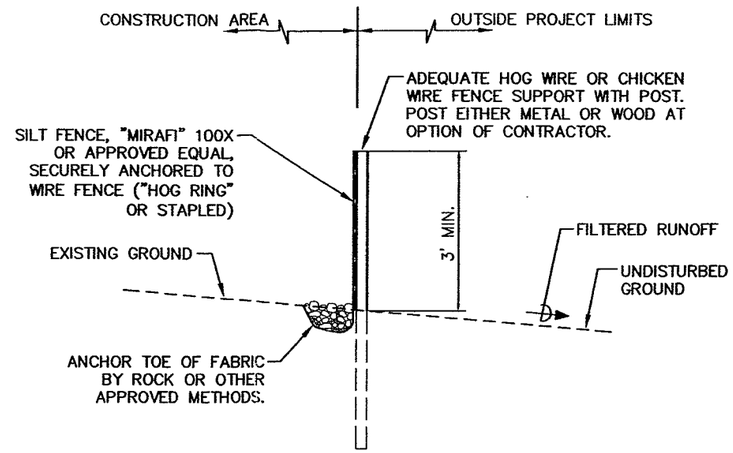
**Pipe Capacity** $= 3 \pi R^2$
$= 3 \times 3.1416 \times 2^2$
$= 3 \times 12.6$
$= 37.8$ cf

**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*

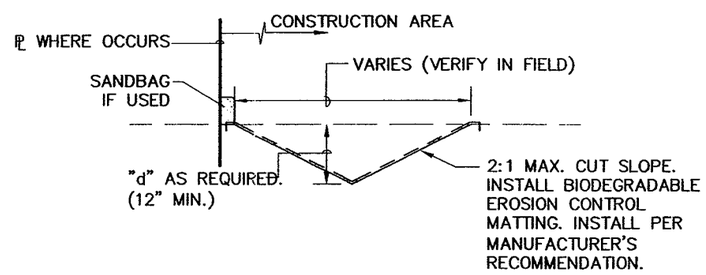



## TYPICAL INSTALLATION - SILT FENCE

NOT TO SCALE

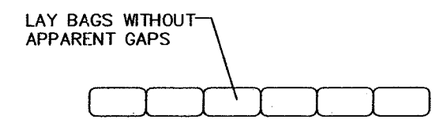
## MAINTENANCE NOTES:

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

Z:\2008\08-040\MISC DRAINAGE&BMP DETS.dwg : 20-JAN-2009 : Revised BY: JOY E

Tax Map Key : (2)3-3-01: 102 & 16 (PORTION)

FIGURE 18

871 KOLU STREET, SUITE 201
WAILUKU, MAUI, HAWAII 96793

R. T. TANAKA ENGINEERS, INC.
LAND SURVEYORS - CIVIL & STRUCTURAL ENGINEERS

JANUARY 07, 2009
JOB NO. 08-40

# APPENDIX H.

# November 17, 2009
# Community Meeting Minutes

MUNEKIYO HIRAGA, INC.

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

MARK ALEXANDER ROY

December 9, 2009

## MEETING MEMORANDUM

**Date of Meeting:** November 17, 2009

**From:** Carol Matasci, Planner

**Purpose of Meeting:** To Inform Waiehu Heights, Waiehu Terrace, and Surrounding Community Members About the Proposed Waiehu Mauka Affordable Housing Project and to Solicit Comments

**Participants:** Approximately thirteen (13) members of the community attended

1. Mike Munekiyo of Munekiyo & Hiraga, Inc. presented an overview of the project. The Waiehu Mauka affordable housing project is intended to further Lokahi Pacific's mission in improving the quality of life, both economically and socially, for residents of the County of Maui. The project consists of 58 affordable for-sale condominium units, 42 affordable rental units, and 6 market price single-family lots. The 100 multi-family units will be priced to be affordable to families making 120 percent and below of the Maui County Area Median Income of $75,400.00.

2. Community members then asked questions and voiced their concerns about the project. A participant inquired about the ownership of the property. It was explained that Pacific Rim Land and Lokahi Pacific have ownership interests in the property.

3. A resident asked why the six (6) single-family lots would be accessed through Waiehu Heights, rather than Kahekili Highway with the rest of the development. Kirk Tanaka of R.T. Tanaka Engineers, Inc. explained that there is a substantial grade difference between those lots and the multi-family portion of the unit, which makes a connecting roadway impractical.

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4. A resident expressed concern about heavy peak hour traffic on Kahekili Highway between Waihee and Happy Valley, and inquired if the proposed project would involve traffic improvements like the proposed Hale Mua project had. In addition, the overcrowded conditions at Waihee School are a concern. Mike Munekiyo responded that it is uncertain when Hale Mua will move forward, but there are no offsite roadway improvements associated with the Waiehu Mauka project envisioned at this time. Regional traffic issues are a legitimate concern.

5. A resident who lives on Akaiki Place, directly adjacent to the proposed project, expressed concerns about blocked views, garbage on the land near the highway, the use of the sand hills by motorcycles, and a concern about rentals and low income residents. The resident will address these concerns in a comment letter.

6. A participant asked about the water source for the project. Mike Munekiyo responded that the project would be on the County system, and that coordination with the Department of Water Supply is ongoing.

7. A participant asked about the six (6) single-family lots. Mike Munekiyo explained that the lots are part of the same project, and would be sold at market rate prices. Access for these six (6) lots will be through Waiehu Heights.

8. A participant asked if the Environmental Assessment would include a discussion of impacts to schools. Mike Munekiyo responded that the Department of Education (DOE) has received a copy of the Draft Environmental Assessment. Comments received from DOE will be addressed in the Final Environmental Assessment.

9. A participant asked when it was planned to start the project. Kamaile Sombelon of Lokahi Pacific responded that it depended on the 201H process and the construction process, but it is anticipated that construction will start next year. Construction will be phased, and take approximately two (2) years.

10. A participant asked if the project would utilize local or mainland firms. Kamaile Sombelon responded that it was Lokahi Pacific's practice to always use local firms, and they would use local firms for the Waiehu Mauka project as well.

11. A neighboring resident asked about the interface between the project and the homes on Akaiki Place. Mike Munekiyo referred to diagrams of this interface from the PowerPoint Presentation. Going south along this interface, the grade difference between the homes and the project site becomes smaller. The neighboring resident stated that the existing view of dirt from Akaiki Place is not preferable, but there is a concern that children would climb over the retaining walls facing the subject property. Mike Munekiyo responded that safety measures along the top of retaining walls would be incorporated into the architectural design.

12. A resident reiterated concerns about impacts to traffic and Waihee School, but said that they would prefer a community on that land rather than off-roading trucks. Mike

Munekiyo responded that these are important and challenging issues for the project.

13. A participant asked about the area by the water tank which was left open in the project plans. Kirk Tanaka explained that from the water tank, there is about a 50 foot drop down on that corner of the property. The area will be left as open space and landscaped in this area, as well as two (2) other small areas on the project site.

14. At the end of the question and answer period, participants were free to view boards with project plans set up around the room and speak with members of the project team.

There being no other comments, the meeting was concluded at 7:45 p.m.

Carol Matasci

Carol Matasci, Planner

CM:lfm
cc: Kamaile Sombelon, Lokahi Pacific
Blanca Lafolette, Pacific Rim Land, Inc.
David Lundquist, Maui Architectural Group, Inc.
Kirk Tanaka, R.T. Tanaka Engineers, Inc.
Mike Munekiyo, Munekiyo & Hiraga, Inc.
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