MICHAEL P. VICTORINO
Mayor

MICHELE CHOUTEAU MCLEAN, AICP
Director

JORDAN E. HART
Deputy Director

FILE COPY

JUL 23 2020

DEPARTMENT OF PLANNING
COUNTY OF MAUI
ONE MAIN PLAZA
2200 MAIN STREET, SUITE 315
WAILUKU, MAUI, HAWAII 96793

July 15, 2020

Keith Kawaoka, Acting Director
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813

Dear Mr. Kawaoka:

SUBJECT: PROPOSED WAILEA RESORT SF-S RESIDENTIAL PROJECT AT TMK (2)2-1-008:145, WAILEA, MAUI, HAWAII

With this letter, on behalf of the Maui Planning Commission, the County of Maui, Department of Planning hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the Proposed Wailea Resort SF-S Residential Project situated at TMK (2)2-1-008:145 on the island of Maui, for publication in the next available edition of the Environmental Notice.

Enclosed is an Adobe Acrobat PDF file of the DEA-AFONSI and a zip file that contains the shapefile of the project's location map.

If there are any questions, please contact Tara Furukawa of the Current Planning Division at (808) 270-7520.

Sincerely,

MICHELE MCLEAN, AICP
Planning Director

Enclosures
xc: Tara Furukawa, Maui County Department of Planning (PDF)
Paul Woodward, Wailea Resort SF-S Partners LP (PDF)
Yukino Uchiyama, Munekiyo Hiraga (PDF)
K:\DATA\Ledcor\SF-S PERMITTING\Applications\Draft EA\OEQC Submittals\DraftEA.FONSI.ltr.doc

21-010

From: webmaster@hawaii.gov
To: HI Office of Environmental Quality Control
Subject: New online submission for The Environmental Notice
Date: Thursday, July 16, 2020 12:29:31 PM

Action Name

Proposed Wailea Resort SF-S Residential Project at Wailea, Maui, Hawai‘i

Type of Document/Determination

Draft environmental assessment and anticipated finding of no significant impact (DEA-AFNSI)

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds

Judicial district

Makawao, Maui

Tax Map Key(s) (TMK(s))

(2)2-1-008:145

Action type

Applicant

Other required permits and approvals

Department of Health (DOH) Community Noise Permit, as applicable; National Pollutant Discharge Elimination System (NPDES) Permit; Special Management Area (SMA) Use Permit; Planned Development (PD) Step II and Step III Approvals; and Construction Permits (Building, Grading, Electrical, Plumbing, Work in County Right-of-Way)

Discretionary consent required

SMA Use Permit Approval and PD Step II and Step III Approvals

Approving agency

County of Maui, Maui Planning Commission

Agency contact name

Tara Furukawa

Agency contact email (for info about the action)

Tara.Furukawa@co.maui.hi.us

Email address or URL for receiving comments

Planning@munekiyohiraga.com

Agency contact phone

(808) 270-7735

Agency address

2200 Main Street
One Main Plaza, Room 315

Wailuku, Hawai‘i 96793
United States
Map It

Applicant

Wailea Resort SF-S Partners LP

Applicant contact name

Paul Woodward

Applicant contact email

Paul.Woodward@ledcor.com

Applicant contact phone

(808) 829-4067

Applicant address

590 Lipoa Parkway, Suite 259
Kīhei, Hawai‘i 96753
United States
Map It

Was this submittal prepared by a consultant?

Yes

Consultant

Munekiyo Hiraga

Consultant contact name

Yukino Uchiyama

Consultant contact email

Planning@munekiyohiraga.com

Consultant contact phone

(808) 983-1233

Consultant address

305 High Street, Suite 104
Wailuku, Hawai‘i 96793
United States
Map It

Action summary

Wailea Resort SF-S Partners LP proposes to develop a residential condominium project on approximately 23.1 acres of land at Tax Map Key (TMK) No. (2)2-1-008:145 in Wailea Resort, Maui, Hawai‘i. The proposed project will consist of 57 single-family residential units, an amenity center, and related infrastructure improvements. The residential units will be developed under a Condominium Property Regime (CPR). Onsite infrastructure improvements include drainage, utilities, landscaping, and access/internal roadway improvements.

The proposed action also involves installation of infrastructure along Wailea Alanui Drive, a public roadway owned by the County of Maui, which is a trigger for the preparation of a Chapter 343,

Environmental Assessment (EA). In addition, a Special Managemen Area (SMA) Use Permit and Planned Development (PD) Step II and Step III approvals will be required for the project.

Reasons supporting determination

See Section VI of the Draft Environmental Assessment.

Attached documents (signed agency letter & EA/EIS)

- Wailea-Res-SF-S-Permitting.May-2020.Draft-EA.pdf
- Wailea-Res-SF-S-Permitting.071520.FONSI-Letter-from-Planning-Dept.pdf

Action location map

- Wailea-Res-SF-S-Permitting-SF-S.Shapefile.zip

Authorized individual

Yukino Uchiyama, AICP

Authorization

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Draft Environmental Assessment

PROPOSED WAILEA RESORT SF-S RESIDENTIAL PROJECT

(TMK NO. (2)2-1-008:145)

Prepared for:
Wailea Resort SF-S Partners LP

Approving Agency:
Maui Planning Commission

May 2020

Copyright © 2020
by Munekiyo Hiraga

MUNEKIYO HIRAGA

Planning. Project Management. Sustainable Solutions.

Draft Environmental Assessment

PROPOSED WAILEA RESORT SF-S RESIDENTIAL PROJECT

(TMK NO. (2)2-1-008:145)

Prepared for:
Wailea Resort SF-S Partners LP

Approving Agency:
Maui Planning Commission

May 2020

Copyright © 2020
by Munekiyo Hiraga

MUNEKIYO HIRAGA

CONTENTS

Page

Executive Summary iv
List of Acronyms vi

I. PROJECT OVERVIEW 1

A. PROPERTY LOCATION, EXISTING USE, AND LAND OWNERSHIP 1

B. PROPOSED ACTION 1

C. PROJECT SUSTAINABLE DESIGN FEATURES 1

D. REGULATORY CONTEXT AND CHAPTER 343, HAWAI'I REVISED STATUTES 6

E. PROJECT DEVELOPMENT SCHEDULE AND COST 6

II. DESCRIPTION OF EXISTING CONDITIONS, POTENTIAL IMPACTS, AND MITIGATION MEASURES 8

A. PHYSICAL SETTING 8
1. Surrounding Land Uses 8
2. Climate 8
3. Topography and Soil Conditions 9
4. Streams and Wetlands 13
5. Flood and Tsunami Hazards 13
6. Sea Level Rise 14
7. Flora and Fauna 14
8. Air Quality 20
9. Greenhouse Gas Emissions 20
10. Noise 22
11. Scenic and Open Space Resources 22
12. Archaeological Resources 23
13. Cultural Resources 25

B. SOCIO-ECONOMIC ENVIRONMENT 28
1. Regional Setting 28
2. Population and Demography 29
3. Economy and Labor Force 30

C. PUBLIC SERVICES 32
1. Police and Fire Protection 32
2. Medical Facilities 33
3. Education Facilities 34
4. Recreational Facilities 35
5. Solid Waste 36

D. INFRASTRUCTURE 37
1. Roadways 37
2. Water System 45
3. Wastewater System 48
4. Drainage 49

5. Electrical, Telephone, and Cable Television Systems 52
E. CUMULATIVE AND SECONDARY IMPACTS 53
III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS 55
A. STATE LAND USE DISTRICTS 55
B. HAWAI'I STATE PLAN 55
C. STATE FUNCTIONAL PLANS 84
D. COUNTYWIDE POLICY PLAN 89
E. MAUI ISLAND PLAN 117
F. KIHEI-MAKENA COMMUNITY PLAN 161
G. PLANNED DEVELOPMENT APPROVAL 166
H. HAWAI'I COASTAL ZONE MANAGEMENT PROGRAM 168
1. Recreational Resources 168
2. Historic/Cultural Resources 170
3. Scenic and Open Space Resources 171
4. Coastal Ecosystem 172
5. Economic Use 172
6. Coastal Hazards 173
7. Managing Development 174
8. Public Participation 174
9. Beach Protection 175
10. Marine Resources 176
I. HRS 205A-26 SPECIAL MANAGEMENT AREA GUIDELINES 177
J. MAUI PLANNING COMMISSION SPECIAL MANAGEMENT AREA RULES AND REGULATIONS 178
IV. SUMMARY OF ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES 183
V. ALTERNATIVES ANALYSIS 184
A. NO ACTION ALTERNATIVE 184
B. DEFERRED ACTION ALTERNATIVE 184
C. PREFERRED ALTERNATIVE 184
VI. SIGNIFICANCE CRITERIA ASSESSMENT 185
VII. LIST OF PERMITS AND APPROVALS 193
VIII. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS 194
IX. REFERENCES i

K:\DATA\LEDCOR\SF-S PERMITTING\APPLICATIONS\DRAFT EA\DRAFT EA.DOCX

List of Figures

Page

Figure 1. Regional Location Map 2
Figure 2. Project Location Map 3
Figure 3. Preliminary Site Plan 4
Figure 4. Soil Association Map 11
Figure 5. Soil Classification Map 12
Figure 6. Flood Insurance Rate Map 15
Figure 7. Tsunami Evacuation Map 16
Figure 8. Sea Level Rise Exposure Area Map 17
Figure 9. Proposed Water System Map 47
Figure 10. Existing Drainage Condition 50
Figure 11. State Land Use District Classification Map 56
Figure 12. Maui Island Plan Map 119
Figure 13. Kihei-Makena Community Plan 162
Figure 14. Special Management Area Boundary Map 169

List of Tables

Page

Table 1. Native Plants Suitable for Paeahu 27
Table 2. Enrollments at Department of Education Schools Serving South Maui Residents 34
Table 3. Level of Service Criteria for Signalized Intersections 39
Table 4. Level of Service Summary 41
Table 5. Drainage Area Summary 52
Table 6. Relationship Between the Proposed Wailea Resort SF-S Residential Project and the State Functional Plans 86

List of Appendices

Appendix A. Ordinance No. 2694
Appendix B. Preliminary Project Plans and View Analysis
Appendix C. Preliminary Engineering and Drainage Report
Appendix D. Biological Resources Survey
Appendix E. Archaeological Inventory Survey
Appendix F. Cultural Impact Assessment
Appendix G. Economic and Fiscal Impact Analysis Table
Appendix H. Traffic Impact Analysis Report
Appendix I. Wailea Community Association Design Review Committee Approval Letter

Executive Summary

Project Name:	Proposed Wailea Resort SF-S Residential Project
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawai‘i Revised Statutes Chapter 200.1, Hawai‘i Administrative Rules (Environmental Impact Statement Rules),
Anticipated Determination:	Finding of No Significant Impact (FONSI)
Applicable Environmental Assessment review "Trigger":	Use of County Lands
Location:	Maui Island Wailea Resort TMK No. (2)2-1-008:145
Landowner and Applicant:	Wailea Resort SF-S Partners LP 590 Lipoa Parkway, Suite 259 Kīhei, Hawai‘i 96753 Contact: Paul Woodward Phone: 829-4067
Approving Agency:	Maui Planning Commission County of Maui c/o Department of Planning One Main Plaza, Room 315 2200 Main Street Wailuku, Hawai‘i 96793 Contact: Tara Furukawa, Staff Planner Phone: 270-7735
Consultant:	Munekiyo Hiraga 305 High Street, Suite 104 Wailuku, Hawai`i 96793 Contact: Yukino Uchiyama, AICP Phone: (808) 983-1233
Project Summary:	Wailea Resort SF-S Partners LP proposes to develop a residential condominium project and related improvements on approximately 23.1 acres of land at Tax Map Key (TMK) No. (2)2-1-008:145 (Parcel 145) in Wailea Resort, Maui, Hawai‘i. The project site is bounded by Kilohana Park and an open space lot owned by the County of Maui to the north, Wailea Alanui Drive and multi-family housing to the west, Kapilii Street

to the east, and single-family residential neighborhoods to the south. The project site is currently vacant.

The project site is designated “Urban” by the State Land Use Commission and “Single-Family” by the Kihei-Makena Community Plan. With respect to the Maui County Zoning, the project site is within the Wailea Resort Planned Development (PD) area and Ordinance 2694, which was approved in 1998 by the Maui County Council, conditionally zoned the parcel as “R-3 Residential District”. The project site is also situated within both the County of Maui’s Urban Growth Boundary (as set forth by the Maui Island Plan) and the Special Management Area (SMA).

The proposed project will consist of 57 single-family residential units, an amenity center, and related infrastructure improvements. The residential units will be developed under a Condominium Property Regime (CPR). The proposed amenity center will include a mail room, barbeque facility, pool and/or hot tub, and other community gathering spaces for the residents of the project. Onsite infrastructure improvements include drainage, utilities, landscaping, and access/internal roadway improvements.

The proposed action also involves installation of infrastructure along Wailea Alanui Drive and Kapili Street. It is noted that Wailea Alanui Drive is a public roadway (owned by the County of Maui) while Kapili Street is a privately owned roadway. Use of County lands is a trigger for preparation of an Environmental Assessment (EA) pursuant to Chapter 343, Hawai‘i Revised Statutes (HRS). The Chapter 343, HRS EA will serve as the primary technical supporting document for the SMA Use Permit application that will be filed with the County of Maui, Department of Planning for processing. The Approving Agency for the EA will be the Maui Planning Commission. Additionally, a PD Step II application will be filed concurrently with the SMA Use Permit application and a PD Step III application will be filed following the SMA Use Permit and the PD Step II approvals.

List of Acronyms

AIS	Archaeological Inventory Survey
BMP	Best Management Practice
CATV	Cable Television
CDP	Census Designated Place
cfs	Cubic Feet Per Second
CIA	Cultural Impact Assessment
CO2 EQ	Carbon Dioxide Equivalent
CPR	Condominium Property Regime
CZM	Coastal Zone Management
DOE	Department of Education
DOH	Department of Health
DWS	Department of Water Supply
EA	Environmental Assessment
EB	Eastbound
EPA	Environmental Protection Agency
EV	Electric Vehicle
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Findings of No Significant Impact
FTE	Full Time Equivalent
GET	General Excise Tax
GHG	Greenhouse Gases
GPD	Gallons per Day
HAR	Hawaiʻi Administrative Rules
HCZMP	Hawaii Coastal Zone Management Program
HRS	Hawaiʻi Revised Statutes
KCA	Kihei Community Association
KNXD	Keawakapu Extremely Stony Silty Clay Loam
kWh	Kilowatt Hour
LID	Low Impact Development
LOS	Level of Service
LT	Left Turn
MCC	Maui County Code
MG	Million Gallon
MGD	Million Gallons per Day
MIP	Maui Island Plan
MOA	Memorandum of Agreement
MPC	Maui Planning Commission
MPD	Maui Police Department
mph	Miles per Hour
MSA	Metropolitan Statistical Area
MUTCD	Manual on Uniform Traffic Control Devices
MXC	Makena Loam
NB	Northbound
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System

PD	Planned Development
PEDR	Preliminary Engineering and Drainage Report
PV	Photovoltaic
PVC	Polyvinyl Chloride
DOT	State Department of Transportation
RT	Right Turn
SB	Southbound
SHPD	State Historic Preservation Division
SIHP	State Inventory of Historic Places
SLUC	State Land Use Commission
SMA	Special Management Area
SMAC	South Maui Advisory Committee
TH	Through
TIAR	Traffic Impact Analysis Report
TMK	Tax Map Key
UDRB	Urban Design Review Board
UGB	Urban Growth Boundary
UHMC	University of Hawaiʻi Maui College
USFWS	U.S. Fish and Wildlife Service
WB	Westbound
WCA	Wailea Community Association
WWRD	Department of Environmental Management, Wastewater Reclamation Division

PROJECT OVERVIEW

I

I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE, AND LAND OWNERSHIP

Wailea Resort SF-S Partners LP (hereafter referred to as "Applicant") proposes the development of a residential project and related improvements on approximately 23.1 acres of land at Tax Map Key (TMK) (2)2-1-008:145 (Parcel 145) in Wailea Resort, Maui, Hawai'i. See **Figure 1**. The proposed project is bounded by Kilohana Park and an open space lot owned by the County of Maui to the north, Wailea Alanui Drive and multi-family housing to the west, Kapilii Street to the east, and single-family residential neighborhoods to the south. See **Figure 2**. The project parcel is currently vacant. Access to the project site will be provided from Kapili Street. Parcel 145 is owned by the Applicant.

The project site is designated "Urban" by the State Land Use Commission and "Single-Family" by the Kihei-Makena Community Plan. With respect to the Maui County Zoning, the project site is within the Wailea Resort Planned Development (PD) area and Ordinance No. 2694, which was approved in 1998 by the Maui County Council, conditionally zoned the parcel as "R-3 Residential District". See **Appendix "A"**. It is noted that Ordinance No. 2694 refers to TMK No. (2)2-1-008:115, which was subsequently subdivided into TMK No. (2)2-1-008:115 (a 0.093-acre utility lot) and Parcel 145 in 2001. The project site is also situated within the County of Maui's Urban Growth Boundary (UGB) (as set forth by the Maui Island Plan) and the Special Management Area (SMA).

B. PROPOSED ACTION

The proposed project will consist of 57 single-family residential units, an amenity center, and related infrastructure improvements. The residential units will be developed under a Condominium Property Regime (CPR) with no accessory dwelling units being allowed. The proposed amenity center will include a mail room, barbeque facility, pool and/or hot tub, and other community gathering spaces for residents of the project. Onsite infrastructure improvements include drainage, utilites, landscaping, and access/internal roadway improvements. The proposed action also involves infrastructure improvements, including installation of driveways along Wailea Alanui Drive and Kapili Street and a new pedestrian crossing on Wailea Alanui Drive. See **Figure 3** and **Appendix "B"**.

C. PROJECT SUSTAINABLE DESIGN FEATURES

A comprehensive set of sustainability design features will be implemented as part of the Wailea Resort SF-S Residential Project. The Applicant has organized its sustainable design features around relevant State and County Plans (such as the Aloha+Challenge and Maui Island Plan, respectively), as well as the unique product offering of single-family

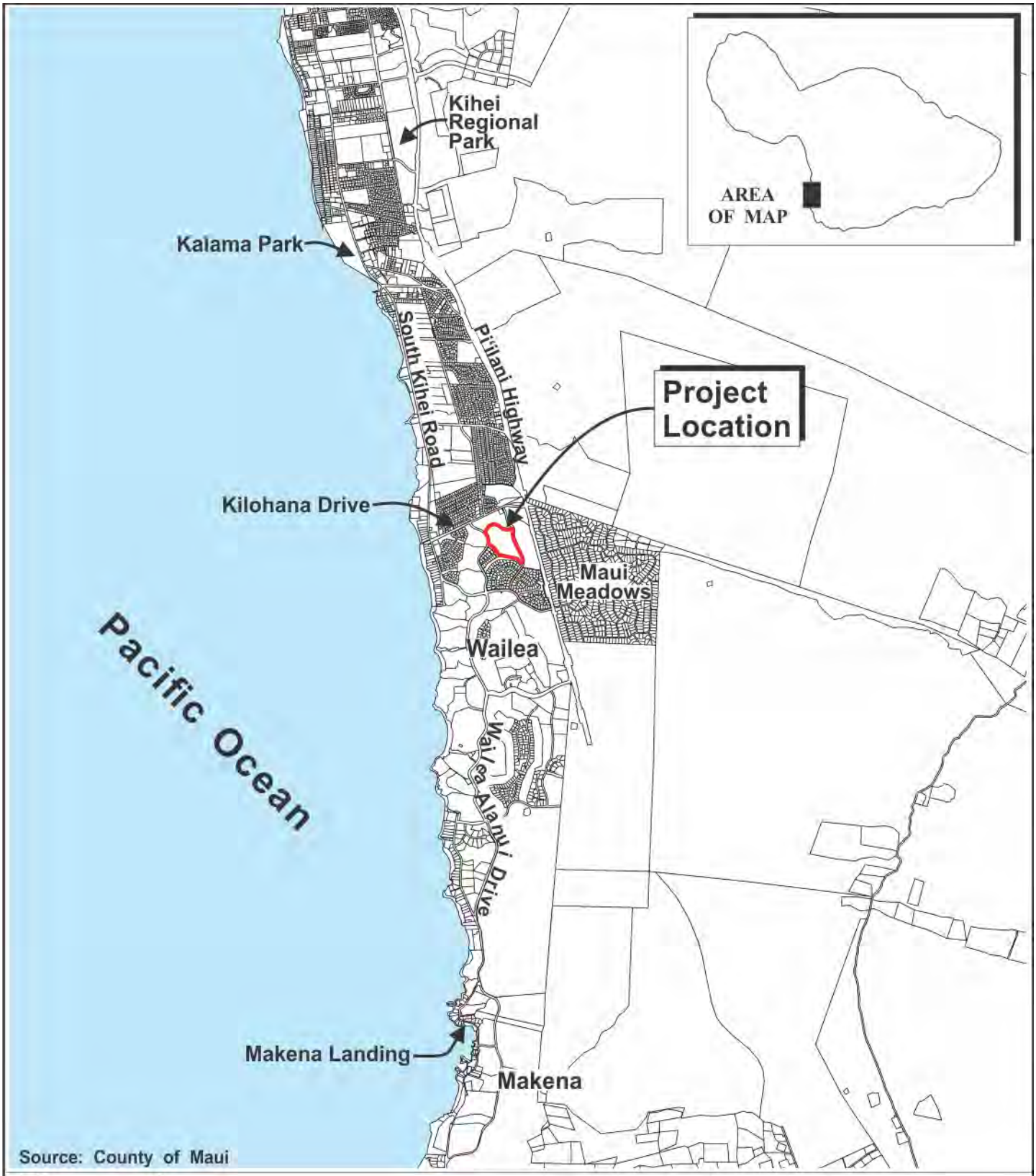


Figure 1

Wailea Resort SF-S Residential Project

Regional Location Map

0 1250 2500 5000 Feet

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor/SF-S Permitting/Applications/Figures/Regional Location

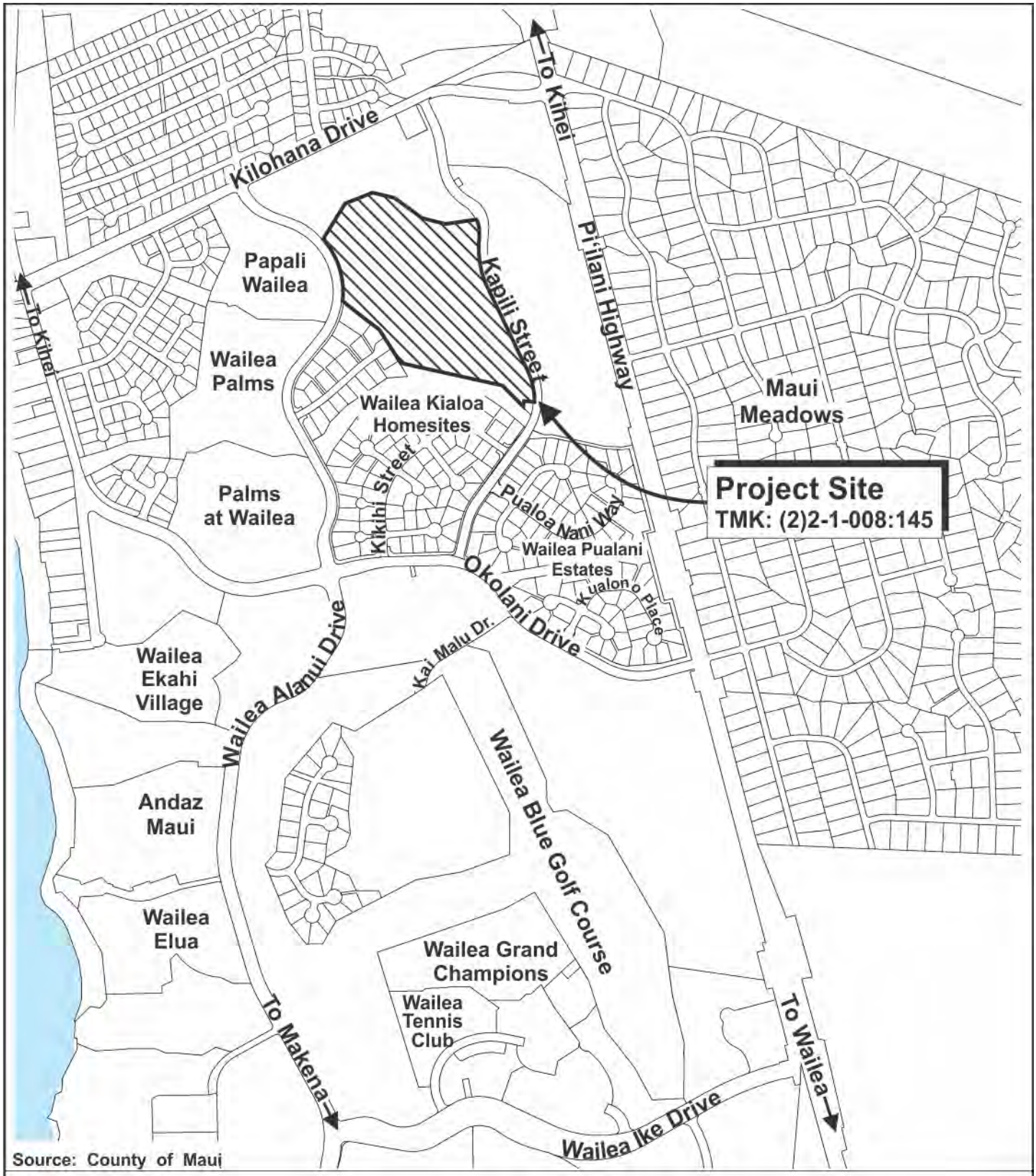


Figure 2 Proposed Wailea Resort SF-S Residential Project

Project Location Map

0 450 Feet
225 900

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor\SF-S PERMITTING\Applications\Figures\Project Location Map

Source: Group 70

Figure 3 Proposed Wailea Resort SF-S Residential Project NOT TO SCALE

Preliminary Site Plan

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor/SF-S Permitting/Applications/Figures/Preliminary Site Plan

homes in a condominium setting. Detailed techniques associated with sustainable development were evaluated by the Applicant for implementation as part of the proposed Wailea Resort SF-S Residential Project through all phases, including site planning and design, construction and development, and operations.

The following four (4) sustainability principles and prospective key features have been established by the Applicant in order to be less resource consumptive and align with sustainable development best practices in the industry:

1. <u>Efficient Use of Resources</u>

- Use of native or drought tolerant plants with a goal of no or low herbicide use
- Ready for future R-1 recycled water hook up and use for common area irrigation
- Onsite construction material recycling and waste minimization through standardization of homes
- Recycling capabilities in each home for pick up by refuse hauler
- Low Impact Design (LID) of stormwater facilities to minimize offsite runoff of pollutants and volume of water flows

2. <u>Low Energy Use</u>

- Rooftop solar photovoltaic (PV)-ready home design and option for homeowners to implement
- Electric Vehicle (EV) charger-ready home design and option for homeowners to implement
- Use of LED lighting and natural lighting in homes
- Use of Energy Star appliances
- Home design to capture natural air flow and minimize air conditioning needs

3. <u>Mobility Flexibility</u>

- Encourage bicycling and walking through road design including multi-modal paths on main roads and shade trees
- Half mile walks to current transit stop or beaches

4. Honoring the History and Native Culture of Maui and South Maui

- Strategic placemaking in project to tell relevant stories through landscaping, rock gardens, etc.
- Informing buyers of history and culture through various methods, including books, art, and design within the Sales Gallery

D. REGULATORY CONTEXT AND CHAPTER 343, HAWAIʻI REVISED STATUTES

As noted above, the proposed Wailea Resort SF-S Residential Project involves infrastructure improvements within Wailea Alanui Drive and Kapili Street. It is noted that Wailea Alanui Drive is a public right-of-way while Kapili Street is a private roadway owned by A&B Wailea LLC. Use of County lands is a trigger for preparation of an Environmental Assessment (EA) pursuant to Chapter 343, Hawaiʻi Revised Statutes (HRS). This EA is being prepared pursuant to both HRS, Chapter 343 and Chapter 11-200.1 Hawaiʻi Administrative Rules (HAR). Accordingly, this document addresses the project's technical characteristics, environmental impacts and alternatives, and advances findings and conclusions relative to the significance of the proposed action. The Approving Agency for the EA is the Maui Planning Commission.

In addition to the EA, compliance with the Hawaiʻi Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, will be required. The subject property is located within the island of Maui's Special Management Area (SMA) and will require a SMA Use Permit. The Rules and Regulations of the Maui Planning Commission, Chapter 202, were established in order to implement Chapter 205A, HRS relating to Special Management Areas. In addition to establishing procedures for processing of SMA applications and procurement of related permits, the rules assist the Maui Planning Commission in giving consideration to State policy regarding coastal zones. As such, the Maui Planning Commission will review the SMA Use Permit application upon completion of the EA process.

The subject property is located within the Wailea Resort Planned Development (PD) area, which is subject to procedural requirements of Maui County Code (MCC), Chapter 19.32. A PD Step II application will be submitted for review and action by the Maui Planning Commission concurrently with the SMA Use Permit application. A PD Step III application will be filed following the SMA Use Permit and the PD Step II approvals.

E. PROJECT DEVELOPMENT SCHEDULE AND COST

It is estimated the proposed construction of the Wailea Resort SF-S Residential Project will cost approximately $130 million.

Construction of the project will commence upon receipt of applicable regulatory permits and approvals. The construction duration of the project is estimated to be approximately four (4) years.

DESCRIPTION OF EXISTING CONDITIONS, POTENTIAL IMPACTS, AND MITIGATION MEASURES

II

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

A. PHYSICAL SETTING

1. Surrounding Land Uses

a. Existing Conditions

The project site is located in the midst of the resort community of Wailea, approximately 0.4 mile inland from the south Maui shoreline. Wailea Resort is a resort destination area consisting of resort-oriented single-family and multi-family units, hotels, commercial uses, and recreational amenities.

Access to the project site is from Kapili Street. On the northside of the project site are Kilohana Park and an open space lot owned by the County of Maui, to the west is Wailea Alanui Drive and existing multi-family housing, to the east is Kapili Street, and to the south are the existing single-family residential neighborhoods. Refer to **Figure 2**.

b. Potential Impacts and Mitigation Measures

The proposed action involves development of vacant land within an established resort area for a residential project which includes 57 single-family condominium residential units, an amenity center, and related infrastructure improvements. The project is compatible with the surrounding resort and residential uses within Wailea Resort and there are no anticipated adverse land use impacts associated with the proposed project.

2. Climate

a. Existing Conditions

The Kīhei coast is generally sunny, warm, and dry the entire year. The average annual temperatures in Kīhei range between the low 70's to the high 80's. The average annual temperature in 2018 was 75.4 degrees Fahrenheit as measured from the nearby Mākena Golf Course. June through August are historically the warmer months of the year, while the cooler months are January to March (Maui County Data Book, 2018).

Average rainfall distribution in the Kīhei-Mākena region varies from under ten (10) inches per year along the coastline to twenty (20) inches per year in the higher elevations. The annual rainfall in the area as measured from the nearby Mākena Golf Course in 2018 was 20.5 inches. Rainfall in the Kīhei-Mākena region is highly seasonal, with most of the precipitation occurring in the winter months (Maui County Data Book, 2018).

Northeast tradewinds prevail approximately 80 to 85 percent of the time. Winds average ten (10) to fifteen (15) miles per hour during afternoons, with slightly lighter winds during mornings and nights. Between October to April, the southerly winds of Kona storms may be experienced (Maui County Data Book, 2018).

b. <u>Potential Impacts and Mitigation Measures</u>

According to the United States Environmental Protection Agency (EPA), the development of cities and suburban areas has a tendency to increase temperatures slightly (a mean increase of up to 5.4 degrees Fahrenheit annually, with a tendency to increase up to 22 degrees Fahrenheit in the evenings) as compared to surrounding natural land cover. This "heat island" effect, as it is often denoted, refers to urban air and surface temperatures that may be higher than nearby rural or undeveloped areas (U.S. Environmental Protection Agency, 2018).

In order to minimize the potential of an elevated heat island profile, a number of landscaping measures are being incorporated into the project plans. For example, shade trees and landscape vegetation will be planted throughout the proposed project to take advantage of the natural cooling effects of shading and the evaporative effects of water from the soil and leaves. Landscape enhancements, including ornamental tree and accent plantings around buildings and throughout the new community, will also provide cooling effects. A minimum of 20 percent of the project area will be maintained as open space. These mitigation measures will serve to offset the potential "heat island" effect of the proposed project. As a result, the proposed action is not anticipated to significantly alter local micro-climates.

3. <u>Topography and Soil Conditions</u>

a. <u>Existing Conditions</u>

The existing topographic conditions of the project area are characterized by moderately sloping lands from east to west at an average grade of approximately 10 percent. Elevations across the site range from 266 feet

at its eastern edge along Kapili Street to 126 feet at its northwestern boundary along Kilohana Park. See **Appendix "C"**.

Underlying the project area is the Keawakapu-Makena soil association. See **Figure 4**. The soil survey of the islands of Kaua'i, O'ahu, Maui, Moloka'i and Lana'i, State of Hawai'i characterizes the soils of this association as gently sloping to moderately steep and well drained (U.S. Soil Conservation Service, 1972). The underlying material is fine-textured to medium-textured subsoil and ranges in depth from shallow to deep and is comprised of fragmental *A'a* lava.

The soil series underlying the project site is Makena loam, stony complex, 3 to 15 percent slopes (MXC) and Keawakapu extremely stony silty clay loam, 3 to 25 percent slopes (KNXD). See **Figure 5**.

MXC is generally found on the lower leeward slopes of Haleakalā, between Mākena and Kama'ole, and consists of Makena loam and stony land. Stony land occurs on the low ridges and makes up 30 to 60 percent of the complex. Makena loam is a dark brown to dark yellowish brown well drained soil, developed from volcanic ash, and is usually located between the low ridges of stony land. Makena loam is characterized by a relatively high permeability, and a low shrink swell potential. Permeability on stony land is very rapid.

KNXD is generally found on upland areas on the island of Maui. These soils are dark reddish brown in color and were developed in volcanic ash. KNXD is characterized by moderate permeability and a low shrink-swell potential.

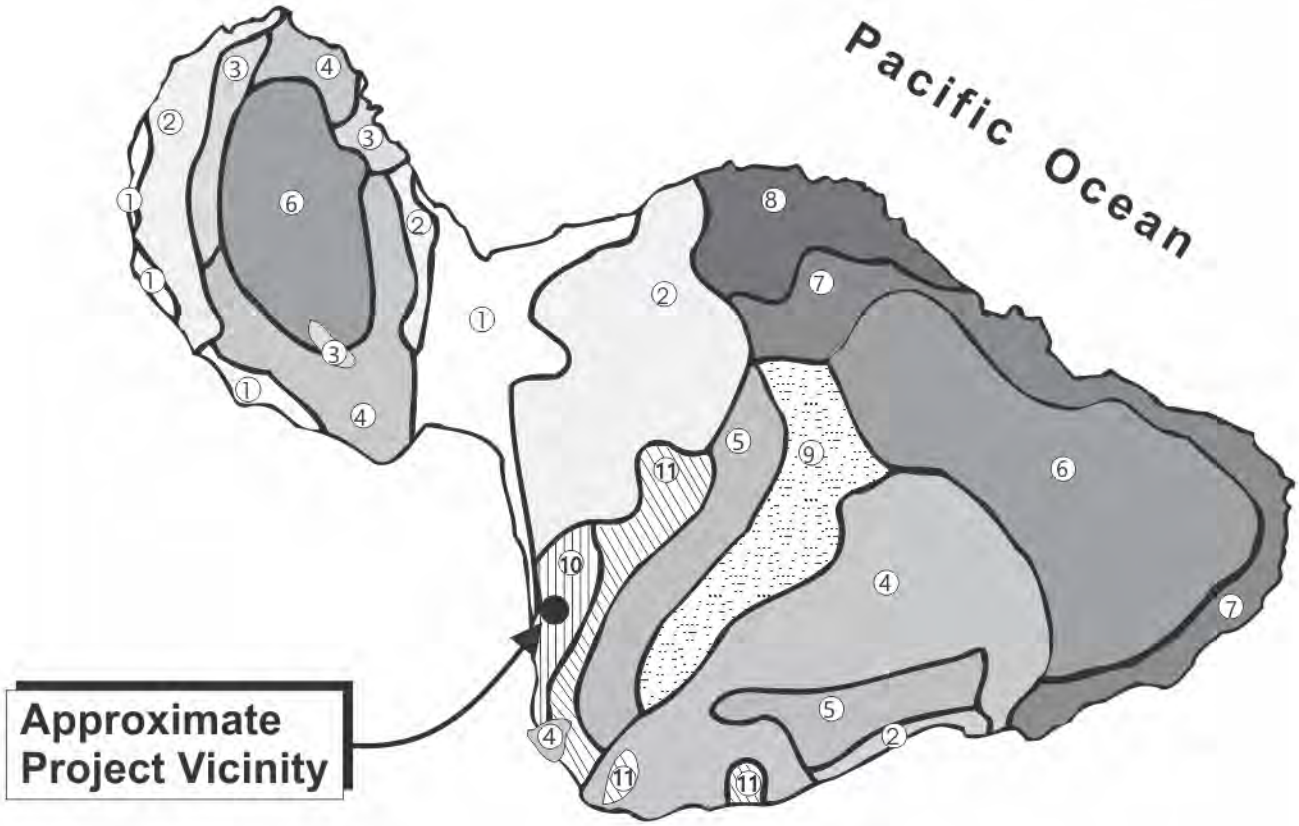
Highly vesicular basalt with an irregular and spiny surface, referred to as *A'a* lava, underlies both soil types at depths of usually less than about five (5) feet.

b. <u>Potential Impacts and Mitigation Measures</u>

The proposed project is compatible with the site's underlying soil characteristics. The project site will be graded so as to respect the natural form of the hillside, and maintain the drainage pattern that now exists. To control runoff, sedimentation, and erosion during construction a comprehensive program of Best Management Practices (BMPs) will be implemented in accordance with applicable provisions of the Maui County Code (MCC) and Drainage Rules of the Department of Public Works. Following construction, a comprehensive drainage system will be implemented, consisting of a combination of Low Impact Development

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



Source: USDA Soil Conservation Service

Figure 4 Proposed SF-S Residential Project

Soil Association Map

NOT TO SCALE

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor/SF-S Permitting/Applications/Figures/Soil Association

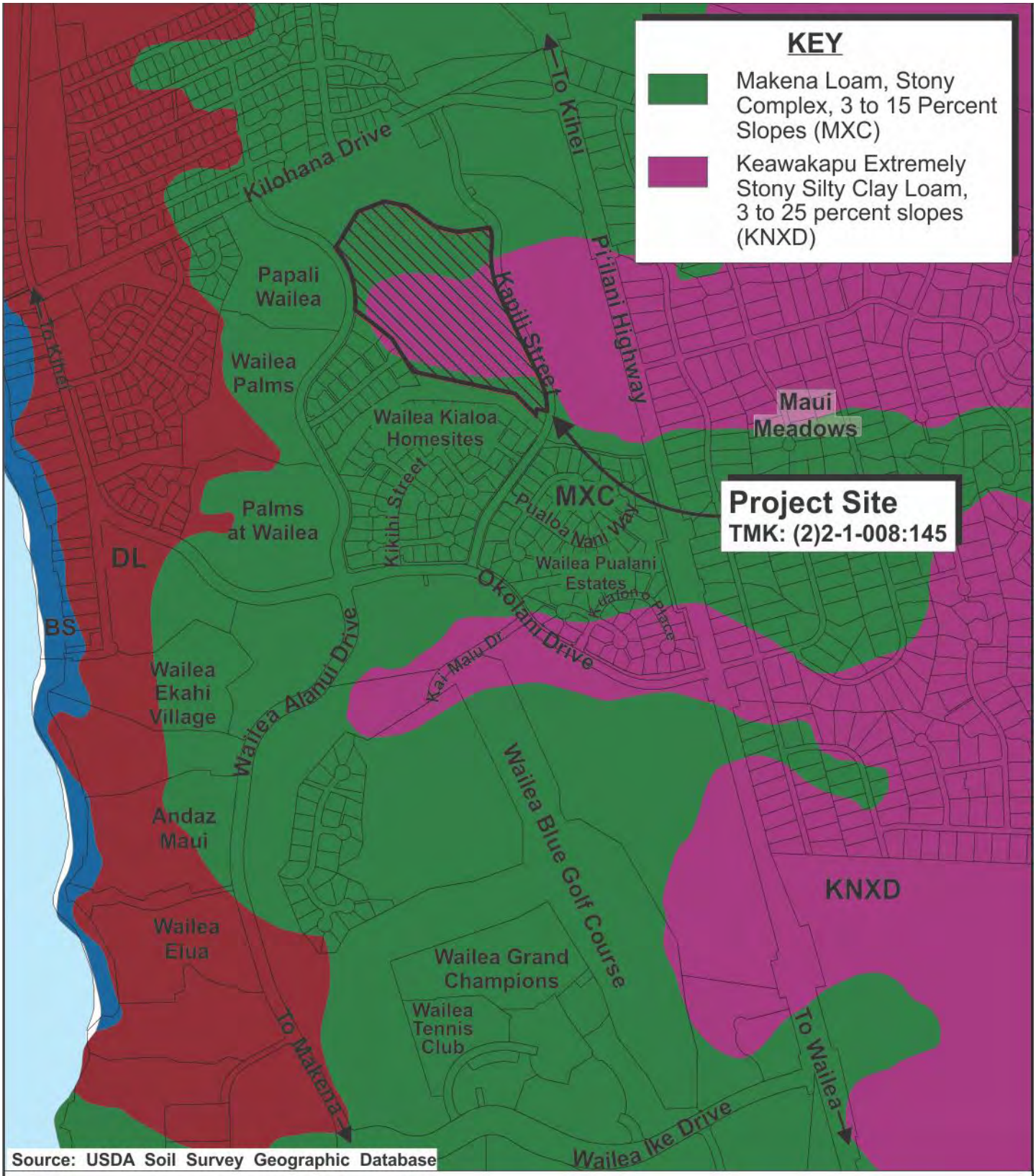


Figure 5 Proposed Wailea Resort SF-S Residential Project

Soil Classification Map

0 450 Feet
225 900

MUNEKIYO HIRAGA

Prepared for: Wailea Resort SF-S Partners LP

Ledcor\SF-S PERMITTING\Applications\Figures\Soil Class

(LID) measures, such as bioretention strips, and a conventional drainage system consisting of inlets and underground pipes. With implementation of the mitigation measures, the post-development runoff (for the 10-year, 1-hour storm) will be less than or equal to the pre-development condition. Refer to **Appendix "C"**.

An application for a National Pollution Discharge Elimination System (NPDES) permit for construction will be submitted to the State Department of Health (DOH) for review and approval prior to start of construction.

With implementation of the foregoing mitigation measures, the proposed action is not anticipated to involve significant adverse impacts on topography and soil parameters.

4. Streams and Wetlands

a. Existing Conditions

There are no streams or wetlands located within the project site. An unnamed stream is located approximately 0.25 mile south of the project site near Okolani Drive in the Wailea Pualani Estates Subdivision, which eventually exits into the ocean at Keawakapu Beach Park. There are no wetlands in the vicinity of the project site.

b. Potential Impacts and Mitigation Measures

The proposed project will not present any significant adverse impacts on streams or wetlands in the region.

As mentioned previously, a program of BMPs will be implemented to manage potential impacts from runoff during the construction period. Following construction, a comprehensive drainage system will be implemented to retain the increase in post development runoff (for the 10-year, 1-hour storm) generated by the proposed project. Refer to **Appendix "C"**.

5. Flood and Tsunami Hazards

a. Existing Conditions

According to the Flood Insurance Rate Maps, the project site is located in Flood Zone X (unshaded), areas of minimal flood hazard determined to be

outside the 0.2 percent annual chance floodplain. See **Figure 6**. Further, the project site is located approximately 0.4 mile inland from the nearest shoreline and outside of the tsunami evacuation zone or extreme tsunami evacuation zone. See **Figure 7**.

b. Potential Impacts and Mitigation Measures

There are no restrictions on development associated with the Flood Zone X (unshaded) designation. The project site is located outside of the tsunami evacuation zone and extreme tsunami evacuation zone. As such, no impacts on these parameters are anticipated with project implementation.

6. Sea Level Rise

a. Existing Conditions

Due to Hawai‘i’s location in the Pacific, it is often faced with risks due to extreme weather events. Changing climatic patterns caused by global warming result in impacts, including rising sea levels, storm surge, increased flood potential, and beach erosion for oceanfront and shoreline parcels. A 3.2-foot rise in sea level is projected for the Hawaiian Islands by the mid to latter half of the 21st Century based on the findings of the Hawai‘i Sea Level Rise Vulnerability and Adoption Report that was prepared in 2017 by the Hawai‘i Climate Change Mitigation and Adoption Commission. The project site is located outside (inland of) the projected 3.2-foot sea level rise exposure area for Wailea. See **Figure 8**.

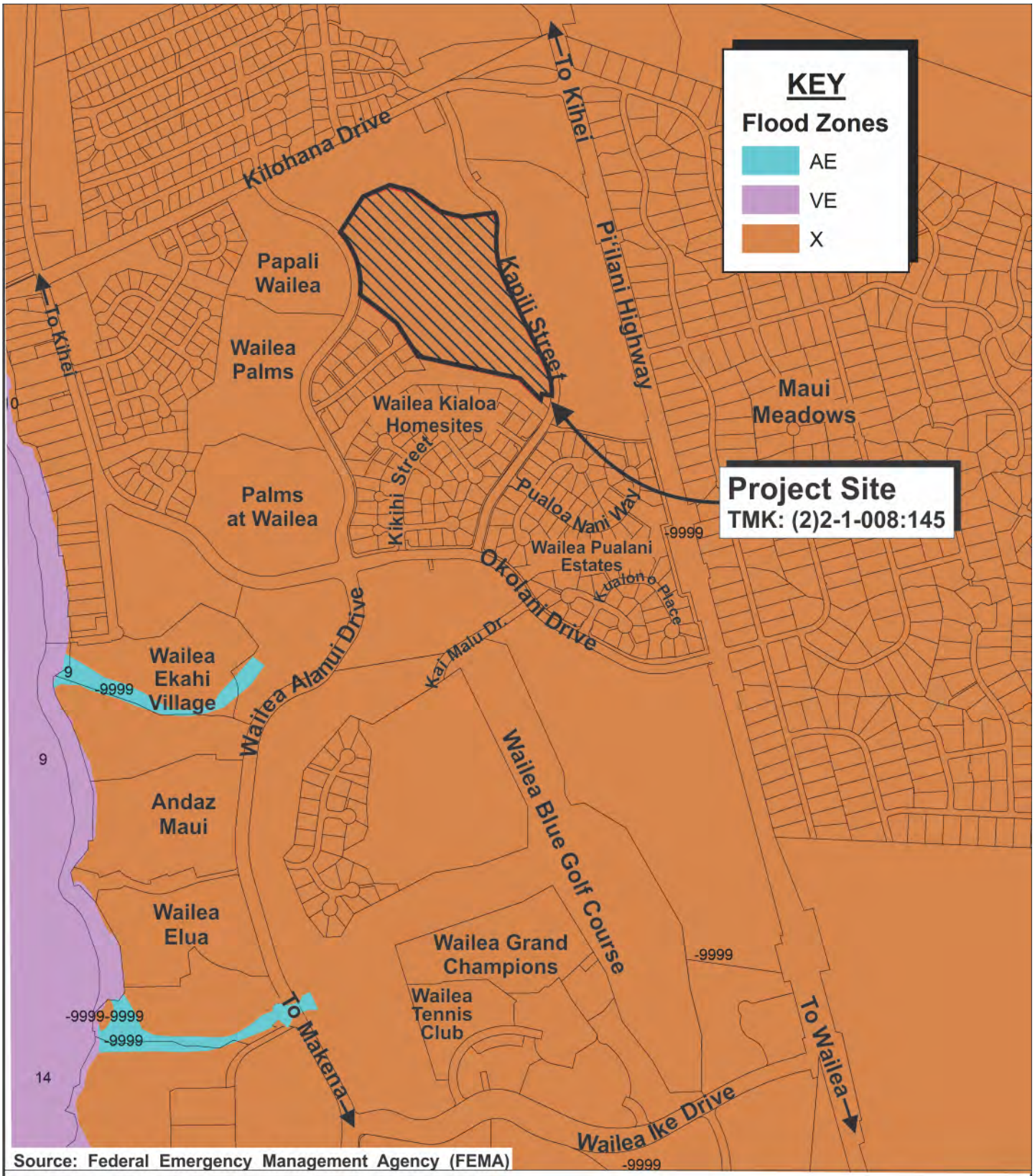
b. Potential Impacts and Mitigation Measures

Due to the site’s location mauka of Wailea Alanui Drive and inland of the 3.2-foot sea level rise exposure area, there are no anticipated impacts with regards to sea level rise inundation for the proposed project. Refer to **Figure 8**.

7. Flora and Fauna

a. Existing Conditions

A Biological Resources Survey has been completed for the project site in May 2019 by Robert W. Hobdy. See **Appendix “D”**. No federally listed threatened, endangered, or candidate endangered plant species were observed within the project site. Vegetation on the project site was



Source: Federal Emergency Management Agency (FEMA)

Figure 6

Proposed Wailea Resort SF-S Residential Project

Flood Insurance Rate Map

0 225 450 900 Feet

MUNEKIYO HIRAGA

Prepared for: Wailea Resort SF-S Partners LP

Ledcor\SF-S PERMITTING\Applications\Figures\FIRM

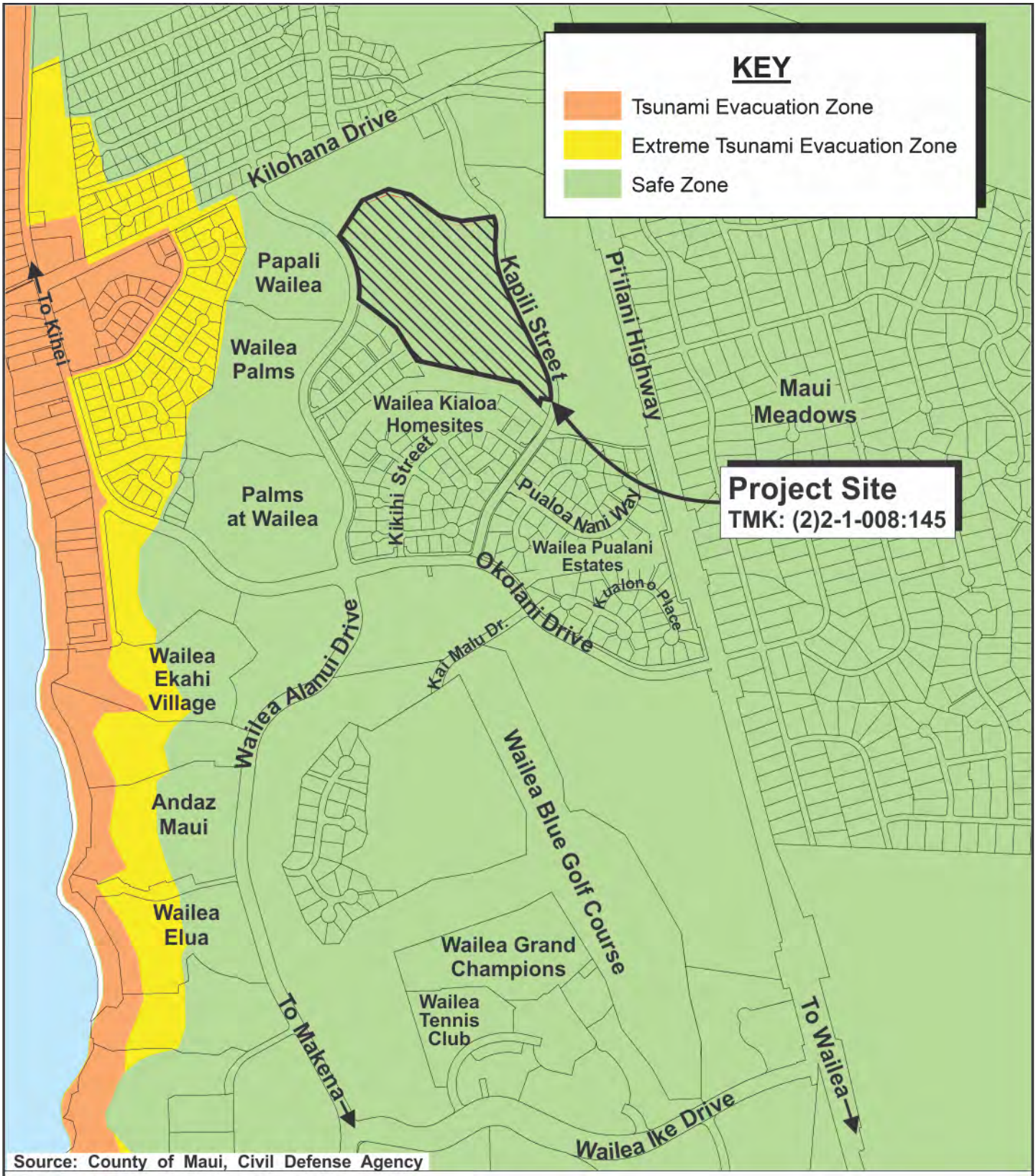


Figure 7 Proposed Wailea Resort SF-S Residential Project

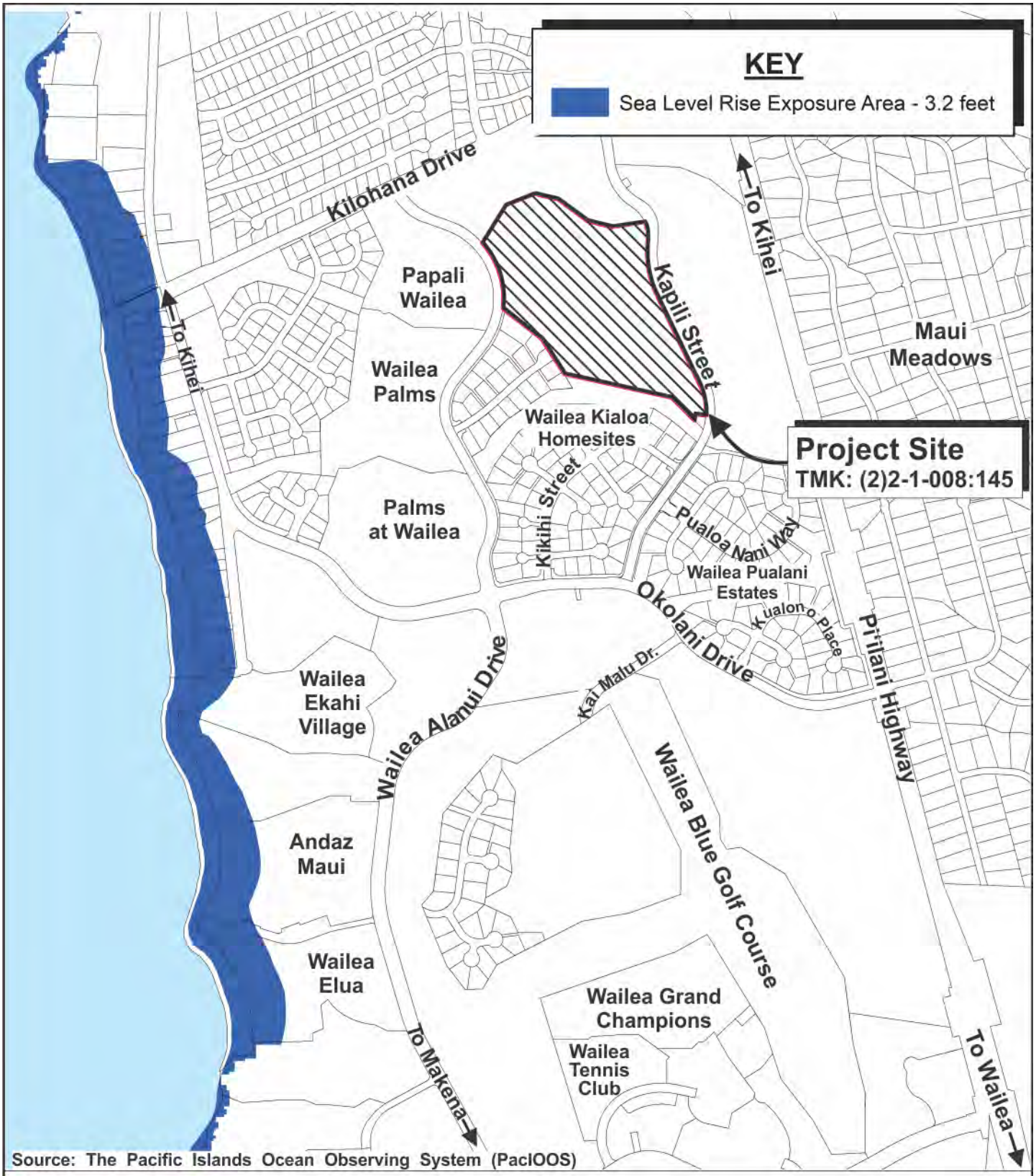
Tsunami Evacuation Map

0 450 Feet
225 900

MUNEKIYO HIRAGA

Prepared for: Wailea Resort SF-S Partners LP

Ledcor\SF-S PERMITTING\Applications\Figures\Tsunami



Source: The Pacific Islands Ocean Observing System (PacIOOS)

Figure 8

Proposed Wailea Resort SF-S Residential Project

Sea Level Rise Exposure Area Map

0 425 Feet
212.5 850

MUNEKIYO HIRAGA

Prepared for: Wailea Resort SF-S Partners LP

Ledcor\SF-S PERMITTING\Applications\Figures\Sea Level Rise

predominantly non-native in character. A total of 15 plant species were recorded of which two (2) species are native, the ʻilima (*Sida fallax*) and ʻuhaloa (*Waltheria indica*). These two (2) native species are widespread and common throughout the dry areas in Hawaiʻi.

Just one (1) non-native mammal species was observed during two (2) site visits in the project area. Axis deer (*Axis axis*) were common in the area. A herd of ten animals were seen, and their trails, tracks, droppings, and signs of feeding were found. Other animals that can be expected in the area are mice (*Mus dometicus*), rats (*Rattus spp*), mongoose (*Herpestus auropunctatus*), domestic cats (*Felis catus*), and domestic dogs (*Canus femiliaris*). Although special effort was made to look for the Hawaiian hoary bat by making an evening survey at two (2) locations in the area with a bat detecting device, no bats were detected.

Birdlife was moderate in species and in total numbers in this dry habitat. Ten species of non-native birds were observed on the project site. Three (3) species were common, the zebra dove (*Geopelia striata*), the mourning dove (*Zenaida macroura*), and the gray francolin (*Francolinus pondicerianus*). Less common were the spotted dove (*Streptopelia chinensis*), the common myna (*Acridotheres tristis*), and the African silverbill (*Lonchura cantans*). Four (4) other species were of rare occurrence. No native birds were observed in or around the project site.

Two (2) species of non-native lizards were observed, the garden skink (*Lampropholis delicata*) and the mourning gecko (*Lepidodactylus lugubris*).

One non-native snail species, the giant African snail (*Achatina fulica*), was seen in the project site.

Insect life was modest in the project site. Seven (7) non-native species of insects were observed on the project site. Two (2) species were common, the short-horned grasshopper (*Oedaleus abruptus*) and the dung fly (*Musca sorbens*). Less common was the monarch butterfly (*Danaus plexippus*). Four (4) other species were of rare occurrence.

b. <u>Potential Impacts and Mitigation Measures</u>

The Biological Resources Survey concluded that the vegetation in the area is dominated by non-native plants, and because there are no endangered or threatened species within the area, there are no serious concerns regarding disturbances or losses of critical native botanical resources.

The fauna species recorded during the survey, including all mammals, birds, reptiles, mollusks, and insects, were entirely non-native species that are of no conservation concern.

While not detected during the survey, the Hawaiian hoary bat could occasionally occur in this habitat. These bats are highly mobile and move around to take advantage of spikes in insect activity that provide the food they depend on. The U.S. Fish and Wildlife Service (USFWS) has federal jurisdiction over these bats under provisions of the Endangered Species Act (1973) and provided comments as part of the Chapter 343, Hawai‘i Revised Statutes (HRS) early consultation process for the project. Based on the recommendation by the USFWS, woody plants greater than 15 feet tall will not be disturbed, removed, or trimmed during the bat birthing and pup-rearing season (June 1 through September 15). Further, barbed wire for fencing will not be used within the project site.

Seabirds, such as the endangered dark rumped petrel (*Pterodroma phaeophygia sandwichensis*) and the wedge-tailed shearwater (*Puffinus pacificus chlororhynchus*), nesting on Haleakalā and the coastal sites of Wailea Point and Molokini, may traverse the project site at night. These birds can become attracted to and confused by bright lights, crash and be killed by vehicles and cats and dogs that find them. Based on the recommendation by the USFWS, any outdoor lighting, particularly when used during each year’s peak fledgling period, could result in seabird disorientation, fallout, and injury or mortality. As such, any outdoor lighting within the project site will be hooded to direct the light downward.

‘Aiea, or tree tobacco, which could be host plants for Blackburn's sphinx moth, were not found during the Biological Resources Survey. Based on the recommendations by the USFWS, all tree tobacco less than three (3) feet tall will be removed if found and the Applicant and/or its contractor will monitor the site every four (4) to six (6) weeks for new tree tobacco growth before, during, and after the proposed ground-disturbing activity.

With implementation of the above noted mitigation measures, significant adverse impacts to flora and fauna resources are not anticipated as a result of the proposed project. Refer to **Appendix “D”**.

8. Air Quality

a. Existing Conditions

There are no point sources of airborne emissions in the immediate vicinity of the project site. The air quality in the Wailea area is considered good with existing airborne pollutants attributed to automobile exhaust from the region's roadways. The closest Department of Health air monitoring site is located at the Hale Piʻilani Park which is located in Kīhei, approximately 5.5 miles to the north. Particulate matter associated with cane burning ceased at the end of 2016 with the closure of sugar cane operations on Maui. Available data indicates that pollutant levels are significantly below the applicable State standards (State of Hawaiʻi, Department of Health, 2019).

b. Potential Impacts and Mitigation Measures

Implementation of the project would involve potential for impacts from dust generated by short-term construction-related activities. Site work, such as clearing, grubbing, grading, and utilities and roadway improvements, for example, will generate wind-blown particulates. A comprehensive BMP plan will be developed and implemented for the construction phase of the project. Examples of mitigation measures include the use of dust control measures, such as regular watering and sprinkling, installation of dust screens, and timely revegetation of graded areas.

Once construction is completed, project-related vehicular traffic will generate automotive emissions. Bicycling and walking will be encouraged for residents and visitors of the proposed community by road design, including installation of multi-modal paths on the main project spine road, which will connect to Wailea Alanui Drive and Kapili Street, and installation of shade trees. Given the density and use characteristics associated with the project, the proposed new community is not anticipated to present significant adverse impacts which would detrimentally affect local and regional ambient air quality conditions.

9. Greenhouse Gas Emissions

a. Existing Conditions

Greenhouse gases (GHG) (carbon dioxide, methane, nitrous oxide and fluorinated gases) trap heat in the earth's atmosphere. In the context of climate and ocean warming, increases in levels of atmospheric GHG have been attributed to human activity (IPCC, 2017). Within the State of Hawaiʻi, the energy sector (including fossil fuel burning to produce electricity,

transportation, waste incineration, and natural gas systems) is identified as the source of 89.7 percent of GHG emissions (Hawaii Department of Health, 2019). Other sources of GHG emissions include industrial facilities, agriculture and forestry, and waste treatment such as landfills, composting, and wastewater treatment.

The Federal Greenhouse Gas Reporting Program (40 CFR Part 98) requires mandatory reporting of GHG emissions from sources that emit 25,000 metric tons or more of carbon dioxide equivalent (CO2 EQ) per year in the United States. Categories of use which are generally associated with this level of reporting include power plants, petroleum and natural gas systems, refineries and other heavy manufacturing processes. On Maui, facilities operating at or above the 25,000 metric ton level include Maui Electric Company's Kahului Power Plant, Maalaea Power Plant, and the Central Maui Landfill (U.S. EPA, 2017).

b. <u>Potential Impacts and Mitigation Measures</u>

The proposed action involves the development of 57 single-famiy residential condominium units and related improvements. GHG emissions are anticipated during and after the construction phase of the project. The average energy use per household in Maui County is 581 kilowatt hour (kWh)/month (Hawaii Energy, 2017). This corresponds roughly to production of 4.9 metric tons of CO2 EQ per year (U.S. EPA, 2018). It is noted that homes within the SF-S Residential Project will incorporate sustainable design features to reduce overall energy consumption and GHG emissions per square foot in accordance with the project's overall guiding sustainability principles. The sustainable design features include rooftop solar photovoltaic (PV)-ready and Electric Vehicle (EV) charger-ready home designs, use of LED and natural lighting, use of Energy Star certified appliances, and home designs to capture natural air flow to minimize air conditioning needs. Energy Star is a program run by the EPA and the U.S. Department of Energy that promotes energy efficiency.

Based on the foregoing, GHG emissions from the proposed project will be far below the GHG reporting threshold and are not anticipated to be significant.

10. Noise

a. Existing Conditions

The project site is situated within the resort community of Wailea and adjacent to Piʻilani Highway. Sources of ambient noise include wind, local vehicular traffic, golf course, and resort activities.

b. Potential Impacts and Mitigation Measures

Ambient noise conditions will be temporarily impacted by construction activities. Heavy construction equipment and possible vibrations for construction activities would be the dominant source of noise during construction. Equipment mufflers or other noise attenuating equipment, as well as proper equipment maintenance, will be used during construction activities in order to mitigate potential impacts to ambient noise conditions in the vicinity. Also, construction activities are anticipated to be limited to daytime working hours. The contractor for the project will be required to comply with the maximum allowable noise levels for stationary equipment established by Hawaiʻi Administrative Rules (HAR), Chapter 11-46, "Community Noise Control". Should a community noise permit be required, said permit will be obtained prior to the commencement of construction.

Once completed, the proposed project is not anticipated to detrimentally affect ambient noise levels.

11. Scenic and Open Space Resources

a. Existing Conditions

In proximity to the project site, the lands makai (west) are predominantly developed with residential, commercial/retail, and hotel, and defined by the built up urban landscape of Wailea. The lands mauka (east) of the project site are characterized by a vacant lot and beyond Piʻilani Highway and the rural residential single-family subdivision of Maui Meadows. The Pacific Ocean, the island of Kahoʻolawe, and the West Maui coastline may be visible from selected points within the project site.

b. Potential Impacts and Mitigation Measures

The proposed project has been designed to complement and enhance existing development within the Wailea Resort. Particular attention has been given to the placement of buildings during the design process to arrive at a site plan that the Applicant believes is both design sensitive and place

appropriate to the Wailea community. In particular, the project provides open space relief, landscaping, and building forms to complement existing residential and commercial developed properties and the surrounding environment.

It is noted that all lands in the Wailea Resort, including the subject property, are in a Planned Development (PD) governed by MCC Section 19.32. The preliminary plans for the proposed project have been developed to meet the Planned Development Standards as set forth in Section 19.32.030 of the MCC and the project area will retain approximately 20 percent of open space.

The site plan has been carefully designed to allow for makai view corridors from Kapili Street and mauka view corridors from Wailea Alanui Drive and to create a new residential community that integrates with its surrounding resort residential environment. The View Analysis of the proposed architectural concept of the project provides 3-dimensional "before" and "after" perspectives of the proposed new community from public vantage points located around the project site. Refer to **Appendix "B"**. As documented by the view studies, the proposed project is not anticipated to substantially affect scenic vistas and view planes.

12. Archaeological Resources

a. Existing Conditions

An Archaeological Inventory Survey (AIS) was prepared by Scientific Consultant Services. See **Appendix "E"**. The AIS followed a work plan approved by the State Historic Preservation Division (SHPD) in March, 2020. The objective of the AIS was to identify and document historic properties, to gather sufficient information on these properties, to evaluate the significance of any newly identified historic properties, to determine the project effect on these properties, and to advance appropriate mitigation recommendations to address potential adverse effects.

It is noted that two (2) AIS reports were previously conducted in the project area. These previously completed studies informed the formulation of the approved work plan. From a methodological standpoint, the AIS encompassed a full pedestrian survey of the project area, locating and assessing previously identified sites, recording of newly identified sites, and mapping of each feature in the project areas. Manual testing was conducted at select features to provide a distribution of site types and function. The results of the AIS are presented below.

As a general finding, the AIS notes that archaeological features within the project area have not been well-preserved. This assessment is attributed to past mechanical alterations associated with World War II training activities, baseyards, and firebreaks. The AIS further concludes that most features appear to be surviving remnants due to prior earth-moving and landscape-altering, thereby retaining only a fraction of their original extent.

The AIS identified seven (7) temporary sites consisting of 12 features. The AIS reports that seven (7) features are associated with the pre-contact/early historic period and exhibit traditional Hawaiian architecture. These features, consisting of four (4) modified outcrops, two (2) linear mounds, and one (1) L-shape, were determined to be related to an agricultural function. These features were combined into a single site landscape as State Inventory of Historic Places (SIHP) 50-50-14-8709 based on their similar construction style and function.

Three (3) military-related features were also documented and included in a single site landscape as SIHP 50-50-14-8710. These features consisted of roughly stacked basalt in one (1) to two (2) courses forming C and U shapes and are similar in construction style to those found throughout the Makena area. The AIS noted that military construction in the project area could have potentially adversely impacted earlier pre-contact/early historic sites, thus making it difficult to determine pre-World War II activities in the project area.

Two (2) boundary features were associated with historic ranching and identified as part of SIHP 50-50-14-4791, which was previously documented in the two (2) AIS reports undertaken in the project area. This site consists of a wall measuring about 29 meters in length. The western segment of the wall is badly collapsed while the eastern portion of the wall is intact. The AIS notes that additional fieldwork and research suggest that this wall is part of a larger wall which continued upland, east of Piʻilani Highway.

b. <u>Potential Impacts and Mitigation Measures</u>

All sites identified and documented during the AIS process were assessed for significance in terms of the five (5) criteria of the Hawaiʻi State Register of Historic Places set forth by Section 13-275-6, HAR. These criteria are as follows:

<u>Criterion A:</u> Site is associated with events that have made a significant contribution to the broad patterns of our history.

Criterion B: Site is associated with the lives of persons significant to our past.

Criterion C: Site is an excellent site type; embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value or that represent a significant and distinguishable entity, whose components may lack individual construction.

Criterion D: Site has yielded or has the potential to yield information important to prehistory or history.

Criterion E: Site has cultural significance to an ethnic group; examples include religious structures, burials, major traditional trails, and traditional cultural places.

Given its construction detail, state of preservation and association with early historic land use and possible political demarcation, SIHP 50-50-14-4791 is assessed to be significant under Criterions A, C and D. No further work is recommended for the three (3) features of Site 50-50-14-4791.

SIHP 50-50-14-8709 and -8710 described above are determined to be significant under Criterion D. No further work is also recommended for these sites. The AIS concludes that these sites are in marginal condition and provide limited further value for archaeological research. Refer to **Appendix "E"**. Based on the foregoing, it is not anticipated that the proposed project would result in significant adverse impacts to archaeological resources.

13. Cultural Resources

a. Existing Conditions

A Cultural Impact Assessment (CIA) for the proposed project was prepared by Aina Archaeology. See **Appendix "F"**. The geographic scope of the CIA encompassed the ahupuaʻa of Paeahu. In keeping with the Office of Environmental Quality Control's guidelines for the preparation of CIAs, it was the objective of this study to gain an understanding of traditional cultural practices within the study area and to identify any potential effects on these practices which may occur as the result of project implementation.

The ahupuaʻa of Paeahu is situated within the moku or district of Honuaʻula. Paeahu traditionally included offshore fishery, which encompassed the shoreline and bays from Keawakapu to Halo. The kula lands (open plain

lands), where agricultural activities were undertaken, and the region in which the proposed action is located, extends towards the mauka extent of the ahupuaʻa.

The CIA establishes the context for Paeahu's cultural historical background with documentation of the traditions of the Paeahu region prior to Western arrival. This background explores the value of place names in interpreting cultural practices. As well, the CIA documents moʻolelo (traditional stories) and their role in explaining the creation of lands and resources. The CIA describes the traditional Hawaiian settlement of the Paeahu ahupuaʻa and its relationship to resource (e.g., water and land) utilization. Finally, the CIA reviews the history of the region, including post-contact milestones, up to the modern era.

All of the above establishes the context for understanding cultural practices at Paeahu, thereby enabling the formulation and implementation of a sound CIA methodology.

b. <u>Potential Impacts and Mitigation Measures</u>

The methodological framework for conducting a CIA begins with an outreach program which identified individuals with knowledge of the traditional cultural practices within and adjacent to the proposed project area. In this regard, Aina Archaeology initiated contact with government agencies, advisory councils, local community organizations, traditional cultural practitioners, as well as kamaʻaina and kupuna with generational ties to the project site.

Scoping letters were sent to 20 individuals with diverse backgrounds. This step in the process allowed for the identification of individuals who were willing to be interviewed as part to the information gathering phase of the analysis. As a result of the outreach process, interviews were conducted with four (4) individuals.

Based on the testimony of Land Commission kuleana claims, information gathered during the CIA's background research and information provided by the interviewees, the CIA concludes that Paeahu functioned in the typical traditional sense, with a focus on marine resource gathering in off-shore waters and along the coastline, as well as cultivation of kula ʻuala (potato), maia (banana), and kalo (taro). The CIA states that while traditional Hawaiian archaeological sites and features associated with traditional and potentially historical agriculture were noted within the project area, there were no currently active traditional and customary practices identified in association with resources in the study area.

Notwithstanding, the CIA's recommendations and the Applicant's proposed mitigation measures are summarized as follows:

1. Consult with those who participated in the CIA process, as well as some of those who may have declined at this time, be undertaken by the project proponent in order to understand how the moʻolelo (stories) of this land might be preserved and shared, either through physical preservation of the previously identified historic properties related to traditional Hawaiian land use and incorporated into the design of the project, or through interpretation to retain and return a sense of place that opens up access to the area for the local native Hawaiian families and generations to come.

2. Consult with Aha Moku O Maui and those who participated in this study, on traditional place names that could be incorporated into materials, as well as the overall project name as a means to honor Hawaiian space and restore the knowledge of place that is inherent in *wahiʻinoa*.

3. Incorporate native plants suitable to the leeward environment of Paeahu, as shown in **Table 1** into the landscaping palette to foster and support lāʻau lapaʻau (traditional medical) practices and provide resources for hana noʻeau (art) practices.

Table 1. Native Plants Suitable for Paeahu

Resource	Traditional Use
Moʻo (Gossyplum sp.)	*Kapa* dyes and scenting
ʻIlima (sida fallax) (observed within the current project area	*Lei* making
Noni (Morinda citrifolia)	*Lāʻau lapaʻau*
Kukui (Aleurites molucanna)	Fruit and nut: Traditional tattooing ink, traditional light source, *waʻa* (canoe) manufacture, food resource.
Pili	House thatching and other household uses (e.g. tinder, floor padding, etc.) Burnt leaves and stalks: dyes and *lāʻau lapaʻau*
ʻUhaloa (Walterhia indica)	*Lāʻau lapaʻau*
ʻAʻaliʻI (Dodonaea viscosa)	Wood: posts for traditional hale construction and fishing implements Capsules and Leaves: *Lei* making Leaves: *Lāʻau lapaʻau*

4. Reduce light pollution by exceeding the lighting standards of the Wailea Resort to assist with reducing seabirds fallout due to disorientation related to artificial lighting and maintain the visibility of the night sky.

5. Identify potential runoff and flooding zones within the project area to ensure proper maintenance of water channels in order to help minimize coastal resource degradation that may result from flooding.

6. Reduce stormwater runoff by using Low Impact Design (LID) measures and green infrastructure methods to capture, collect, and retain stormwater, as well as potentially remove pollutants in any stormwater runoff that might eventually enter the ocean through the project area.

It is noted that various sustainability strategies will be undertaken as part of the project to educate new residents of the proposed residential community and honor the native Hawaiian history and culture in accordance with the project's overall guiding sustainability principles. The proposed sustainability strategies include strategic placemaking to tell relevant stories and informing new residents of native Hawaiian culture through books, art, and design.

With implementation of the mitigation measures discussed above, the proposed project is not anticipated to present significant adverse impacts on cultural resources. Refer to **Appendix "F"**.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Regional Setting

a. Existing Conditions

From a regional standpoint, the project site is located within the Kihei-Makena Community Plan region which encompasses the area from Māʻalaea in the north to La Perouse Bay in the south. This region contains a diverse range of physical and socio-economic environments. With its dry and mild climate and proximity to recreation-oriented shoreline resources, the visitor-based economy has grown steadily over the years. The town of Kīhei serves as the commercial and residential center of the region with the master-planned communities of Wailea and Mākena serving as the focal

point for visitor activities. A number of internationally recognized hotels and golf courses are located along the coastline at Wailea and Mākena.

b. Potential Impacts and Mitigation Measures

The proposed project is compatible with the surrounding resort-related and residential land uses. The regional character of the Wailea and Mākena areas will be complemented by the proposed action. Project design parameters have taken into consideration architectural and landscape thematic concepts which will advance consistency with the area's built environment.

2. Population and Demography

a. Existing Conditions

According to Gale Cengage Learning, which provides demographic data based on the 2000 and 2010 Census and provides current and future year estimates for various geographic areas, the resident population of the County of Maui was 154,834 in 2010 and was estimated to be 164,872 in 2019. This represents a 6.5 percent increase over the past nine (9) year period. By 2024, the population of the County of Maui is projected to reach approximately 169,217 (Gale Cengage Learning, 2020).

The project area is located on the southwestern part of Maui, within the Kihei-Makena Community Plan region. Just as Maui County's population has grown, the resident population of the Kīhei-Mākena region has also increased. The population of the Kīhei-Mākena region (including Kīhei, Mākena, Wailea Census Designated Places (CDP)) is estimated to be 28,215 in 2019 (Gale Cengage Learning, 2020), comprising 17.1 percent of the County's population. According to the 2010 Census, the resident population of the Kīhei-Mākena region was 26,917. The resident population for this region in 2019 increased by 4.8 percent since 2010. By 2024, the population for the region is projected to reach approximately 28,590 (Gale Cengage Learning, 2020).

b. Potential Impacts and Mitigation Measures

As a resort community, the expected buyer demographic profile includes local residents, with the majority of buyers being from off-island. Based on the Applicant's experience in developing similar projects, it is anticipated that approximately 90 percent of the single-family condominium units will be utilized as part-time residences.

In terms of housing, the Wailea Resort SF-S Residential Project proposes 57 single-family residential condominium units. The Applicant recognizes the need for affordable housing on Maui and is committed to meeting its workforce housing obligations for this project, in full compliance with the applicable County requirements. Under the County's Residential Workforce Housing Policy (Chapter 2.96, MCC), developers are required to provide residential workforce housing units equivalent to at least 25 percent of the total number of market rate units. The proposed project will utilize residential workforce housing credits, which were acquired from A&B Wailea LLC, the previous owner of the property, to comply with applicable requirements of Chapter 2.96, MCC.

Beyond the use of the aforementioned workforce housing credits, the applicant has been and will continue to evaluate building residential workforce housing units when such opportunities are commercially viable.

The proposed action is not anticipated to have significant adverse impacts on population.

3. Economy and Labor Force

a. Existing Conditions

The economy of Maui is heavily dependent upon the visitor industry and in turn the industry fosters the retail and service industries. The dependency on the visitor industry is especially evident in the Kīhei-Mākena region, which is one of the State's major resort destination areas. The foundation for the region's visitor strength lies in the availability of vacation rentals, hotel condominiums, single-family and multi-family resort residential properties, world-class resorts and recreational facilities throughout Kīhei, Wailea, and Mākena. Service support for the visitor industry is found in Kīhei, where numerous retail commercial centers are located.

Hawaiʻi's economy through 2019 was strong, with record-setting visitor arrivals and low unemployment. However, the COVID-19 pandemic will have far reaching impacts on the economy on Maui, in Hawaiʻi, and across the nation and world. Stay-at-home regulations and travel quarantines aimed to curb the spread of the COVID-19 virus in Hawaiʻi have caused many businesses to shut down or drastically reduce operations. Unemployment claims have soared. It was reported that more than one third of Hawaiʻi's labor force has filed unemployment claims as the Hawaiian islands effectively shut down large sectors of the economy to slow the spread of the COVID-19 virus (Honolulu Star Advertiser, 2020). It is expected that the recovery will take many months, if not years, and as

such, the labor force, and State and County revenues will suffer for some time to come.

b. Potential Impacts and Mitigation Measures

The proposed project includes development of 57 single-family residential condominium units, an amenity center, and related infrastructure improvements. As will be detailed below, the project will generate construction-related spending and employment during the estimated 3 year construction period. Once completed, the project will support the local economy on Maui by directly creating jobs and generating new spending in the local economy. As noted previously, it is anticipated that approximately 90 percent of the single-family condominium units will be utilized as part-time residences. A summary of the anticipated economic and fiscal impacts for the project during construction and at full build-out is provided below. Detailed tables are provided in **Appendix "G"**.

(1) Development-Related (Construction Period) Economic and Fiscal Impacts

The proposed project is estimated to cost approximately $130 million to construct over a 3-year development period. The project is anticipated to create approximately 77 full-time equivalent (FTE) construction-related jobs on average per year, with an annual payroll of $5.8 million. Project-related construction expenditures would result in a General Excise Tax (GET) revenue of $453,000 per year or $1.36 million over a 3-year development period for the State of Hawai‘i. Salaries and wages from construction activities would result in approximately $347,000 of annual Personal Income Tax revenue for the State. In addition, approximately $1.23 million of Conveyance Tax revenue is estimated for all 57 residential units for the State of Hawai‘i based on the projected sale price for each residential unit. Refer to **Appendix "G"**. The County will collect permit fees associated with construction permits for the project. Inasmuch as the State and County of Maui are not anticipated to bear any additional costs as a result of project construction, the proposed project will generate a positive fiscal impact for the State and County during the construction period.

(2) Build-Out Economic and Fiscal Impacts

From a long-term perspective, the project will create new jobs and generate new spending in the local economy. The Wailea Resort SF-S Residential Project will employ three (3) FTE employees for

operations, maintenance, and administration of the residential community. This will result in an increase in Personal Income Tax revenue to the State of Hawai‘i by $8,300 annually. New residents of the Wailea Resort SF-S Project are anticipated to spend money locally (i.e. shopping and dining). In addition, each homeowner of the proposed community will contribute approximately $3,000 of homeowners association fee per month, portions of which will be spent locally for repair and maintenance of the community. These new spending by the residents and/or homeowners of the proposed community will in turn result in an increase in the GET revenue to the State of Hawai‘i.

The proposed project will result in a substantial increase in property tax revenue to the County of Maui. Residential property tax revenues for the project are estimated based on the estimated sales price for each residential unit and improvement value (construction cost) for the proposed amenity center. Detailed calculations of the residential property tax revenues are presented in **Appendix "G"**. The total annual property tax generated at the subject property after the project build-out is estimated at $1.13 million per year. In 2019, the existing property tax assessment for the subject property was approximately $60,800. Therefore, the net new property tax revenue generated by the proposed project is estimated to be approximatey $1.07 million annually. Refer to **Appendix "G"**.

Based on the foregoing, the proposed project will have a direct positive economic and fiscal impact resulting from increased employment and tax revenues for the State and County. Beyond the direct economic and fiscal impacts, it is noted that the project will generate indirect and induced benefits for the local economy which have not been quantified above. The project is anticipated to help mitigate the impacts of the COVID-19 pandemic by facilitating economic activity and tax revenues.

C. PUBLIC SERVICES

1. Police and Fire Protection

a. Existing Conditions

The County of Maui's Police Department's (MPD) main headquarters is in Wailuku at its Mahalani Street facility. The department consists of several

patrol, support, administrative, and investigative divisions that service the Hāna, Lānaʻi, Lāhainā, Molokaʻi, Wailuku, and Kīhei regions.

The MPD has a station in Kīhei on the east side of Piʻilani Highway at the intersection with Kanani Street approximately 1.6 miles north of the project site. The MPD's Kīhei station covers the Kīhei-Mākena region.

Fire prevention, protection, and suppression services are provided by the County of Maui, Department of Fire and Public Safety. The Kīhei Fire Station, which services the Kīhei-Mākena region from North Kīhei to Kamaʻole Beach Park II, is situated on South Kīhei Road near Kalama Park, approximately 2.4 miles northwest of the project site near the Kilohana Drive/Kapili Street intersection. The Wailea Fire Station is located in the close proximity of the subject property, approximately 700 feet to the north near the Kilohana Drive/Kapili Street intersection. The Wailea Station services the area from Kamaʻole Beach Park II to Mākena, and is located on land that was donated, in part, by the previous owner of the subject parcel.

b. <u>Potential Impacts and Mitigation Measures</u>

The project site is located within the Wailea Resort, in the vicinity of existing resort properties which are currently afforded similar services. The proposed project is not expected to extend the service area for emergency service providers. Access to the proposed project is planned from Kapili Street.

The proposed action will contribute towards police and fire protection services through real property tax revenues generated from the project. As such, substantial secondary impacts or effects on public facilities, such as on police and fire protection services, are not anticipated from project implementation.

2. <u>Medical Facilities</u>

a. <u>Existing Conditions</u>

Maui Memorial Medical Center, the only major medical facility on the island, services the Kīhei-Mākena region. Acute, general, and emergency care services are provided by this facility, which is licensed for 213 beds and is situated in Wailuku, in the vicinity of Mahalani Street and Maui Lani Parkway.

Clinics and doctors' offices are situated throughout the Kīhei and Wailea areas, however, these offer medical services on a lesser scale. Such clinics include Kihei Clinic, Wailea Medical Services, Kihei Pediatric Clinic, Kihei Physicians, the Kihei-Wailea Medical Center, Maui Medical Group, and Kaiser Permanente.

b. Potential Impacts and Mitigation Measures

The proposed project is not anticipated to affect the service capabilities of emergency medical or general care operations. As noted above, medical services are available throughout the Kīhei-Makena region.

3. Education Facilities

a. Existing Conditions

The State DOE operates four (4) schools in South Maui. Kīhei Elementary School and Kamali'i Elementary School cover grades Kindergarten to 5, and Lokelani Intermediate School covers grades 6 to 8. Maui High School, which covers grades 9 to 12 and is located in Kahului, is the designated public high school for South Maui residents. Kīhei Public Charter School covers grades Kindergarten to 12. The enrollments for these schools are presented in **Table 2**.

Table 2. Enrollments at Department of Education Schools Serving South Maui Residents

School	Actual Enrollment SY 18-19
Maui High	2,017
Lokelani Intermediate	551
Kamali'i Elementary	472
Kīhei Elementary	690
Kīhei Charter	652
Source: Department of Education, 2019.	

The University of Hawai'i Maui College (UHMC), located in Kahului, is a branch of the University of Hawai'i system. UHMC is the primary higher education institution serving Maui.

The new Kihei High School is scheduled to be open in 2021 and will serve the Kīhei-Makena region.

b. Potential Impacts and Mitigation Measures

The proposed project will offer 57 single-family residential condominium units for sale. For the most part, the units will be used intermittently by their owners. As previously mentioned, approximately 90 percent of the proposed homes at the project are anticipated to be part-time residences and would not have children enrolled in local public schools. In addition, resort-oriented housing in Wailea attracts an older population, including many retirees who do not have school-age children. The impacts from the project on school facilities and enrollments are, therefore, not anticipated to be significant.

The project site is located in the DOE's Central Maui Impact Fee District. It is noted that the proposed project is covered under a fair share agreement between DOE and A&B Wailea LLC, the previous owner of the subject property. A&B Wailea LLC contributed $1 million towards the construction of Kamali‘i Elementary School in Kīhei and received DOE credits in the amount of 1,176 units, a portion of which will be utilized towards the proposed Wailea Resort SF-S Residential Project to satisfy the DOE impact fee requirement.

4. Recreational Facilities

a. Existing Conditions

Diverse recreational opportunities are available in the Kihei-Makena Community Plan region. Shoreline activities, such as fishing, surfing, jogging, camping, picnicking, snorkeling, swimming, and windsurfing, are by far the predominant forms of recreation in the area. Within the Wailea Resort there are numerous recreational facilities such as Kilohana Park on Kilohana Drive and the various beach parks from Keawakapu Beach to Polo Beach.

Numerous public park facilities exist within Kīhei, a relatively short driving distance from the project site, including Waipuilani, Kalama, and Kama‘ole I/II/III Beach Parks. Additional recreational resources include the Kīhei Community Center and Aquatic Center and South Maui Park, as well as the resort-affiliated, world-class golf courses and tennis centers of Wailea and Mākena.

b. Potential Impacts and Mitigation Measures

While usage of recreational facilities (such as beach parks) in the Wailea area may slightly increase with implementation of the proposed project, this

increase is not expected to be significant given the average daily population characteristics of the project. It is noted that pursuant to zoning conditions of Ordinance No. 2694, which was approved in 1998 by the Maui County Council and conditionally zoned the subject parcel as "R-3 Residential District", the parks assessment has been satisfied for the subject property through the donation of a 5.75-acre parcel, identified as TMK (2)3-9-038:26, to the County for use as a fire station and a park.

Given the foregoing, the proposed project is not anticipated to impact recreational facilities in the Kīhei-Mākena region.

5. 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 are 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. A County supported green waste recycling facility is also located at the Central Maui Landfill.

The County of Maui's 2009 Integrated Solid Waste Management Plan estimates that the Central Maui Landfill has adequate capacity to accommodate commercial and residential waste needs through the year 2026 (Gershman, Brickner & Bratton, Inc., 2009). The County is currently in the process of planning a processing facilities project at the Central Maui Landfill which will further extend the life of the landfill.

b. Potential Impacts and Mitigation Measures

Construction waste generated by the project will be transported to appropriate processing facilities. Post-construction, the proposed project will be served by a private waste collection company. The proposed project is, therefore, not anticipated to affect the service capabilities of the County's residential waste collection operations.

As mentioned previously, the Central Maui Landfill has adequate capacity through the year 2026 with capacity enhancements expected with implementation of the facilities processing project adjacent to the landfill. The remaining capacity estimated by the Integrated Solid Waste Management Plan is based on future disposal volumes that assumes significant population growth. The proposed project is not anticipated

to present significant adverse impacts on Central Maui Landfill solid waste capacity estimates.

In accordance with the project's overall guiding sustainability principles, various waste management strategies will be implemented through construction and operation of the project. The strategies include onsite recycling of construction materials, construction waste minimization through standardization of homes, and recycling capabilities in each home for home pick up by a refuse hauler.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

Access to the project site is provided by Kapili Street. The following is a summary of major roadways in the vicinity of the project site.

Pi'ilani Highway – is a north-south State Highway that extends southward from Maui Veterans Highway at its intersection with North Kīhei Road and terminates approximately seven (7) miles to the south at Wailea Ike Drive. Pi'ilani Highway provides regional access to Kīhei and Wailea and is generally a two-way, four-lane, principal arterial that transitions to a two-way, two-lane roadway south of its intersection with Kilohana Drive and Mapu Drive. Exclusive left-turn lanes and right-turn deceleration lanes are provided at all major intersections with the shoulder areas of the highway designated as bicycle lanes. Within the study area, the posted speed limit along this roadway is 45 miles per hour (mph).

South Kihei Road – is generally a two-way, two-lane, undivided, north-south County roadway that traverses the Kīhei coastline. This roadway begins at a T-intersection with North Kihei Road near Maui Veterans Highway and eventually terminates at Okolani Drive in Wailea. South Kihei Road provides local access to shopping centers and visitor accommodations. The posted speed limit along this roadway in the Project vicinity is 20 mph. Continuous sidewalks and a shoulder/bike lane are provided along South Kihei Road in the vicinity of the Project.

Kilohana Drive – is a two-way, two-lane, east-west County roadway that extends from South Kīhei Road eastward to Pi'ilani Highway. The posted speed limit along this roadway is 25 mph.

Okolani Drive – is a four-lane, divided, east-west County collector roadway between South Kīhei Road and Wailea Alanui Drive. Okolani Drive narrows to a two-lane undivided roadway east of Wailea Alanui Drive to its intersection with Pi‘ilani Highway directly across of Mikioi Street. The posted speed limit on Okolani Drive is 30 mph.

Kapili Street – is a two-way, two-lane, undivided, north-south private roadway that extends southward from its intersection with Kilohana Drive to its intersection with Okolani Drive. The posted speed limit along this roadway is 30 mph. Continuous sidewalks are provided adjacent to the southbound side for the entire length of Kapili Street and along the northbound side within residential areas. Kapili Street is currently privately owned but is open for public use.

Wailea Alanui Drive – is a two-way, two-lane, divided, north-south, County roadway that extends northward from its intersection with Makena Road and terminates to the north at its intersection with Kilohana Drive and Lawakua Street. The posted speed limit along this roadway is 30 mph. Continuous sidewalks are provided along the southbound side of Wailea Alanui Drive within the project vicinity.

Wailea Ike Drive – is a divided, east-west, two-way, four-lane collector roadway that connects Pi‘ilani Highway with Wailea Alanui Drive. Wailea Ike Drive provides access to resort, residential, and commercial areas. The posted speed limit is 30 mph.

Wailea Ike Place – is an undivided, north-south, two-way, two-lane roadway that provides access to the Grand Champions Villas residential neighborhood, Wailea Tennis Club and various retail/office space to the north of Wailea Ike Drive and the Wailea Ekolu Village residential neighborhood and Wailea Village Center to the south of Wailea Ike Drive. The posted speed limit is 20 mph.

Kualono Place – is a two-way, two-lane, private driveway providing residents with access from the Wailea Pualani Estates gated community to Okolani Drive.

A Traffic Impact Analysis Report (TIAR) was prepared for the proposed project by Austin, Tsutsumi & Associates in May 2020. See **Appendix “H”**.

The TIAR evaluated the following intersections:

- South Kihei Road/Kilohana Drive (Unsignalized)
- Kilohana Drive/Wailea Alanui Drive (Unsignalized)

- Kilohana Drive/Kapili Street (Unsignalized)
- Pi‘ilani Highway/Kilohana Drive (Signalized)
- Pi‘ilani Highway/Okolani Drive (Unsignalized)
- Okolani Drive/Kualono Place (Unsignalized)
- Okolani Drive/Kapili Street (Unsignalized)
- Okolani Drive/Wailea Alanui Drive (4-way stop)
- Wailea Alanui Drive/Wailea Ike Drive (Signalized)
- Wailea Ike Drive/Wailea Ike Place (North) (Unsignalized)
- Wailea Ike Drive/Wailea Ike Place (South) (Unsignalized)

Level of service (LOS) of each intersection was evaluated as part of the TIAR. LOS is a measure of the acceptability of delay values to motorists at a given intersection. The criteria are presented in **Table 3** below.

Table 3. Level of Service Criteria for Signalized Intersections

Level of Service	Control Delay per Vehicle (sec./veh)
A	< 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	> 80.0

Based on traffic counts, the weekday morning peak hour was determined to occur between 7:30 a.m. and 8:30 a.m. and the afternoon peak hour was determined to occur 3:15 p.m. to 4:15 p.m. At the time of traffic counts, Wailea Village Center construction was occurring, which impacted turning movements at the Wailea Ike Drive/Wailea Ike Place (South) intersection. As a result, 2017 traffic counts were used at this intersection.

The majority of movements at the study intersections operated adequately at LOS D or better and under-capacity conditions during the peak hours of traffic with the exception of the following:

Pi‘ilani Highway and Kilohana Drive Intersection – During the afternoon peak hour, northbound through volumes were observed to queue for about a 30-35 minute period extending as far south to Okolani Drive. By 4:50 p.m., vehicle queues were observed to clear

without heavy congestion. Traffic analysis indicates the intersection operates at overall LOS C with all movements operating at LOS D or better, with the exception of the northbound left-turn movement, which operates at LOS E.

Pi‘ilani Highway and Okolani Drive Intersection – During the morning peak hour, all approaches operate relatively smoothly with minor movements experiencing moderate delay. Traffic analysis indicated that the northbound and southbound left-turn movements operate at LOS A and the eastbound and westbound left-turn/through movements operate at LOS E and LOS C, respectively. During the afternoon peak hour, higher volumes along Pi‘ilani Highway result in longer delays to the minor street movements. The northbound and southbound left-turn movements operate at LOS A/B and the eastbound/westbound approaches operate at LOS E/F, with eastbound approach operating over-capacity. A traffic signal is currently being designed and will be implemented at the Pi‘ilani Highway/Okolani Drive/Mikioi Place intersection as part of the mitigation for the Kai Malu Wailea residential development.

b. Potential Impacts and Mitigation Measures

The proposed project will have access from Kapili Street. The proposed project involves two (2) driveway improvements (main entrance and vehicle exit) along Kapili Street and an emergency access improvement and a new pedestrian crossing along Wailea Alanui Drive.

To analyze the traffic impacts in the area, the TIAR analysed traffic projections for Base Year 2024 without the proposed SF-S Residential Project, including traffic generated by other known developments in the vicinity of the proposed project in addition to an ambient growth rate. The TIAR also analyzed traffic projections for Future Year 2024 with the proposed project, which include the Base Year traffic volumes in addition to traffic volumes generated by the Wailea Resort SF-S Residential Project.

The LOS at the study intersections for existing, future (without project) and future (with project) are summarized in**Table 4**, below:

Table 4. Level of Service Summary

Intersection	Existing Conditions		Base Year 2024 Without Project		Future Year 2024 with Project	
	AM LOS	PM LOS	AM LOS	PM LOS	AM LOS	PM LOS
1: South Kihei Road and Kilohana Drive						
WB LT/RT	B	C	B	C	B	C
SB LT	A	A	A	A	A	A
Overall	–	–	–	–	–	–
2: Wailea Ala Nui Drive and Kilohana Drive						
NB LT/TH/RT	B	B	B	B	B	B
WB LT	A	A	A	A	A	A
SB LT/TH/RT	B	B	B	B	B	B
Overall	–	–	–	–	–	–
3: Kapali Street and Kilohana Drive						
NB LT/RT	A	A	A	B	A	B
WB LT	A	A	A	A	A	A
Overall	–	–	–	–	–	–
4: Piilani Highway and Kilohana Drive/Mapu Drive						
NB LT	D	E	E	E	E	E
NB TH	–	–	A	B	A	B
NB TH/RT	A	B	–	–	–	–
NB RT	–	–	A	A	A	B
EB LT	C	D	D	D	D	D
EB TH/RT	C	D	D	D	D	D
WB LT	–	–	D	D	D	D
WB TH	–	–	D	D	D	D
WB LT/TH/RT	C	D	–	–	–	–
WB RT	–	–	D	D	D	D
SB LT	D	D	D	D	D	D
SB TH	B	B	C	C	C	C
SB RT	A	A	A	A	A	A
Overall	B	C	C	C	C	C
5: Piilani Highway and Okolani Drive						
NB LT	A	A	D	D	D	D
NB TH	–	–	A	B	A	B
NB RT	–	–	A	A	A	A
EB LT/TH/RT	E	F*	C	D	C	D
WB LT/TH/RT	C	E	C	D	C	D

Intersection	Existing Conditions		Base Year 2024 Without Project		Future Year 2024 with Project	
	AM LOS	PM LOS	AM LOS	PM LOS	AM LOS	PM LOS
SB LT	A	B	C	D	C	D
SB TH	–	–	A	A	A	A
SB RT	–	–	A	A	A	A
Overall	–	–	A	B	B	B
6: Okolani Drive and Kualono Place						
NB LT/TH/RT	–	–	A	A	A	A
EB LT	A	A	A	A	A	A
WB LT	–	–	A	A	A	A
SB LT/TH/RT	–	–	A	A	A	A
SB LT/RT	A	A	–	–	–	–
Overall	–	–	–	–	–	–
7: Okolani Drive and Kapali Street						
EB LT	A	A	A	A	A	A
SB LT/RT	A	A	A	A	A	A
Overall	–	–	–	–	–	–
8: Wailea Alanui Drive and Okolani Drive						
NB LT	B	C	C	F*	C	F*
NB TH	A	B	A	B	A	B
NB RT	A	A	A	B	A	B
EB LT	A	B	A	B	A	B
EB TH	A	A	A	B	A	B
EB RT	B	B	C	D	C	D
WB LT/TH	B	B	B	C	B	C
WB RT	A	A	A	B	A	B
SB LT/TH	A	B	B	B	B	B
SB RT	A	A	A	B	A	B
Overall	B	B	C	E	C	E
9: Wailea Alanui Drive and Wailea Ike Drive						
NB TH	B	C	C	D	C	D
NB RT	B	B	C	C	C	C
WB LT	B	C	C	D	C	D
WB RT	B	B	B	C	B	C
SB LT	C	C	C	D	C	D
SB TH	B	B	C	C	C	C
Overall	B	C	C	D	C	D
10: Wailea Ike Drive and Wailea Ike Place (North)						
NB LT/TH	B	B	C	D	C	D
SB TH/RT	B	B	C	C	C	C

Intersection	Existing Conditions		Base Year 2024 Without Project		Future Year 2024 with Project	
	AM LOS	PM LOS	AM LOS	PM LOS	AM LOS	PM LOS
Overall	–	–	–	–	–	–
11: Wailea Ike Place (South) and Wailea Ike Drive						
NB TH/RT	B	B	B	D	B	D
SB LT/TH	B	C	B	E	B	E
Overall	–	–	–	–	–	–
12: Kapali Street and Project Driveway						
NB LT	–	–	–	–	A	A
EB LT/TH	–	–	–	–	A	A
Overall	–	–	–	–	–	–

Notes: * Denotes over-capacity conditions
NB – Northbound
SB – Southbound
WB – Westbound
EB – Eastbound
RT – Right turn
LT – Left turn
TH – Through

Source: Austin, Tsutsumi & Associates, Inc.

For Base Year 2024 (without project), regional traffic along Pi‘ilani Highway is anticipated to increase by 215 to 300 vehicles per direction (average 28 percent increase) and along South Kīhei Road by 110 to 170 vehicles per direction (average 42 percent increase) from ambient growth and various background projects included in the analysis. The majority of study intersections will continue operating adequately, similar to existing conditions, with the exception of the following:

Pi‘ilani Highway/Kilohana Drive/Mapu Place – With the planned widening improvement, this intersection will operate adequately with an overall LOS C for morning and afternoon peak hours of traffic. The northbound left-turn movement is anticipated to operate at LOS E due to longer signal cycles which favors through movements along the highway. Mainline through movements will operate adequately at LOS C or better and below capacity.

Wailea Alanui Drive/Okolani Drive – At this four-way stop intersection, the morning peak traffic will operate adequately with all movements operating at an overall LOS C or higher. During the afternoon peak hour, the overall intersection will operate at LOS E with the northbound left-turn movement forecast to operate over-capacity at LOS F conditions. The northbound left-turn and eastbound right-turn movements provide for heavier flows that

service regional traffic between Kīhei and the Wailea/Makena regions. All remaining movements at this intersection are relatively low, with peak volumes generally below 100 vehicles per movement. Based on the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) four-hour signal warrant, a signal will likely not be warranted by Year 2024.

Wailea Ike Drive/Wailea Ike Place (South) – The southbound left turn/through movement is anticipated to operate at LOS E conditions during the afternoon peak hour, however, should operate well below capacity. Existing observations also showed minimal southbound queues ranging from only 1 to 2 vehicles. Based on MUTCD, a signal will likely not be warranted by Year 2024.

For the Future Year 2024 (with project), the proposed project is forecast to generate approximately 32(30) new vehicle trips during the morning (afternoon) peak hours of traffic, respectively. Upon completion of the Project, all study intersections are forecast to operate with similar LOS as Base Year 2024 traffic conditions. Regionally along Piʻilani Highway, traffic generated by the Project will increase by approximately 1 to 8 vehicles in each direction per peak hour, which translates to a 0.6 percent increase in traffic. Similarly along South Kihei Road, traffic will only increase by approximately 4 vehicles in each direction per peak hour, which translates to a 0.8 percent increase in traffic. Due to generally low traffic increases as a result of the Project, the majority of movements will operate with the same LOS as Base Year 2024 condition. All movements that operated at LOS E/F with Base Year 2024 conditions will continue operating at LOS E/F for Future Year 2024.

As discussed previously, the Wailea Alanui Drive/Okolani Drive intersection is forecast to operate at overall LOS E and the northbound left-turn will operate over-capacity at LOS F during the afternoon peak hour for Base Year 2024. Since there are no planned improvements at the Wailea Alanui Drive/Okolani Drive intersection, it was analyzed as a 4-way stop for Future Year 2024. A traffic signal is likely not warranted. Refer to **Appendix "H"**.

It is noted that a Memorandum of Agreement, dated March 14, 2016, and its subsequent amendment between the State DOT and landowners in Wailea Resort, encompass the subject property. As such, the Applicant will contribute the regional fair share for the following planned improvements in Wailea Resort:

- Widening of Piilani Highway to provide an additional northbound through lane and an exclusive northbound right-turn lane at the Pi‘ilani Highway/Kilohana Drive/Mapu Place intersection.

- Widening of the westbound Mapu Drive approach to provide an exclusive left-turn, through, and right-turn lane.

It is noted that these planned improvements will not be triggered by the construction of the proposed Wailea Resort SF-S Residential Project and will be implemented at the appropriate time in accordance with the Memorandum of Agreement and its subsequent amendment. The proposed 57 units of the project will count towards the 150-unit trigger needed to implement the planned improvements.

In accordance with the project’s overall guiding sustainability principles, residents and visitors of the proposed community will be encouraged to walk and bicycle by road design, including installation of multi-modal paths on main roads, which will connect to the Wailea Alanui Drive and Kapili Street, and installation of shade trees. Based on the foregoing, the proposed project is not anticipated to result in significant adverse impacts to the traffic conditions in the vicinity of the project site.

2. Water System

a. Existing Conditions

A Preliminary Engineering and Drainage Report (PEDR) was prepared for the proposed project in May 2020. Refer to **Appendix “C”**. The proposed project is located within the existing service area of the County of Maui Department of Water Supply (DWS)’s Central Maui Water system. The Central Maui water system serves residents and businesses in Wailuku, Pāi‘a, Kahului, Pu‘unēnē, and Kīhei. The water sources of the Central Maui water system include groundwater wells located in Waiehu and Waihee which draw water from the Iao Aquifer.

The existing Wailea water storage system is divided into three (3) systems, the Low, Mid, and High level water storage systems.

b. Potential Impacts and Mitigation Measures

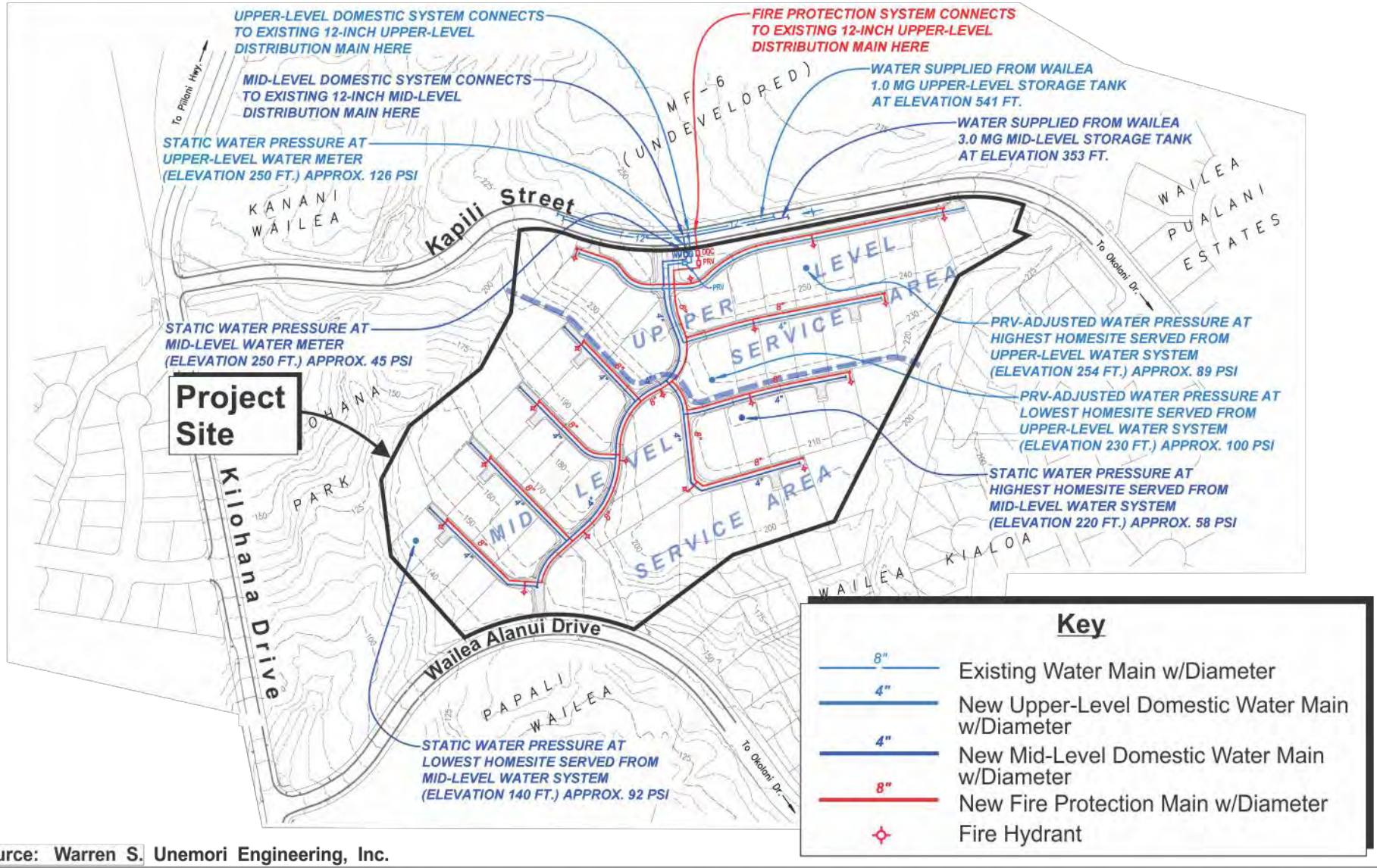
Potable water for drinking and fire protection for the proposed Wailea Resort SF-S Residential Project will be supplied from DWS’ existing 3.0 million gallon (MG) capacity Wailea Mid-Level storage tank located along Kalai Waa Street and A&B Wailea LLC’s existing 1.0 MG capacity Upper-

Level storage tank located within the Wailea 670 development. A&B Wailea LLC is in the process of dedicating the Upper-Level storage tank to DWS. An existing 17-mile long transmission line transmits water from DWS' well sources in Waiehu and Waihee to fill these tanks. Together, the 1.0 MG Upper-Level tank and 3.0 MG Mid-Level tank provide the necessary water pressure, domestic storage capacity, and fire protection storage capacity that are needed to meet DWS' water service standards for the Wailea Resort SF-S Residential Project. As such, no storage improvements are required for the proposed project. Refer to **Appendix "C"**.

An existing network of 12-, 16-, and 18-inch diameter distribution mains within the Wailea Resort brings water from the 3.0 MG Wailea Mid-Level and 1.0 MG Upper-Level storage tanks to the Wailea Resort SF-S Residential Project site. Three (3) sets of service mains, including two (2) for drinking water and another for fire protection, will be extended into the project site from the existing 12-inch Mid-Level and 12-inch Upper-Level distribution mains located on Kapili Street to provide water service to each home and supply the fire hydrants located at regular intervals through the development.

Two (2) DWS-issued 3-inch water meters, one for the Upper-Level service zone and the other for the Mid-Level service zone, will be installed on the drinking water main near Kapili Street to measure water usage by the entire development. See **Figure 9**. Water use by each condominium unit, amenity center building, and common-area irrigation will be tracked by privately-read sub-meters installed downstream of the main County meter. The project's existing 1-inch irrigation water meter will be utilized to supplement the project's water demands. Refer to **Appendix "C"**.

It is noted that the proposed project is located beyond the service limits of the existing R-1 distribution system. In accordance with the project's overall guiding sustainability principles, the project's irrigation system for common areas will be designed to facilitate the future connection to the R-1 distribution system when it becomes available. Based on the foregoing, significant adverse impacts to the Maui County's water system are not anticipated as a result of the proposed project.



Source: Warren S. Unemori Engineering, Inc.

Figure 9 Proposed Wailea Resort SF-S Residential Project NOT TO SCALE

Proposed Water System Map

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor/SF-S Permitting/Applications/Figures/Prop Water System

3. Wastewater System

a. Existing Conditions

The service area for the County's Kīhei Wastewater Reclamation System extends from North Kīhei to Wailea. The system consists of a number of pump stations and force mains which convey wastewater through the County's transmission lines. The combined flows are transported to the Kīhei Wastewater Reclamation Facility, which is located adjacent to the Maui Nui Golf Club. The existing design capacity of the Kīhei Wastewater Reclamation Facility is 8.0 million gallons per day (MGD).

The wastewater generated within the Wailea area is collected and transported to sewer pump stations by a series of gravity polyvinyl chloride (PVC) sewerlines and manholes. Generally, the collection system consists of primarily 8-inch gravity mains running throughout the existing residential and commercial areas that eventually connect to a main trunk line ranging from 8-inch to 30-inch diameter that runs along Wailea Alanui Drive and South Kīhei Road. The wastewater collected is transported to a series of force mains ranging from 6-inch to 12-inch diameter to existing pump stations.

b. Potential Impacts and Mitigation Measures

According to the PEDR prepared for the proposed project, the proposed Wailea Resort SF-S Residential Project is expected to generate a wastewater flow of approximately 20,000 gallons per day (GPD). A conventional gravity sewer collection system will be installed as part of the project, which will collect wastewater generated by the buildings and discharge it into the existing 8-inch diameter County sewer main located on Wailea Alanui Drive. The County sewerage system will, in turn, convey the wastewater down Kilohana Drive to South Kīhei Road, then along South Kīhei Road to Pumping Station No. 8; then from Pump Station No. 8 to Pump Station No. 7; then from Pump Station No. 7 to Pump Station No. 6; then from Pump Station No. 6 to the Kihei Wastewater Reclamation Facility above Pi'ilani Highway. Refer to **Appendix "C"**.

According to Maui County Department of Environmental Management's Wastewater Reclamation Division (WWRD), about 4,800 feet of a large diameter gravity sewerline, located under South Kīhei Road between Sewer Pump Stations No. 7 and No. 8. is nearing its current safe operating capacity and will require a capacity upgrade if flows increase significantly

due to new developments in the Wailea Resort. WWRD is currently working to plan and program the needed capacity upgrade.

WWRD's Kihei Wastewater Reclamation Facility is currently processing about four (4) MGD out of its eight (8) MGD design capacity. It is anticipated that the Kihei Wastewater Reclamation Facility has sufficient treatment capacity to accommodate the project's projected sewer demand. Refer to **Appendix "C"**.

4. Drainage

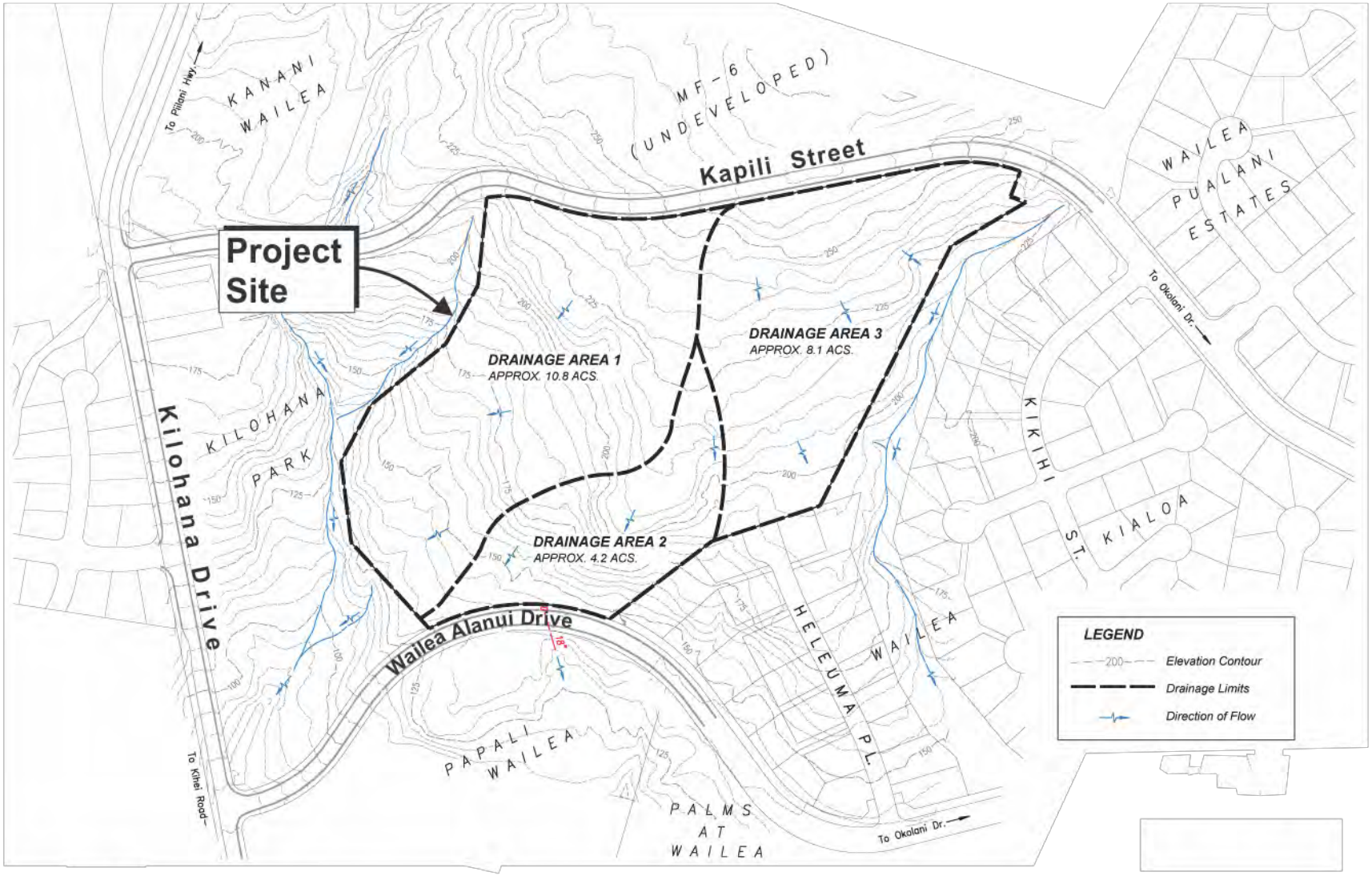
a. Existing Conditions

According to the PEDR prepared for the project, the existing 23.1-acre project site generates approximately 24.5 cubic feet per second (cfs) of onsite surface runoff during a 10-year, 1-hour storm which flows off of the project site in three (3) directions. See **Figure 10** and refer to **Appendix "C"**.

Drainage Area 1 - generates approximately 11.3 cfs of onsite surface runoff which sheet flows to an existing drainage gully located on the County-owned Kilohana Park parcel to the north of the project site. The runoff then flows into an underground storm drain along Kilohana Drive; through an open drainageway crossing the Wailea Kai subdivision; through a culvert crossing at South Kihei Road; then into the ocean at Keawekapu Beach.

Drainage Area 2 - generates approximately 4.5 cfs of onsite surface runoff which enters an 18-inch culvert crossing at Wailea Alanui Drive. The runoff then passes into an open drainage way between the Palms at Wailea and Papali Wailea condominiums; past the Wailea Kai subdivision; through a culvert crossing at South Kīhei Road; then into the ocean at Keawekapu Beach.

Drainage Area 3 - generates approximately 8.7 cfs of onsite surface runoff which flows into the grassed drainage channel passing through the adjacent Wailea Kialoa Subdivision. The runoff then crosses under Wailea Alanui Drive; through the Palms at Wailea; through the Wailea Kai subdivision; across South Kīhei Road; and into the ocean at Keawekapu Beach.



Source: Warren S. Unemori Engineering, Inc.

Figure 10 Proposed Wailea Resort SF-S Residential Project NOT TO SCALE

Existing Drainage Condition

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor/SF-S Permitting/Applications/Figures/Exist Drainage Condition

b. Potential Impacts and Mitigation Measures

Development of the proposed Wailea Resort SF-S Residential Project is expected to generate an onsite 10-year, 1-hour peak storm flow of 52.9 cfs, which results in 28.4 cfs increase from its existing condition. The project site will be graded in order to maintain the natural form of the hillside and the drainage pattern that exists. Two (2) different approaches to mitigating the post-development runoff will be implemented:

Drainage Area 1

A LID stormwater system will be implemented for Drainage Area 1. Runoff from rooftops and pavements will be directed into bioretention strips ("Green Streets") located along on one (1) side of the streets in which runoff will be held and allowed to percolate into the ground. Subsurface storage chambers will be used to augment the capacity of the bioretention strips and underground drainage piping will be installed as a safety precaution to handle overflows and prevent flooding during large storm events.

Drainage Area 2

A conventional storm drainage system will be employed within Drainage Area 2. The conventional system includes inlets and underground pipes installed throughout Drainage Area 2 to collect the runoff shed by rooftops and pavements and convey it to stormwater detention basins located just upstream of pre-designated discharge points.

Drainage Area 3

Drainage Area 3 will employ a combination of a LID stormwater system ("Green Street" bioretention strips), subsurface storage chambers, and a conventional open stormwater basin to provide the storage capacity necessary to mitigate post-development runoff. As with Drainage Area 1, underground drainage piping will be installed as a safety precaution to handle overflows and prevent flooding during large storm events.

The onsite stormwater retention/detention facilities and LID water quality measures described above will mitigate the increase in peak flow attributable to development of the project, with the result that post-development flows discharged into each of the three (3) receiving storm

drainage facilities downstream of Drainage Areas 1, 2 and 3 will either decrease or remain unchanged from the current, pre-development condition. See **Table 5**.

Table 5. Drainage Area Summary

Drainage Area	Receiving Facility	Approx. Area Draining to Receiving Facility	Pre-Development Peak Runoff (10 yr/1 hr)	Post-Development Peak Runoff *BEFORE* Mitigation	Post-Development Peak Runoff *AFTER* Mitigation	Net Change in Peark Flow *AFTER* Mitigation
1	Drainage through Kilohana Park	10.6 acres	11.3 cfs	24.4 cfs	≤11.3 cfs	≤0.0 cfs
2	18" diameter Roadway Culvert at Wailea Alanui	4.1 acres	4.5 cfs	9.2 cfs	≤4.5 cfs	≤0.0 cfs
3	Drainageway through Wailea Kialoa Subd	8.4 acres	8.7 cfs	19.3 cfs	≤8.7 cfs	≤0.0 cfs
	Total	**23.1 acres**	**24.5 cfs**	**52.9 cfs**	**≤24.5 cfs**	**≤0.0 cfs**

Based on the foregoing, the proposed project is not anticipated to present significant adverse impacts on downstream properties and nearshore waters. Refer to **Appendix "C"**.

5. Electrical, Telephone, and Cable Television Systems

a. Existing Conditions

Electrical, telephone, and cable television (CATV) services in the Kīhei-Wailea-Mākena area are provided by Maui Electric Company, Hawaiian Telcom, and Spectrum (Oceanic Time Warner) Cable, respectively. Refer to **Appendix "C"**.

b. Potential Impacts and Mitigation Measures

Utility infrastructure for the proposed project will be placed underground. The existing underground power and telecom distribution lines will be extended from the mauka shoulder of Kapili Street. Underground ducting and distribution equipment will be installed within utility easements located

alongside the internal streets to connect the amenity center and homesites throughout the development. In accordance with the project's overall guiding sustainability principles, energy conservation and efficiency measures will be incorporated into the project design to reduce overall energy consumption, including use of LED and natural lighting, Energy Star certified appliances, and home designs to capture natural air flow to minimize air conditioning needs.

Coordination with Maui Electric Company, Hawaiian Telcom, and Spectrum (Oceanic Time Warner) Cable will be undertaken to ensure that utilities' planning and design can be programmed in concert with the project development schedule.

E. CUMULATIVE AND SECONDARY IMPACTS

Cumulative impacts are defined by Title 11, Chapter 200.1, HAR, Environmental Impact Statement Rules as:

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

"Secondary impacts" or "indirect effects" are defined by Title 11, Chapter 200.1, HAR as:

> *[E]ffects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. An indirect effect may include a growth inducing effect and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems including ecosystems*

Although located within the Wailea Resort area, the proposed project is limited to the development of the Wailea Resort SF-S Residential Project site. The project has independent utility and is not a phase or increment of a larger total undertaking; a necessary precedent for a larger project; or a commitment to some larger project; in the reasonably foreseeable future. The proposed project will stand on its own and is not reliant upon or a trigger for any other development within Wailea Resort or elsewhere.

The Maui Island Plan (MIP), Kihei-Makena Community Plan (KMCP), and Maui County Zoning define the parameters for growth. As will be discussed further in Chapter III, the proposed Wailea Resort SF-S Residential Project is located within the Urban Growth Boundary (UGB) for the area as designated within the MIP. Furthermore, the KMCP appropriately designates the affected parcel for Single-Family use. As noted previously, Ordinance 2694 was approved in 1998 by the Maui County Council and conditionally

zoned the parcel as “R-3 Residential District”. In this context, the proposed Wailea Resort SF-S Residential Project is consistent with the growth and type of development that is envisioned for the area. Furthermore, by proposing the development on lands located within the UGB and on lands with appropriate land use designations, the proposed Wailea Resort SF-S Residential Project will contain growth to designated areas rather than promoting urban sprawl and the development of lands not designated for such growth.

The cumulative impacts of the proposed project, together with other reasonably foreseeable actions, will include both increased population and infrastructural demands. All necessary infrastructure to serve the proposed project will be provided by the Applicant and designed to meet applicable local, State, and Federal regulations. The PEDR and TIAR prepared for the proposed project have evaluated potential impacts and designed infrastructure systems for the project in the context of future projected regional growth.

With respect to secondary impacts, the proposed Wailea Resort SF-S Residential Project will spur positive economic development opportunities through the establishment of resort residential uses. The proposed project will benefit the local economy through increased resident spending. The proposed project will also provide 57 single-family condominium residential units to the island’s resort housing market within Wailea Resort, a location designated as appropriate for such growth by the MIP.

Given the foregoing, there are no significant adverse cumulative or secondary impacts anticipated with implementation of the proposed Wailea Resort SF-S Residential Project.

RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

III

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

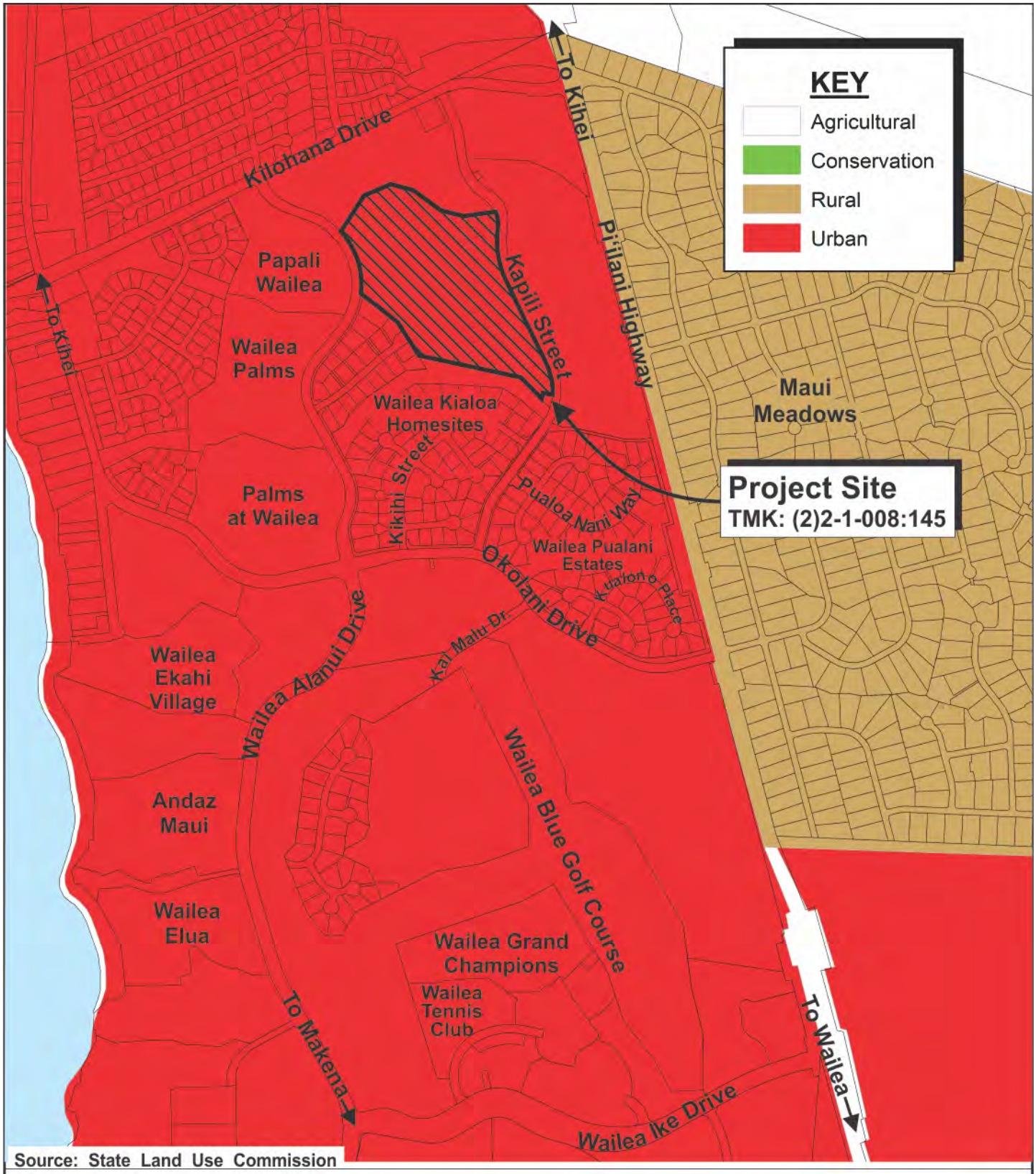
This section discusses the relationship between the proposed Wailea Resort SF-S Residential Project and State and County land use plans, policies, and controls for the Kīhei-Mākena region.

A. STATE LAND USE DISTRICTS

Pursuant to Chapter 205, Hawaiʻi Reivsed Statutes (HRS), 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 "Urban" district. See **Figure 11**. The proposed action involves the use of the property for 57 single-family residential condominium units, an amenity center, and related improvements, which are compatible with the "Urban" classification.

B. HAWAIʻI STATE PLAN

Chapter 226, HRS, also known as the Hawaiʻi 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 Plan consists of three (3) parts. Part I includes the Overall Theme, Goals, Objectives, and Policies; Part II includes Planning, Coordination, and Implementation; and Part III establishes Priority Guidelines. Inasmuch as Part II of the State Plan covers its administrative structure and implementation process, discussion of the proposed project's applicability to Part II is not appropriate. Below is an analysis of the project's applicability to Part I and Part III of the Hawaiʻi State Plan.



Source: State Land Use Commission

Figure 11 Proposed Wailea Resort SF-S Residential Project

State Land Use District Classification Map

0 450 Feet
225 900

MUNEKIYO HIRAGA

Prepared for: Wailea Resort SF-S Partners LP

Ledcor\SF-S PERMITTING\Applications\Figures\SLUD

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
HRS 226-1: Findings and Purpose			
HRS 226-2: Definitions			
HRS 226-3: Overall Theme			
HRS 226-4: State Goals. In order to guarantee, for the present and future generations, those elements of choice and mobility that insure that individuals and groups may approach their desired levels of self-reliance and self determination, it shall be the goal of the State to achieve: (1) 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. (2) 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. (3) 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.			
Analysis: **The proposed Wailea Resort SF-S Residential Project will create a well designed single-family residential neighborhood that enhances the mental and physical well-being of its residents and supports the local economy by creating new spending and employment opportunities during construction and operation phases of the project.**			
Chapter 226-5 Objective and Policies for Population			
Objective: 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.	✓		
Policies:			
(1) 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.	✓		
(2) Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs and desires.	✓		
(3) Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the islands.	✓		
(4) Encourage research activities and public awareness programs to foster an understanding of Hawaii's limited capacity to accommodate population needs and to address concerns resulting from an increase in Hawaii's population.			✓
(5) Encourage federal actions and coordination among major governmental agencies to promote a more balanced distribution of immigrants among the states, provided that such actions do not prevent the reunion of immediate family members.			✓
(6) Pursue an increase in federal assistance for states with a greater proportion of foreign immigrants relative to their state's population.			✓
(7) Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
Analysis: **The proposed Wailea Resort SF-S Residential Project is a residential development that will provide housing in an area that has been planned to manage population growth with available infrastructure and services. The proposed project will generate both short-term and long-term employment opportunities for the construction as well as operational phases of the new community, which will support the local economy.**			
Chapter 226-6 Objectives and policies for the economy – – in general			
Objectives: Planning for the State's economy in general shall be directed toward achievement of the following objectives:			
(1) Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people, while at the same time stimulating the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.	✓		
(2) A steadily growing and diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of industries on the neighbor islands.	✓		
Policies:			
(1) Promote and encourage entrepreneurship within Hawaii by residents and nonresidents of the State.			✓
(2) Expand Hawaii's national and international marketing, communication, and organizational ties, to increase the State's capacity to adjust to and capitalize upon economic changes and opportunities occurring outside the State.			✓
(3) Promote Hawaii as an attractive market for environmentally and socially sound investment activities that benefit Hawaii's people.			✓
(4) Transform and maintain Hawaii as a place that welcomes and facilitates innovative activity that may lead to commercial opportunities.			✓
(5) Promote innovative activity that may pose initial risks, but ultimately contribute to the economy of Hawaii.			✓
(6) Seek broader outlets for new or expanded Hawaii business investments.			✓
(7) Expand existing markets and penetrate new markets for Hawaii's products and services.			✓
(8) Assure that the basic economic needs of Hawaii's people are maintained in the event of disruptions in overseas transportation.			✓
(9) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.	✓		
(10) Encourage the formation of cooperatives and other favorable marketing arrangements at the local or regional level to assist Hawaii's small scale producers, manufacturers, and distributors.			✓
(11) Encourage labor-intensive activities that are economically satisfying and which offer opportunities for upward mobility.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(12) Encourage innovative activities that may not be labor-intensive, but may otherwise contribute to the economy of Hawaii.			✓
(13) Foster greater cooperation and coordination between the government and private sectors in developing Hawaii's employment and economic growth opportunities.	✓		
(14) Stimulate the development and expansion of economic activities which will benefit areas with substantial or expected employment problems.			✓
(15) Maintain acceptable working conditions and standards for Hawaii's workers.	✓		
(16) Provide equal employment opportunities for all segments of Hawaii's population through affirmative action and nondiscrimination measures.			✓
(17) Stimulate the development and expansion of economic activities capitalizing on defense, dual-use, and science and technology assets, particularly on the neighbor islands where employment opportunities may be limited.			✓
(18) Encourage businesses that have favorable financial multiplier effects within Hawaii's economy, particularly with respect to emerging industries in science and technology.			✓
(19) Promote and protect intangible resources in Hawaii, such as scenic beauty and the aloha spirit, which are vital to a healthy economy.	✓		
(20) Increase effective communication between the educational community and the private sector to develop relevant curricula and training programs to meet future employment needs in general, and requirements of new or innovative potential growth industries in particular.			✓
(21) Foster a business climate in Hawaii--including attitudes, tax and regulatory policies, and financial and technical assistance programs-- that is conducive to the expansion of existing enterprises and the creation and attraction of new business and industry.			✓
Analysis: **The proposed project will create substantial economic activity in the labor intensive construction sector during construction of the project. The operation of the residential community will also create long-term employment opportunities. In addition, new residents will generate new spending in the local economy. The project has been designed to protect the scenic beauty of the Wailea Resort area with approximately 20 percent of the project area being maintained in open space.**			
Chapter 226-7 Objectives and policies for the economy – – agriculture.			
Objectives: Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:			
(1) Viability of Hawaii's sugar and pineapple industries.			✓
(2) Growth and development of diversified agriculture throughout the State.			✓
(3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic, and social well-being.			✓
Policies:			
(1) Establish a clear direction for Hawaii's agriculture through stakeholder commitment and advocacy.			✓

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(2) Encourage agriculture by making the best use of natural resources.			✓
(3) Provide the governor and the legislature with information and options needed for prudent decision-making for the development of agriculture.			✓
(4) Establish strong relationships between the agricultural and visitor industries for mutual marketing benefits.			✓
(5) Foster increased public awareness and understanding of the contributions and benefits of agriculture as a major sector of Hawaii's economy.			✓
(6) Seek the enactment and retention of federal and state legislation that benefits Hawaii's agricultural industries.			✓
(7) Strengthen diversified agriculture by developing an effective promotion, marketing, and distribution system between Hawaii's food producers and consumers in the State, nation, and world.			✓
(8) Support research and development activities that strengthen economic productivity in agriculture, stimulate greater efficiency, and enhance the development of new products and agricultural by-products.			✓
(9) Enhance agricultural growth by providing public incentives and encouraging private initiatives.			✓
(10) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.			✓
(11) Increase the attractiveness and opportunities for an agricultural education and livelihood.			✓
(12) In addition to the State's priority on food, expand Hawaii's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.			✓
(13) Promote economically competitive activities that increase Hawaii's agricultural self-sufficiency, including the increased purchase and use of Hawaii-grown food and food products by residents, businesses, and governmental bodies as defined under section 103D-104.			✓
(14) Promote and assist in the establishment of sound financial programs for diversified agriculture.			✓
(15) Institute and support programs and activities to assist the entry of displaced agricultural workers into alternative agricultural or other employment.			✓
(16) Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses.			✓
(17) Perpetuate, promote, and increase use of traditional Hawaiian farming systems, such as the use of loko i‘a, māla, and irrigated lo‘i, and growth of traditional Hawaiian crops, such as kalo, ‘uala, and ‘ulu.			✓
(18) Increase and develop small-scale farms.			✓
Analysis: **Not Applicable.**			
Chapter 226-8 Objective and policies for the economy – – visitor industry.			

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
Objective: Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy.			✓
Policies:			
(1) Support and assist in the promotion of Hawaii's visitor attractions and facilities.			✓
(2) Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people.			✓
(3) Improve the quality of existing visitor destination areas by utilizing Hawaii's strengths in science and technology.			✓
(4) Encourage cooperation and coordination between the government and private sectors in developing and maintaining well-designed, adequately serviced visitor industry and related developments which are sensitive to neighboring communities and activities.			✓
(5) Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawaii's people.			✓
(6) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the visitor industry.			✓
(7) Foster a recognition of the contribution of the visitor industry to Hawaii's economy and the need to perpetuate the aloha spirit.			✓
(8) Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawaii's cultures and values.			✓
Analysis: **Not Applicable.**			
Chapter 226-9 Objective and policies for the economy – – federal expenditures.			
Objective: Planning for the State's economy with regard to federal expenditures shall be directed towards achievement of the objective of a stable federal investment base as an integral component of Hawaii's economy.			✓
Policies:			
(1) Encourage the sustained flow of federal expenditures in Hawaii that generates long-term government civilian employment;			✓
(2) Promote Hawaii's supportive role in national defense, in a manner consistent with Hawaii's social, environmental, and cultural goals by building upon dual-use and defense applications to develop thriving ocean engineering, aerospace research and development, and related dual-use technology sectors in Hawaii's economy;			✓
(3) Promote the development of federally supported activities in Hawaii that respect statewide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawaii's environment;			✓
(4) Increase opportunities for entry and advancement of Hawaii's people into federal government service;			✓
(5) Promote federal use of local commodities, services, and facilities available in Hawaii;			✓

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(6) Strengthen federal-state-county communication and coordination in all federal activities that affect Hawaii; and			✓
(7) Pursue the return of federally controlled lands in Hawaii that are not required for either the defense of the nation or for other purposes of national importance, and promote the mutually beneficial exchanges of land between federal agencies, the State, and the counties.			✓
Analysis: **Not Applicable.**			
Chapter 226-10 Objective and policies for the economy – – potential growth and innovative activities.			
Objective: Planning for the State's economy with regard to potential growth and innovative activities shall be directed towards achievement of the objective of development and expansion of potential growth and innovative activities that serve to increase and diversify Hawaii's economic base.			✓
Policies:			
(1) Facilitate investment and employment growth in economic activities that have the potential to expand and diversify Hawaii's economy, including but not limited to diversified agriculture, aquaculture, renewable energy development, creative media, health care, and science and technology-based sectors;			✓
(2) Facilitate investment in innovative activity that may pose risks or be less labor-intensive than other traditional business activity, but if successful, will generate revenue in Hawaii through the export of services or products or substitution of imported services or products;			✓
(3) Encourage entrepreneurship in innovative activity by academic researchers and instructors who may not have the background, skill, or initial inclination to commercially exploit their discoveries or achievements;			✓
(4) Recognize that innovative activity is not exclusively dependent upon individuals with advanced formal education, but that many self-taught, motivated individuals are able, willing, sufficiently knowledgeable, and equipped with the attitude necessary to undertake innovative activity;			✓
(5) Increase the opportunities for investors in innovative activity and talent engaged in innovative activity to personally meet and interact at cultural, art, entertainment, culinary, athletic, or visitor-oriented events without a business focus;			✓
(6) Expand Hawaii's capacity to attract and service international programs and activities that generate employment for Hawaii's people;			✓
(7) Enhance and promote Hawaii's role as a center for international relations, trade, finance, services, technology, education, culture, and the arts;			✓
(8) Accelerate research and development of new energy-related industries based on wind, solar, ocean, underground resources, and solid waste;			✓
(9) Promote Hawaii's geographic, environmental, social, and technological advantages to attract new or innovative economic activities into the State;			✓

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(10) Provide public incentives and encourage private initiative to attract new or innovative industries that best support Hawaii's social, economic, physical, and environmental objectives;			✓
(11) Increase research and the development of ocean-related economic activities such as mining, food production, and scientific research;			✓
(12) Develop, promote, and support research and educational and training programs that will enhance Hawaii's ability to attract and develop economic activities of benefit to Hawaii;			✓
(13) Foster a broader public recognition and understanding of the potential benefits of new or innovative growth-oriented industry in Hawaii;			✓
(14) Encourage the development and implementation of joint federal and state initiatives to attract federal programs and projects that will support Hawaii's social, economic, physical, and environmental objectives;			✓
(15) Increase research and development of businesses and services in the telecommunications and information industries;			✓
(16) Foster the research and development of nonfossil fuel and energy efficient modes of transportation; and			✓
(17) Recognize and promote health care and health care information technology as growth industries.			✓
Analysis: **Not Applicable.**			
Chapter 226-10.5 Objectives and policies for the economy – – information industry.			
Objective: Planning for the State's economy with regard to telecommunications and information technology shall be directed toward recognizing that broadband and wireless communication capability and infrastructure are foundations for an innovative economy and positioning Hawaii as a leader in broadband and wireless communications and applications in the Pacific Region.			✓
Policies:			
(1) Promote efforts to attain the highest speeds of electronic and wireless communication within Hawaii and between Hawaii and the world, and make high speed communication available to all residents and businesses in Hawaii;			✓
(2) Encourage the continued development and expansion of the telecommunications infrastructure serving Hawaii to accommodate future growth and innovation in Hawaii's economy;			✓
(3) Facilitate the development of new or innovative business and service ventures in the information industry which will provide employment opportunities for the people of Hawaii;			✓
(4) Encourage mainland- and foreign-based companies of all sizes, whether information technology-focused or not, to allow their principals, employees, or contractors to live in and work from Hawaii, using technology to communicate with their headquarters, offices, or customers located out-of-state;			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(5) Encourage greater cooperation between the public and private sectors in developing and maintaining a well-designed information industry;			✓
(6) Ensure that the development of new businesses and services in the industry are in keeping with the social, economic, and physical needs and aspirations of Hawaii's people;			✓
(7) Provide opportunities for Hawaii's people to obtain job training and education that will allow for upward mobility within the information industry;			✓
(8) Foster a recognition of the contribution of the information industry to Hawaii's economy; and			✓
(9) Assist in the promotion of Hawaii as a broker, creator, and processor of information in the Pacific.			✓
Analysis: **Not Applicable.**			
Chapter 226-11 Objectives and policies for the physical environment – – land based, shoreline, and marine resources.			
Objectives: Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:			
(1) Prudent use of Hawaii's land-based, shoreline, and marine resources.	✓		
(2) Effective protection of Hawaii's unique and fragile environmental resources.	✓		
Policies:			
(1) Exercise an overall conservation ethic in the use of Hawaii's natural resources.	✓		
(2) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.			✓
(3) Take into account the physical attributes of areas when planning and designing activities and facilities.	✓		
(4) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.	✓		
(5) Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.			✓
(6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.	✓		
(7) Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.			✓
(8) Pursue compatible relationships among activities, facilities, and natural resources.	✓		
(9) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
Analysis: **The proposed project site has been identified by both the State Land Use Commission and the County of Maui's Maui Island Plan (MIP) as an appropriate location for urban growth in close proximity to existing infrastructure and services. The physical attributes of the project area have been taken into account in the planning and design of the proposed project. A Biological Resources Survey has also been carried out for the proposed project. Appropriate mitigation measures will be implemented to ensure there will be no adverse impacts to endangered plant and animal species and their habitats. In addition, a comprehensive drainage system, including Low Impact Development (LID) measures, will be implemented to ensure protection of the shoreline environment.**			
Chapter 226-12 Objective and policies for the physical environment – – scenic, natural beauty, and historic resources.			
Objective: Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.	✓		
Policies:			
(1) Promote the preservation and restoration of significant natural and historic resources.	✓		
(2) Provide incentives to maintain and enhance historic, cultural, and scenic amenities.			✓
(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.	✓		
(4) Protect those special areas, structures, and elements that are an integral and functional part of Hawaii's ethnic and cultural heritage.	✓		
(5) Encourage the design of developments and activities that complement the natural beauty of the islands.	✓		
Analysis: **An Archaeological Inventory Survey (AIS) and Cultural Impact Assessment (CIA) have been undertaken to ensure the proposed project will not adversely impact historic and cultural resouces. A View Analysis has also been prepared to ensure that views from surrounding roadways and public vantage points will not be adversely impacted. The proposed project has been designed to complement the natural beauty of the Wailea Resort. Landscaping and vegetative open spaces have been incorporated in the project design to provide visual buffers.**			
Chapter 226-13 Objectives and policies for the physical environment – – land, air, and water quality.			
Objectives: Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives.			
(1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.	✓		
(2) Greater public awareness and appreciation of Hawaii's environmental resources.	✓		
Policies:			
(1) Foster educational activities that promote a better understanding of Hawaii's limited environmental resources.	✓		

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(2) Promote the proper management of Hawaii's land and water resources.	✓		
(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.	✓		
(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaii's people.	✓		
(5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.	✓		
(6) Encourage design and construction practices that enhance the physical qualities of Hawaii's communities.	✓		
(7) Encourage urban developments in close proximity to existing services and facilities.	✓		
(8) Foster recognition of the importance and value of the land, air, and water resources to Hawaii's people, their cultures and visitors.	✓		
Analysis: **The proposed project will be developed pursuant to guiding sustainability principles which recognize Hawai‘i's limited environmental resources. The proposed project will incorporate various sustainable design features in project design to reduce resource use as much as practicable. The proposed project site has been identified by both the State Land Use Commission and the County of Maui's MIP as an appropriate location for urban growth in close proximity to infrastructure and existing services.**			
Chapter 226-14 Objective and policies for facility systems – – in general.			
<u>Objective</u>: Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.			✓
<u>Policies</u>:			
(1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.			✓
(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.			✓
(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.			✓
(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.			✓
Analysis: **Not Applicable.**			
Chapter 226-15 Objectives and policies for facility systems – – solid and liquid waste.			
<u>Objectives</u>: Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:			
(1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(2) Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.			✓
Policies:			
(1) Encourage the adequate development of sewerage facilities that complement planned growth.	✓		
(2) Promote re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic.	✓		
(3) Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.			✓
Analysis: **The proposed project will be designed to meet applicable State and County standards for solid and liquid waste disposal. The proposed project will be served by a private waste collection company and the County's wastewater collection and disposal system. The applicant will promote re-use and recycling of solid waste within the new community to the extent practicable.**			
Chapter 226-16 Objective and policies for facility systems – – water.			
Objective: Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.			✓
Policies:			
(1) Coordinate development of land use activities with existing and potential water supply.	✓		
(2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.			✓
(3) Reclaim and encourage the productive use of runoff water and wastewater discharges.			✓
(4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.			✓
(5) Support water supply services to areas experiencing critical water problems.			✓
(6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.	✓		
Analysis: **The project is located within the Urban Growth Boundary (UGB) of the MIP, which identifies areas for future urban development where existing public services are available. The project will connect to the County water system. Two (2) 3-inch water meters will be installed on the drinking water main near Kapili Street to measure water usage by the entire development. In accordance with the project's overall guiding sustainability principles, water conservation design features and practices will be incorporated into the project where feasible.**			
Chapter 226-17 Objectives and policies for facility systems – – transportation.			
Objectives: Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:			

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(1) An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.	✓		
(2) A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State.			✓
Policies:			
(1) Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter;			✓
(2) Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives;			✓
(3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties;			✓
(4) Provide for improved accessibility to shipping, docking, and storage facilities;			✓
(5) Promote a reasonable level and variety of mass transportation services that adequately meet statewide and community needs;			✓
(6) Encourage transportation systems that serve to accommodate present and future development needs of communities;			✓
(7) Encourage a variety of carriers to offer increased opportunities and advantages to interisland movement of people and goods;			✓
(8) Increase the capacities of airport and harbor systems and support facilities to effectively accommodate transshipment and storage needs;			✓
(9) Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification;			✓
(10) Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment;			✓
(11) Encourage safe and convenient use of low-cost, energy-efficient, non-polluting means of transportation;	✓		
(12) Coordinate intergovernmental land use and transportation planning activities to ensure the timely delivery of supporting transportation infrastructure in order to accommodate planned growth objectives; and			✓
(13) Encourage diversification of transportation modes and infrastructure to promote alternate fuels and energy efficiency.	✓		
Analysis: **In accordance with the project's overall guiding sustainability principles, bicycling and walking will be encouraged by road design within the proposed Wailea Resort SF-S Residential Project. Multi-modal paths will be installed on main roads and will be connected to Wailea Alanui Drive and Kapili Street.**			
Chapter 226-18 Objectives and policies for facility systems – – energy.			
Objectives: Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:			
(1) Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(2) Increased energy security and self-sufficiency through the reduction and ultimate elimination of Hawaii's dependence on imported fuels for electrical generation and ground transportation.	✓		
(3) Greater diversification of energy generation in the face of threats to Hawaii's energy supplies and systems;	✓		
(4) Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use; and	✓		
(5) Utility models that make the social and financial interests of Hawaii's utility customers a priority.			✓
(b) To achieve the energy objectives, it shall be the policy of this State to ensure the short- and long-term provision of adequate, reasonably prices, and dependable energy services to accommodate demand.			✓
Policies:			
(1) Support research and development as well as promote the use of renewable energy sources;	✓		
(2) Ensure that the combination of energy supplies and energy-saving systems is sufficient to support the demands of growth;	✓		
(3) Base decisions of least-cost supply-side and demand-side energy resource options on a comparison of their total costs and benefits when a least-cost is determined by a reasonably comprehensive, quantitative, and qualitative accounting of their long-term, direct and indirect economic, environmental, social, cultural, and public health costs and benefits;			✓
(4) Promote all cost-effective conservation of power and fuel supplies through measures, including:	✓		
(A) Development of cost-effective demand-side management programs;	✓		
(B) Education;			✓
(C) Adoption of energy-efficient practices and technologies; and	✓		
(D) Increasing energy efficiency and decreasing energy use in public infrastructure			✓
(5) Ensure, to the extent that new supply-side resources are needed, that the development or expansion of energy systems uses the least-cost energy supply option and maximizes efficient technologies; and			✓
(6) Support research, development, demonstration, and use of energy efficiency, load management, and other demand-side management programs, practices, and technologies;			✓
(7) Promote alternate fuels and transportation energy efficiency;			✓
(8) Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications;	✓		
(9) Support actions that reduce, avoid, or sequester Hawaii's greenhouse gas emissions through agriculture and forestry initiatives;			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(10) Provide priority handling and processing for all state and county permits required for renewable energy projects;			✓
(11) Ensure that liquefied natural gas is used only as a cost-effective transitional, limited-term replacement of petroleum for electricity generation and does not impede the development and use of other cost-effective renewable energy sources; and			✓
(12) Promote the development of indigenous geothermal energy resources that are located on public trust land as an affordable and reliable source of firm power for Hawaii.			✓
Analysis: **The proposed project will incorporate sustainable design features, such as rooftop solar photovoltaic (PV) and Electric Vehicle (EV) charger-ready home designs and use of energy efficient appliances and lighting, to reduce overall energy consumption and greenhouse gas (GHG) emissions per square foot.**			
Chapter 226-18.5 Objectives and policies for facility systems – – telecommunications.			
<u>Objectives</u>:			
(a) Planning for the State's telecommunications facility systems shall be directed towards the achievement of dependable, efficient, and economical statewide telecommunications systems capable of supporting the needs of the people.			✓
(b) To achieve the telecommunications objective, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable telecommunications services to accommodate demand.			✓
<u>Policies</u>:			
(1) Facilitate research and development of telecommunications systems and resources;			✓
(2) Encourage public and private sector efforts to develop means for adequate, ongoing telecommunications planning;			✓
(3) Promote efficient management and use of existing telecommunications systems and services; and			✓
(4) Facilitate the development of education and training of telecommunications personnel.			✓
Analysis: **Not Applicable.**			
Chapter 226-19 Objectives and policies for socio-cultural advancement – – housing.			
<u>Objectives</u>: Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:	✓		
(1) Greater opportunities for Hawaii's people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more affordable housing is made available to very low-, low- and moderate-income segments of Hawaii's population.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(2) The orderly development of residential areas sensitive to community needs and other land uses.	✓		
(3) The development and provision of affordable rental housing by the State to meet the housing needs of Hawaii's people.			✓
Policies:			
(1) Effectively accommodate the housing needs of Hawaii's people.	✓		
(2) Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.			✓
(3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.	✓		
(4) Promote appropriate improvement, rehabilitation, and maintenance of existing housing units and residential areas.			✓
(5) 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.	✓		
(6) Facilitate the use of available vacant, developable, and underutilized urban lands for housing.	✓		
(7) Foster a variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods that reflect the culture and values of the community.	✓		
(8) Promote research and development of methods to reduce the cost of housing construction in Hawaii.			✓
Analysis: **The project site is currently vacant and in proximity to existing urban services making it an appropriate location for resort residential development. The proposed project will comply with applicable requirements of Chapter 2.96, MCC by utilizing the County workforce housing credits that were issued for already completed workforce housing units, which were acquired from A&B Wailea LLC, the previous owner of the property.**			
Chapter 226-20 Objectives and policies for socio-cultural advancement – – health.			
Objectives: Planning for the State's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:			
(1) Fulfillment of basic individual health needs of the general public.			✓
(2) Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.			✓
(3) Elimination of health disparities by identifying and addressing social determinants of health.			✓
Policies:			
(1) Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems, including substance abuse.			✓
(2) Encourage improved cooperation among public and private sectors in the provision of health care to accommodate the total health needs of individuals throughout the State.			✓

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(3) Encourage public and private efforts to develop and promote statewide and local strategies to reduce health care and related insurance costs.			✓
(4) Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.			✓
(5) Provide programs, services, and activities that ensure environmentally healthful and sanitary conditions.			✓
(6) Improve the State’s capabilities in preventing contamination by pesticides and other potentially hazardous substances through increased coordination, education, monitoring, and enforcement.			✓
(7) Prioritize programs, services, interventions, and activities that address identified social determinants of health to improve native Hawaiian health and well-being consistent with the United States Congress' declaration of policy as codified in title 42 United States Code section 11702, and to reduce health disparities of disproportionately affected demographics, including native Hawaiians, other Pacific Islanders, and Filipinos. The prioritization of affected demographic groups other than native Hawaiians may be reviewed every ten years and revised based on the best available epidemiological and public health data.			✓
Analysis: **Not Applicable.**			
Chapter 226-21 Objectives and policies for Socio-cultural advancement – – education.			
Objective: Planning for the State’s socio-cultural advancement with regard to education shall be directed towards achievement of the objective of the provision of a variety of educational opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations.			✓
Policies:			
(1) Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.			✓
(2) Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.			✓
(3) Provide appropriate educational opportunities for groups with special needs.			✓
(4) Promote educational programs which enhance understanding of Hawaii’s cultural heritage.			✓
(5) Provide higher educational opportunities that enable Hawaii’s people to adapt to changing employment demands.			✓
(6) Assist individuals, especially those experiencing critical employment problems or barriers, or undergoing employment transitions, by providing appropriate employment training programs and other related educational opportunities.			✓
(7) Promote programs and activities that facilitate the acquisition of basic skills, such as reading, writing, computing, listening, speaking, and reasoning.			✓
(8) Emphasize quality educational programs in Hawaii’s institutions to promote academic excellence.			✓
(9) Support research programs and activities that enhance the education programs of the State.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
Analysis: **Not Applicable.**			
Chapter 226-22 Objective and policies for socio-cultural advancement – – social services.			
Objective: Planning for the State's socio-cultural advancement with regard to social services shall be directed towards the achievement of the objective of improved public and private social services and activities that enable individuals, families, and groups to become more self-reliant and confident to improve their well-being.			✓
Policies:			
(1) Assist individuals, especially those in need of attaining a minimally adequate standard of living and those confronted by social and economic hardship conditions, through social services and activities within the State's fiscal capacities.			✓
(2) Promote coordination and integrative approaches among public and private agencies and programs to jointly address social problems that will enable individuals, families, and groups to deal effectively with social problems and to enhance their participation in society.			✓
(3) Facilitate the adjustment of new residents, especially recently arrived immigrants, into Hawaii's communities.			✓
(4) Promote alternatives to institutional care in the provision of long-term care for elder and disabled populations.			✓
(5) Support public and private efforts to prevent domestic abuse and child molestation, and assist victims of abuse and neglect.			✓
(6) Promote programs which assist people in need of family planning services to enable them to meet their needs.			✓
Analysis: **Not Applicable.**			
Chapter 226-23 Objective and policies for socio-cultural advancement – – leisure.			
Objective: Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.			✓
Policies:			
(1) Foster and preserve Hawaii's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.			✓
(2) Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently.			✓
(3) Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.			✓
(4) 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.			✓

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(5) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.			✓
(6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.			✓
(7) Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawaii's people.			✓
(8) Increase opportunities for appreciation and participation in the creative arts, including the literary, theatrical, visual, musical, folk, and traditional art forms.			✓
(9) Encourage the development of creative expression in the artistic disciplines to enable all segments of Hawaii's population to participate in the creative arts.			✓
(10) Assure adequate access to significant natural and cultural resources in public ownership.			✓
Analysis: **Not Applicable.**			
Chapter 226-24 Objective and policies for socio-cultural advancement – – individual rights and personal well-being.			
Objective: Planning for the State's socio-cultural advancement with regard to individual rights and personal well-being shall be directed towards achievement of the objective of increased opportunities and protection of individual rights to enable individuals to fulfill their socio-economic needs and aspirations.			✓
Policies:			
(1) Provide effective services and activities that protect individuals from criminal acts and unfair practices and that alleviate the consequences of criminal acts in order to foster a safe and secure environment.			✓
(2) Uphold and protect the national and state constitutional rights of every individual.			✓
(3) Assure access to, and availability of, legal assistance, consumer protection, and other public services which strive to attain social justice.			✓
(4) Ensure equal opportunities for individual participation in society.			✓
Analysis: **Not Applicable.**			
Chapter 226-25 Objective and policies for socio-cultural advancement – – culture.			
Objective: Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawaii's people.			✓
Policies:			
(1) Foster increased knowledge and understanding of Hawaii's ethnic and cultural heritages and the history of Hawaii.	✓		

Hawai'i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
(2) Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawaii's people and which are sensitive and responsive to family and community needs.	✓		
(3) Encourage increased awareness of the effects of proposed public and private actions on the integrity and quality of cultural and community lifestyles in Hawaii.			✓
(4) Encourage the essence of the aloha spirit in people's daily activities to promote harmonious relationships among Hawaii's people and visitors.			✓
Analysis: **A Cultural Impact Assessment has been prepared for the proposed project. Further, in accordance with the project's overall guiding sustainability principles, various measures will be implemented as part of the project to educate new residents of the proposed residential community and honor native Hawaiian culture and art.**			
Chapter 226-26 Objectives and policies for socio-cultural advancement – – public safety.			
Objective: Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:			
(1) Assurance of public safety and adequate protection of life and property for all people.			✓
(2) Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic well-being of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.			✓
(3) Promotion of a sense of community responsibility for the welfare and safety of Hawaii's people.			✓
Policies (Public Safety):			
(1) Ensure that public safety programs are effective and responsive to community needs.			✓
(2) Encourage increased community awareness and participation in public safety programs.			✓
Policies (Public Safety-Criminal Justice):			
(1) Support criminal justice programs aimed at preventing and curtailing criminal activities.			✓
(2) Develop a coordinated, systematic approach to criminal justice administration among all criminal justice agencies.			✓
(3) Provide a range of correctional resources which may include facilities and alternatives to traditional incarceration in order to address the varied security needs of the community and successfully reintegrate offenders into the community.			✓
Policies (Public Safety – Emergency Management):			
(1) Ensure that responsible organizations are in a proper state of readiness to respond to major war-related, natural, or technological disasters and civil disturbances at all times.			✓
(2) Enhance the coordination between emergency management programs throughout the State.			✓
Analysis: **Not Applicable.**			

Hawai‘i State Plan, Chapter 226, HRS Part I. Overall Themes, Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not Applicable	S	N/S	N/A
Chapter 226-27 Objectives and policies for socio-cultural advancement – – government.			
<u>Objectives</u>: Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:			
(1) Efficient, effective, and responsive government services at all levels in the State.			✓
(2) Fiscal integrity, responsibility, and efficiency in the state government and county governments.			✓
<u>Policies</u>:			
(1) Provide for necessary public goods and services not assumed by the private sector.			✓
(2) Pursue an openness and responsiveness in government that permits the flow of public information, interaction, and response.			✓
(3) Minimize the size of government to that necessary to be effective.			✓
(4) Stimulate the responsibility in citizens to productively participate in government for a better Hawaii.			✓
(5) Assure that government attitudes, actions, and services are sensitive to community needs and concerns.			✓
(6) Provide for a balanced fiscal budget.			✓
(7) Improve the fiscal budgeting and management system of the State.			✓
(8) Promote the consolidation of state and county governmental functions to increase the effective and efficient delivery of government programs and services and to eliminate duplicative services wherever feasible.			✓
Analysis: **Not Applicable.**			

HAWAI‘I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
Chapter 226-101: Purpose. The purpose of this part is to establish overall priority guidelines to address areas of statewide concern.			
Chapter 226-102: Overall direction. The State shall strive to improve the quality of life for Hawaii's present and future population through the pursuit of desirable courses of action in seven major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, quality education, principles of sustainability, and climate change adaptation.			
Chapter 226-103: Economic priority guidelines.			
(a) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaii's people and achieve a stable and diversified economy:			
(1) Seek a variety of means to increase the availability of investment capital for new and expanding enterprises.			✓
(A) Encourage investments which:	✓		

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
(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 provide management opportunities to Hawaii residents; and	✓		
(B) Encourage investments in innovative activities that have a nexus to the State, such as:			✓
(i) Present or former residents acting as entrepreneurs or principals;			✓
(ii) Academic support from an institution of higher education in Hawaii;			✓
(iii) Investment interest from Hawaii residents;			✓
(iv) Resources unique to Hawaii that are required for innovative activity; and			✓
(v) Complementary or supportive industries or government programs or projects.			✓
(2) Encourage the expansion of technological research to assist industry development and support the development and commercialization of technological advancements.			✓
(3) Improve the quality, accessibility, and range of services provided by government to business, including data and reference services and assistance in complying with governmental regulations.			✓
(4) Seek to ensure that state business tax and labor laws and administrative policies are equitable, rational, and predictable.			✓
(5) Streamline the processes for building and development permit and review, and telecommunication infrastructure installation approval and eliminate or consolidate other burdensome or duplicative governmental requirements imposed on business, where scientific evidence indicates that public health, safety and welfare would not be adversely affected.			✓
(6) Encourage the formation of cooperatives and other favorable marketing or distribution arrangements at the regional or local level to assist Hawaii's small-scale producers, manufacturers, and distributors.			✓
(7) Continue to seek legislation to protect Hawaii from transportation interruptions between Hawaii and the continental United States.			✓
(8) Provide public incentives and encourage private initiative to develop and attract industries which promise long-term growth potentials and which have the following characteristics:			✓
(A) An industry that can take advantage of Hawaii's unique location and available physical and human resources.			✓
(B) A clean industry that would have minimal adverse effects on Hawaii's environment.			✓
(C) An industry that is willing to hire and train Hawaii's people to meet the industry's labor needs at all levels of employment.			✓
(D) An industry that would provide reasonable income and steady employment.			✓
(9) Support and encourage, through educational and technical assistance programs and other means, expanded opportunities for employee ownership and participation in Hawaii business.			✓

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
(10) Enhance the quality of Hawaii's labor force and develop and maintain career opportunities for Hawaii's people through the following actions:			✓
(A) Expand vocational training in diversified agriculture, aquaculture, information industry, and other areas where growth is desired and feasible.			✓
(B) Encourage more effective career counseling and guidance in high schools and post-secondary institutions to inform students of present and future career opportunities.			✓
(C) Allocate educational resources to career areas where high employment is expected and where growth of new industries is desired.			✓
(D) Promote career opportunities in all industries for Hawaii's people by encouraging firms doing business in the State to hire residents.			✓
(E) Promote greater public and private sector cooperation in determining industrial training needs and in developing relevant curricula and on-the-job training opportunities.			✓
(F) Provide retraining programs and other support services to assist entry of displaced workers into alternative employment.			✓
(b) Priority guidelines to promote the economic health and quality of the visitor industry:			
(1) Promote visitor satisfaction by fostering an environment which enhances the Aloha Spirit and minimizes inconveniences to Hawaii's residents and visitors.			✓
(2) Encourage the development and maintenance of well-designed, adequately serviced hotels and resort destination areas which are sensitive to neighboring communities and activities and which provide for adequate shoreline setbacks and beach access.	✓		
(3) Support appropriate capital improvements to enhance the quality of existing resort destination areas and provide incentives to encourage investment in upgrading, repair, and maintenance of visitor facilities.			✓
(4) Encourage visitor industry practices and activities which respect, preserve, and enhance Hawaii's significant natural, scenic, historic, and cultural resources.			✓
(5) Develop and maintain career opportunities in the visitor industry for Hawaii's people, with emphasis on managerial positions.			✓
(6) Support and coordinate tourism promotion abroad to enhance Hawaii's share of existing and potential visitor markets.			✓
(7) Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.			✓
(8) Support law enforcement activities that provide a safer environment for both visitors and residents alike.			✓
(9) Coordinate visitor industry activities and promotions to business visitors through the state network of advanced data communication techniques.			✓
(c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:			
(1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.			✓
(2) Continue efforts to maintain federal support to provide stable sugar prices high enough to allow profitable operations in Hawaii.			✓
(3) Support research and development, as appropriate, to improve the quality and production of sugar and pineapple crops.			✓
(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:			

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
(1) Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.			✓
(2) Assist in providing adequate, reasonably priced water for agricultural activities.			✓
(3) Encourage public and private investment to increase water supply and to improve transmission, storage, and irrigation facilities in support of diversified agriculture and aquaculture.			✓
(4) Assist in the formation and operation of production and marketing associations and cooperatives to reduce production and marketing costs.			✓
(5) Encourage and assist with the development of a waterborne and airborne freight and cargo system capable of meeting the needs of Hawaii's agricultural community.			✓
(6) Seek favorable freight rates for Hawaii's agricultural products from interisland and overseas transportation operators.			✓
(7) Encourage the development and expansion of agricultural and aquacultural activities which offer long-term economic growth potential and employment opportunities.			✓
(8) Continue the development of agricultural parks and other programs to assist small independent farmers in securing agricultural lands and loans.			✓
(9) Require agricultural uses in agricultural subdivisions and closely monitor the uses in these subdivisions.			✓
(10) Support the continuation of land currently in use for diversified agriculture.			✓
(11) Encourage residents and visitors to support Hawaii's farmers by purchasing locally grown food and food products.			✓
(e) Priority guidelines for water use and development:			
(1) Maintain and improve water conservation programs to reduce the overall water consumption rate.	✓		
(2) Encourage the improvement of irrigation technology and promote the use of nonpotable water for agricultural and landscaping purposes.	✓		
(3) Increase the support for research and development of economically feasible alternative water sources.			✓
(4) Explore alternative funding sources and approaches to support future water development programs and water system improvements.			✓
(f) Priority guidelines for energy use and development:			
(1) Encourage the development, demonstration, and commercialization of renewable energy sources.	✓		
(2) Initiate, maintain, and improve energy conservation programs aimed at reducing energy waste and increasing public awareness of the need to conserve energy.	✓		
(3) Provide incentives to encourage the use of energy conserving technology in residential, industrial, and other buildings.			✓
(4) Encourage the development and use of energy conserving and cost-efficient transportation systems.	✓		
(g) Priority guidelines to promote the development of the information industry:			
(1) Establish an information network, with an emphasis on broadband and wireless infrastructure and capability that will serve as the foundation of and catalyst for overall economic growth and diversification in Hawaii.			✓
(2) Encourage the development of services such as financial data processing, a products and services exchange, foreign language			✓

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
translations, telemarketing, teleconferencing, a twenty-four-hour international stock exchange, international banking, and a Pacific Rim management center.			
(3) Encourage the development of small businesses in the information field such as software development; the development of new information systems, peripherals, and applications; data conversion and data entry services; and home or cottage services such as computer programming, secretarial, and accounting services.			✓
(4) Encourage the development or expansion of educational and training opportunities for residents in the information and telecommunications fields.			✓
(5) Encourage research activities, including legal research in the information and telecommunications fields.			✓
(6) Support promotional activities to market Hawaii's information industry services.			✓
(7) Encourage the location or co-location of telecommunication or wireless information relay facilities in the community, including public areas, where scientific evidence indicates that the public health, safety, and welfare would not be adversely affected.			✓
Analysis: **The development of the project will generate significant expenditures and generate construction-related jobs during build-out of the project. In the long run, the project will provide increased job opportunities for operations of the residential community and create new spending by new residents. Consistent with the applicable priority guidelines for water use/energy use and development, the project will include water and energy conservation measures as well as rooftop solar PV and EV charger-ready home designs, guided by the project's sustainability principles.**			
Chapter 226-104: Population growth and land resources priority guidelines.			
(a) Priority guidelines to effect desired statewide growth and distribution:			
(1) Encourage planning and resource management to insure 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.	✓		
(2) Manage a growth rate for Hawaii's economy that will parallel future employment needs for Hawaii's people.			✓
(3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.	✓		
(4) Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.			✓
(5) Explore the possibility of making available urban land, low-interest loans, and housing subsidies to encourage the provision of housing to support selective economic and population growth on the neighbor islands.			✓
(6) Seek federal funds and other funding sources outside the State for research, program development, and training to provide future employment opportunities on the neighbor islands.			✓
(7) Support the development of high technology parks on the neighbor islands.			✓
(b) Priority guidelines for regional growth distribution and land resource utilization:			

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
(1) 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.	✓		
(2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.			✓
(3) Restrict development when drafting of water would result in exceeding the sustainable yield or in significantly diminishing the recharge capacity of any groundwater area.			✓
(4) Encourage restriction of new urban development in areas where water is insufficient from any source for both agricultural and domestic use.			✓
(5) In order to preserve green belts, give priority to state capital-improvement funds which encourage location of urban development within existing urban areas except where compelling public interest dictates development of a noncontiguous new urban core.			✓
(6) Seek participation from the private sector for the cost of building infrastructure and utilities, and maintaining open spaces.	✓		
(7) Pursue rehabilitation of appropriate urban areas.			✓
(8) Support the redevelopment of Kakaako into a viable residential, industrial, and commercial community.			✓
(9) Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.	✓		
(10) Identify critical environmental areas in Hawaii to include but not be limited to the following: watershed and recharge areas; wildlife habitats (on land and in the ocean); areas with endangered species of plants and wildlife; natural streams and water bodies; scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas particularly sensitive to reduction in water and air quality; and scenic resources.			✓
(11) Identify all areas where priority should be given to preserving rural character and lifestyle.			✓
(12) 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.	✓		
(13) Protect and enhance Hawaii's shoreline, open spaces, and scenic resources.	✓		
Analysis: **The proposed project is located in an area where County services and infrastructure are readily available and will not extend existing limits of service. The proposed project will be developed on lands that have been designated for urban use and appropriately zoned for the proposed use. The proposed project is not near the shoreline and will not adversely impact shoreline resources. A View Analysis has been carried out for the proposed project to ensure that the project will not result in adverse visual impacts to the surrounding roadways and public vantage points.**			
Chapter 226-105: Crime and criminal justice.			
Priority guidelines in the area of crime and criminal justice:			

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
(1) Support law enforcement activities and other criminal justice efforts that are directed to provide a safer environment.			✓
(2) Target state and local resources on efforts to reduce the incidence of violent crime and on programs relating to the apprehension and prosecution of repeat offenders.			✓
(3) Support community and neighborhood program initiatives that enable residents to assist law enforcement agencies in preventing criminal activities.			✓
(4) Reduce overcrowding or substandard conditions in correctional facilities through a comprehensive approach among all criminal justice agencies which may include sentencing law revisions and use of alternative sanctions other than incarceration for persons who pose no danger to their community.			✓
(5) Provide a range of appropriate sanctions for juvenile offenders, including community-based programs and other alternative sanctions.			✓
(6) Increase public and private efforts to assist witnesses and victims of crimes and to minimize the costs of victimization.			✓
Analysis: **Not Applicable.**			
Chapter 226-106: Affordable housing.			
Priority guidelines for the provision of affordable housing:			
(1) Seek to use marginal or nonessential agricultural land and public land to meet housing needs of low- and moderate-income and gap-group households.			✓
(2) Encourage the use of alternative construction and development methods as a means of reducing production costs.			✓
(3) Improve information and analysis relative to land availability and suitability for housing.			✓
(4) Create incentives for development which would increase home ownership and rental opportunities for Hawaii's low- and moderate-income households, gap-group households, and residents with special needs.			✓
(5) Encourage continued support for government or private housing programs that provide low interest mortgages to Hawaii's people for the purchase of initial owner-occupied housing.			✓
(6) Encourage public and private sector cooperation in the development of rental housing alternatives.			✓
(7) Encourage improved coordination between various agencies and levels of government to deal with housing policies and regulations.			✓
(8) 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.			✓
Analysis: **Not Applicable.**			
Chapter 226-107: Quality education.			
Priority guidelines to promote quality education:			
(1) Pursue effective programs which reflect the varied district, school, and student needs to strengthen basic skills achievement;			✓
(2) Continue emphasis on general education "core" requirements to provide common background to students and essential support to other university programs;			✓

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
(3) Initiate efforts to improve the quality of education by improving the capabilities of the education work force;			✓
(4) Promote increased opportunities for greater autonomy and flexibility of educational institutions in their decision making responsibilities;			✓
(5) Increase and improve the use of information technology in education by the availability of telecommunications equipment for:			✓
(A) The electronic exchange of information;			✓
(B) Statewide electronic mail; and			✓
(C) Access to the Internet.			✓
(6) Encourage programs that increase the public's awareness and understanding of the impact of information technologies on our lives;			✓
(7) Pursue the establishment of Hawaii's public and private universities and colleges as research and training centers of the Pacific;			✓
(8) Develop resources and programs for early childhood education;			✓
(9) Explore alternatives for funding and delivery of educational services to improve the overall quality of education; and			✓
(10) Strengthen and expand educational programs and services for students with special needs.			✓
Analysis: Not Applicable.			
CHAPTER 226-108: Sustainability			
Priority guidelines and principles to promote sustainability shall include:			
(1) Encouraging balanced economic, social, community, and environmental priorities;	✓		
(2) Encouraging planning that respects and promotes living within the natural resources and limits of the State;	✓		
(3) Promoting a diversified and dynamic economy;	✓		
(4) Encouraging respect for the host culture;	✓		
(5) Promoting decisions based on meeting the needs of the present without compromising the needs of future generations;	✓		
(6) Considering the principles of the ahupuaa system; and			✓
(7) Emphasizing that everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Hawaii.	✓		
Analysis: **The proposed site has been identified by both the State Land Use Commission and the County's MIP as an appropriate location for urban growth in the close proximity to existing infrastructure and services. Sustainable design features will be incorporated into the project to promote responsible use of resources by its residents.**			
CHAPTER 226-109: Climate change adaptation			
Priority guidelines and principles to promote climate change adaptation shall include:			
(1) Ensure that Hawaii's people are educated, informed, and aware of the impacts climate change may have on their communities;			✓
(2) Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies;			✓
(3) Invest in continued monitoring and research of Hawaii's climate and the impacts of climate change on the State;			✓
(4) Consider native Hawaiian traditional knowledge and practices in planning for the impacts of climate change;			✓

HAWAI'I STATE PLAN, CHAPTER 226, HRS – PART III. PRIORITY GUIDELINES	S	N/S	N/A
(5) Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands, that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change;			✓
(6) Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments;			✓
(7) Promote sector resilience in areas such as water, roads, airports, and public health, by encouraging the identification of climate change threats, assessment of potential consequences, and evaluation of adaptation options;			✓
(8) Foster cross-jurisdictional collaboration between county, state, and federal agencies and partnerships between government and private entities and other nongovernmental entities, including nonprofit entities;			✓
(9) Use management and implementation approaches that encourage the continual collection, evaluation, and integration of new information and strategies into new and existing practices, policies, and plans; and			✓
(10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy.	✓		
Analysis: **The project site is located inland of the 3.2-foot sea level rise exposure area. Sustainable design features have been incorporated into the proposed project to promote responsible resource use and reduce GHG emissions.**			

C. STATE FUNCTIONAL PLANS

A key element of the Statewide Planning System is the Functional Plans which set forth the policies, statewide guidelines, and priorities within a specific field of activity. There are 13 Functional Plans which have been developed by the State agency primarily responsible for a given functional area. Together with the County General Plans, the State Functional Plans establish more specific strategies for implementation. In particular, State Functional Plans provide for the following:

- Identify major Statewide priority concerns
- Define current strategies for each functional area
- Identify major relationships among functional areas
- Provide direction and strategies for departmental policies, programs, and priorities
- Provide a guide for the allocation of resources
- Coordinate State and County roles and responsibilities in the implementation of the Hawaii State Plan

Thirteen (13) Functional Plans have been prepared by State agencies. **Table 6** provides an assessment of the relationship between the proposed action and each of the 13 Functional Plans.

Table 6. Relationship Between the Proposed Wailea Resort SF-S Residential Project and the State Functional Plans

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
1	Agriculture Functional Plan (1991)	Department of Agriculture	Continued viability of agriculture throughout the State	Not Applicable
2	Conservation Lands State Functional Plan (1991)	Department of Land and Natural Resources	Addresses issues of population and economic growth and its strain on current natural resources; broadening public use of natural resources while protecting lands and shorelines from overuse; additionally, promotes the aquaculture industry	Not Applicable
3	Education State Functional Plan (1989)	Department of Education	Improvements to Hawaii's educational curriculum, quality of educational staff, and access to adequate facilities	Not Applicable
4	Employment State Functional Plan (1990)	Department of Labor and Industrial Relations	Improve the qualifications, productivity, and effectiveness of the State's workforce through better education and training of workers as well as efficient planning of economic development, employment opportunities, and training activities	The proposed project will have a beneficial short-term impact on the State's workforce through construction and long-term employment benefits from operations, maintenance, and administration of the residential community.
5	Energy State Functional Plan (1991)	Department of Business, Economic Development and Tourism	Lessen the reliance on petroleum and other fossil fuels in favor of alternative sources of energy so as to keep up with the State's increasing energy demands while also becoming a more sustainable island state; achieving dependable, efficient, and economical statewide energy systems	The project proposes to implement sustainability measures in support of the State's energy objectives.
6	Health State Functional Plan (1989)	Department of Health	Improve health care system by providing for those who don't have access to private health care providers; increasing preventative health measures; addressing 'quality of care' elements in private and public sectors to cut increasing costs	Not Applicable
7	Higher Education Functional Plan (1984)	University of Hawaii	Prepare Hawaii's citizens for the demands of an increasingly complex world through providing technical and intellectual tools	Not Applicable

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
8	Historic Preservation State Functional Plan (1991)	Department of Land and Natural Resources	Preservation of historic properties, records, artifacts and oral histories; provide public with information/education on the ethnic and cultural heritages and history of Hawai‘i	An Archaeological Inventory Survey (AIS) carried out for the project concluded no further archaeological work is recommended. Refer to **Appendix "E"**.
9	Housing State Functional Plan (1989)	Hawaii Housing Finance and Development Corporation	Provide affordable rental and for-sale housing; increase homeownership and amount of rental housing units; acquiring public and privately-owned lands for future residential development; maintain a statewide housing data system	The proposed project will comply with applicable provisions of Chapter 2.96, MCC.
10	Human Services State Functional Plan (1989)	Department of Human Services	Refining support systems for families and individuals by improving elderly care, increasing preventative measures to combat child/spousal abuse and neglect; providing means for 'self-sufficiency'	Not Applicable
11	Recreation State Functional Plan (1991)	Department of Land and Natural Resources	Manage the use of recreational resources via addressing issues: (1) ocean and shoreline recreation, (2) mauka, urban, and other recreation opportunities, (3) public access to shoreline and upland recreation areas, (4) resource conservation and management, (5) management of recreation programs/facilities/areas, and (6) wetlands protection and management	Not Applicable
12	Tourism State Functional Plan (1991)	Department of Business, Economic Development and Tourism	Balance tourism/economic growth with environmental and community concerns; development that is cognizant of the limited land and water resources of the islands; maintaining friendly relations between tourists and community members; development of a productive workforce and enhancement of career and employment opportunities in the visitor industry.	Not Applicable

	State Functional Plan	State Coordinating Agency	Purpose	Analysis
13	Transportation State Functional Plan (1991)	Department of Transportation	Development of a safer, more efficient transportation system that also is consistent with planned physical and economic growth of the state; construction of facility and infrastructure improvements; develop a transportation system balanced with new alternatives; pursue land use initiatives which help reduce travel demand	As documented in the Traffic Impact Analysis Report (TIAR), the proposed project is not anticipated to result in significant adverse impacts to the traffic conditions in the vicinity of the project site. Refer to **Appendix "H"**.

D. COUNTYWIDE POLICY PLAN

The Countywide Policy Plan was adopted in March 2010 and is a comprehensive policy document for the islands of Maui County to the year 2030. The plan replaces the *General Plan of the County of Maui 1990 Update* and provides the policy framework for the development of the forthcoming Maui Island Plan as well as for updating the nine (9) detailed Community Plans.

The Countywide Policy Plan provides broad goals, objectives, policies and implementing actions that portray the desired direction of the County's future. Goals are intended to describe a desirable condition of the County by the year 2030 and are intentionally general. Objectives tend to be more specific and may be regarded as milestones to achieve the larger goals. Policies are not intended as regulations, but instead provide a general guideline for County decision makers, departments, and collaborating organizations toward the attainment of goals and objectives. Implementing actions are specific tasks, procedures, programs, or techniques that carry out policy.

Discussion of the proposed project conforms to the relevant goals, objectives, policies, and implementing actions of the Countywide Policy Plan is provided below.

COUNTYWIDE POLICY PLAN **(Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)**	**S**	**N/S**	**N/A**
A. PROTECT THE NATURAL ENVIRONMENT			
Goal: Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.	✓		
Objective:			
(1) Improve the opportunity to experience the natural beauty and native biodiversity of the islands for present and future generations.			✓
Policies:			
(a) Perpetuate native Hawaiian biodiversity by preventing the introduction of invasive species, containing or eliminating existing noxious pests, and protecting critical habitat areas.			✓
(b) Preserve and reestablish indigenous and endemic species' habitats and their connectivity.	✓		
(c) Restore and protect forests, wetlands, watersheds, and stream flows, and guard against wildfires, flooding, and erosion.			✓
(d) Protect baseline stream flows for perennial streams, and support policies that ensure adequate stream flow to support Native Hawaiian aquatic species, traditional kalo cultivation, and self-sustaining ahupuaʻa.			✓
(e) Protect undeveloped beaches, dunes, and coastal ecosystems, and restore natural shoreline processes.			✓
(f) Protect the natural state and integrity of unique terrain, valued natural environments, and geological features.	✓		
(g) Preserve and provide ongoing care for important scenic vistas, view planes, landscapes, and open-space resources.	✓		
(h) Expand coordination with the State and nonprofit agencies and their volunteers to reduce invasive species, replant indigenous species, and identify critical habitat.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
Implementing Actions:			
(a) Develop island-wide networks of greenways, watercourses, and habitat corridors.	✓		
Analysis: **Pursuant to the requirements of the Planned Development standards, the proposed project will retain over 20 percent of the project area in open space. A View Analysis has been conducted for the project to ensure that view corridors will be preserved. The proposed landscape plan will incorporate, to the extent possible, indigenous and endemic plant species.**			
Objective:			
(2) Improve the quality of environmentally sensitive, locally valued natural resources and native ecology of each island.	✓		
Policies:			
(a) Protect and restore nearshore reef environments and water quality.	✓		
(b) Protect marine resources and valued wildlife.	✓		
(c) Improve the connection between urban environments and the natural landscape, and incorporate natural features of the land into urban design.	✓		
(d) Utilize land-conservation tools to ensure the permanence of valued open spaces.			✓
(e) Mitigate the negative effects of upland uses on coastal wetlands, marine life, and coral reefs.	✓		
(f) Strengthen coastal-zone management, re-naturalization of shorelines, where possible, and filtration or treatment of urban and agricultural runoff.	✓		
(g) Regulate the use and maintenance of stormwater-treatment systems that incorporate the use of native vegetation and mimic natural systems.	✓		
(h) Advocate for stronger regulation of fishing, boating, cruise ship, and ecotourism activities.			✓
(i) Restore watersheds and aquifer-recharge areas to healthy and productive status, and increase public knowledge about the importance of watershed stewardship, water conservation, and groundwater protection.			✓
Implementing Actions:			
(a) Develop regulations to minimize runoff of pollutants into nearshore waters and reduce nonpoint and point source pollution.			✓
Analysis: **The proposed project will incorporate a comprehensive drainage system including LID measures, such as bioretention strips, to channel stormwater runoff into drainage detention basins and subsurface storage chambers, and protect downstream properties as well as marine water quality and nearshore reef environments.**			
Objective:			
(3) Improve the stewardship of the natural environment.	✓		
Policies:			
(a) Preserve and protect natural resources with significant scenic, economic, cultural, environmental, or recreational value.	✓		
(b) Improve communication, coordination, and collaboration among government agencies, nonprofit organizations, communities, individuals, and land owners that work for the protection of the natural environment.			✓
(c) Evaluate development to assess potential short-term and long-term impacts on land, air, aquatic, and marine environments.	✓		
(d) Improve efforts to mitigate and plan for the impact of natural disasters, human influenced emergencies, and global warming.	✓		

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(e) Regulate access to sensitive ecological sites and landscapes.			✓
(f) Reduce air, noise, light, land, and water pollution, and reduce Maui County's contribution to global climate change.	✓		
(g) Plan and prepare for and educate visitors and residents about the possible effects of global warming.			✓
(h) Provide public access to beaches and shorelines for recreational and cultural purposes where appropriate.			✓
(i) Educate the construction and landscape industries and property owners about the use of best management practices to prevent erosion and nonpoint source pollution.			✓
(j) Support the acquisition of resources with scenic, environmental, and recreational value, and encumber their use.			✓
(k) Improve enforcement activities relating to the natural environment.			✓
(l) For each shoreline community, identify and prioritize beach-conservation objectives, and develop action plans for their implementation.			✓
Implementing Actions:			
(a) Document, record, and monitor existing conditions, populations, and locations of flora and fauna communities.	✓		
(b) Implement Federal and State policies that require a reduction of greenhouse-gas emissions.	✓		
(c) Establish a baseline inventory of available natural resources and their respective carrying capacities.			✓
Analysis: **Appropriate Best Management Practices (BMPs) will be implemented during construction of the project to mitigate short-term adverse impacts from construction. It is noted that a Biological Resources Survey has been carried out and appropriate mitigation measures will be implemented to protect flora and fauna resources in the project area. The proposed project will incorporate various sustainable design features to reduce GHG emissions.**			
Objective:			
(4) Educate residents and visitors about responsible stewardship practices and the interconnectedness of the natural environment and people.			✓
Policies:			
(a) Expand education about native flora, fauna, and ecosystems.			✓
(b) Align priorities to recognize that the health of the natural environment and the health of people are inextricably linked.	✓		
(c) Promote programs and incentives that decrease greenhouse-gas emissions and improve environmental stewardship.	✓		
Analysis: **The proposed project will incorporate various sustainable design features, such as rooftop solar PV and EV charger-ready home designs, to minimize GHG emissions from the proposed project.**			
B. PRESERVE LOCAL CULTURES AND TRADITIONS			
Goal: Maui County will foster a spirit of pono and protect, perpetuate, and reinvigorate its residents' multi-cultural values and traditions to ensure that current and future generations will enjoy the benefits of their rich island heritage.	✓		
Objective:			

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(1) Perpetuate the Hawaiian culture as a vital force in the lives of residents.	✓		
Policies:			
(a) Protect and preserve access to mountain, ocean, and island resources for traditional Hawaiian cultural practices.	✓		
(b) Prohibit inappropriate development of cultural lands and sites that are important for traditional Hawaiian cultural practices, and establish mandates for the special protection of these lands in perpetuity.	✓		
(c) Promote the use of ahupuaʻa and moku management practices.			✓
(d) Encourage the use of traditional Hawaiian architecture and craftsmanship.			✓
(e) Promote the use of the Hawaiian language.			✓
(f) Recognize and preserve the unique natural and cultural characteristics of each ahupuaʻa or district.			✓
(g) Encourage schools to promote broader incorporation of Hawaiian and other local cultures' history and values lessons into curriculum.			✓
(h) Ensure the protection of Native Hawaiian rights.	✓		
(i) Promote, encourage, and require the correct use of traditional place names, particularly in government documents, signage, and the tourism industry.			✓
Implementing Actions:			
(a) Establish alternative land use and overlay zoning designations that recognize and preserve the unique natural and cultural characteristics of each ahupuaʻa or district.			✓
(b) Develop requirements for all County applicants to perpetuate and use proper traditional place names in all applications submitted.			✓
Analysis: **An AIS and CIA have been carried out to ensure the proposed project will not adversely impact historic or cultural resources or Hawaiian rights. It is noted that various sustainability strategies will be implemented as part of the project to educate new residents of the proposed residential community and honor native Hawaiian culture.**			
Objective:			
(2) Emphasize respect for our island lifestyle and our unique local cultures, family, and natural environment.	✓		
Policies:			
(a) Acknowledge the Hawaiian culture as the host culture, and foster respect and humility among residents and visitors toward the Hawaiian people and their practices.	✓		
(b) Perpetuate a respect for diversity, and recognize the historic blending of cultures and ethnicities.			✓
(c) Encourage the perpetuation of each culture's unique cuisine, attire, dance, music, and folklore, and other unique island traditions and recreational activities.			✓
(d) Recognize the interconnectedness between the natural environment and the cultural heritage of the islands.	✓		
(e) Protect and prioritize funding for recreational activities that support local cultural practices, such as surfing, fishing, and outrigger-canoe paddling.			✓
Analysis: **The proposed project is consistent with this objective as it involves development of a new resort residential community within an existing designated resort area that has been determined to be a suitable location for such uses.**			
Objective:			

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(3) Preserve for present and future generations the opportunity to know and experience the arts, culture, and history of Maui County.	✓		
Policies:			
(a) Foster teaching opportunities for cultural practitioners to share their knowledge and skills.			✓
(b) Support the development of cultural centers.			✓
(c) Broaden opportunities for public art and the display of local artwork.	✓		
(d) Foster the Aloha Spirit by celebrating the Hawaiian host culture and other Maui County cultures through support of cultural-education programs, festivals, celebrations, and ceremonies.	✓		
(e) Support the perpetuation of Hawaiian arts and culture.	✓		
(f) Support programs and activities that record the oral and pictorial history of residents.			✓
(g) Support the development of repositories for culture, history, genealogy, oral history, film, and interactive learning.			✓
Implementing Actions:			
(a) Establish incentives for the display of public art.			✓
(b) Establish centers and programs of excellence for the perpetuation of Hawaiian arts and culture.			✓
Analysis: **In accordance with the project's overall guiding sustainability principles, the project will incorporate various measures to honor native Hawaiian culture and educate new residents of the residential community.**			
Objective:			
(4) Preserve and restore significant historic architecture, structures, cultural sites, cultural districts, and cultural landscapes.	✓		
Policies:			
(a) Support the development of island-wide historic, archaeological, and cultural resources inventories.	✓		
(b) Promote the rehabilitation and adaptive reuse of historic sites, buildings, and structures to perpetuate a traditional sense of place.			✓
(c) Identify a sustainable rate of use and set forth specific policies to protect cultural resources.			✓
(d) Protect and preserve lands that are culturally or historically significant.	✓		
(e) Support programs that protect, record, restore, maintain, provide education about, and interpret cultural districts, landscapes, sites, and artifacts in both natural and museum settings.	✓		
(f) Perpetuate the authentic character and historic integrity of rural communities and small towns.			✓
(g) Seek solutions that honor the traditions and practices of the host culture while recognizing the needs of the community.			✓
(h) Support the development of an Archaeological District Ordinance.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(i) Protect summits, slopes, and ridgelines from inappropriate development.	✓		
(j) Support the registering of important historic sites on the State and Federal historic registers.			✓
(k) Provide opportunities for public involvement with restoration and enhancement of all types of cultural resources.			✓
(l) Foster partnerships to identify and preserve or revitalize historic and cultural sites.			✓
Implementing Actions:			
(a) Identify, develop, map, and maintain an inventory of locally significant natural, cultural, and historical resources for protection.	✓		
(b) Prepare, continually update, and implement a cultural-management plan for cultural sites, districts, and landscapes, where appropriate.			✓
(c) Enact an Archaeological District Ordinance.			✓
(d) Nominate important historic sites to the State and Federal historic registers.			✓
Analysis: **The proposed project is supportive of protecting and preserving lands that are historically and culturally significant. AIS and CIA studies have been carried out to ensure the proposed project will not adversely impact historic resources and cultural practices.**			
C. IMPROVE EDUCATION			
Goal: Residents will have access to lifelong formal and informal educational options enabling them to realize their ambitions.			✓
Objective:			
(1) Encourage the State to attract and retain school administrators and educators of the highest quality.			✓
Policies:			
(a) Encourage the State to provide teachers with nationally competitive pay and benefit packages.			✓
(b) Encourage the State to ensure teachers will have the teaching tools and support staff needed to provide students with an excellent education.			✓
(c) Explore Maui County district- and school-based decision making in public education.			✓
Analysis: **Not applicable.**			
Objective:			
(2) Provide nurturing learning environments that build skills for the 21st century.			✓
Policies:			
(a) Expand professional-development opportunities in disciplines that support the economic-development goals of Maui County.			✓
(b) Plan for demographic, social, and technological changes in a timely manner.			✓
(c) Encourage collaborative partnerships to improve conditions of learning environments.			✓
(d) Promote development of neighborhood schools and educational centers.			✓
(e) Integrate schools, community parks, and playgrounds, and expand each community's use of these facilities.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(f) Support coordination between land use and school-facility planning agencies.	✓		
(g) Encourage the upgrade and ongoing maintenance of public-school facilities.	✓		
(h) Encourage the State Department of Education to seek reliable, innovative, and alternative methods to support a level of per-pupil funding that places Hawai‘i among the top tier of states nationally for its financial support of public schools.			✓
(i) Encourage the State to promote healthier, more productive learning environments, including by providing healthy meals, more physical activity, natural lighting, and passive cooling.			✓
(j) Encourage the State to support the development of benchmarks to measure the success of Hawai‘i’s public-education system and clarify lines of accountability.			✓
(k) Design school and park facilities in proximity to residential areas.			✓
(l) Support technology- and natural-environment-based learning.			✓
(m) Encourage the State to support lower student-teacher ratios in public schools.			✓
(n) Encourage alternative learning and educational opportunities.			✓
Implementing Actions:			
(a) Develop safe walking and bicycling programs for school children.	✓		
Analysis: **The proposed project is located within the Central Maui School Impact District. The proposed project will satisfy the project’s fair share contribution requirements in accordance with a fair share agreement between the State Department of Education (DOE) and A&B Wailea LLC, the previous owner of the property.**			
Objective:			
(3) Provide all residents with educational opportunities that can help them better understand themselves and their surroundings and allow them to realize their ambitions.			✓
Policies:			
(a) Encourage the State to improve Maui Community College as a comprehensive community college that will serve each community.			✓
(b) Broaden the use of technology and telecommunications to improve educational opportunities throughout the County.			✓
(c) Attract graduate-level research programs and institutions.			✓
(d) Promote the teaching of traditional practices, including aquaculture; subsistence agriculture; Pacific Island, Asian, and other forms of alternative health practices; and indigenous Hawaiian architecture.			✓
(e) Integrate cultural and environmental values in education, including self-sufficiency and sustainability.			✓
(f) Foster a partnership and ongoing dialogue between business organizations, formal educational institutions, and vocational training centers to tailor learning and mentoring programs to County needs.			✓
(g) Ensure teaching of the arts to all ages.			✓
(h) Expand and develop vocational learning opportunities by establishing trade schools.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(i) Encourage the State to integrate financial and economic literacy in elementary, secondary, and higher-education levels.			✓
Implementing Actions:			
(a) Encourage the State to establish a four-year university, and support the development of other higher-education institutions to enable residents to obtain bachelor degrees and postgraduate degrees in Maui County.			✓
Analysis: **Not Applicable.**			
Objective:			
(4) Maximize community-based educational opportunities.			✓
Policies:			
(a) Encourage the State and others to expand pre-school, after-school, and homebased (parent-child) learning.			✓
(b) Support public-private partnerships to develop youth-internship, -apprenticeship, and -mentoring programs.			✓
(c) Support the development of a wide range of informal educational and cultural programs for all residents.			✓
(d) Improve partnerships that utilize the skills and talents at Hawai‘i’s colleges and universities to benefit the County.			✓
(e) Support career-development and job-recruitment programs and centers.			✓
(f) Attract learning institutions and specialty schools to diversify and enhance educational opportunities.			✓
(g) Expand education of important life skills for the general public.			✓
(h) Support community facilities such as museums, libraries, nature centers, and open spaces that provide interactive-learning opportunities for all ages.			✓
Analysis: **Not Applicable.**			
D. STRENGTHEN SOCIAL AND HEALTHCARE SERVICES			
Goal: Health and social services in Maui County will fully and comprehensively serve all segments of the population.			✓
Objective:			
(1) In cooperation with the Federal and State governments and nonprofit agencies, broaden access to social and healthcare services and expand options to improve the overall wellness of the people of Maui County.			✓
Policies:			
(a) Work with other levels of government and the nonprofit sector to expand services to address hunger, homelessness, and poverty.			✓
(b) Support the improvement of opportunities for disadvantaged youth, encourage the tradition of hanai relatives, and support expanded opportunities for foster care.			✓
(c) Support expanded long-term-care options, both in institutions and at home, for patients requiring ongoing assistance and medical attention.			✓
(d) Encourage the expansion and improvement of local hospitals, facilitate the establishment of new healthcare facilities, and facilitate prompt and high-quality emergency- and urgent-care services for all.			✓
(e) Support broadened access to affordable health insurance and health care, and recognize the unique economic challenges posed to families when healthcare services are provided off-island.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(f) Encourage equal access to social and healthcare services through both technological and traditional means.			✓
Analysis: **Not Applicable.**			
Objective:			
(2) Encourage the Federal and State governments and the private sector to improve the quality and delivery of social and healthcare services.			✓
Policies:			
(a) Strengthen partnerships with government, nonprofit, and private organizations to provide funding and to improve counseling and other assistance to address substance abuse, domestic violence, and other pressing social challenges.			✓
(b) Encourage the State to improve the quality of medical personnel, facilities, services, and equipment.			✓
(c) Encourage investment to improve the recruitment of medical professionals and the quality of medical facilities and equipment throughout Maui County.			✓
(d) Promote the development of continuum-of-care facilities that provide assisted living, hospice, home-care, and skilled-nursing options allowing the individual to be cared for in a manner congruent with his or her needs and desires.			✓
(e) Support improved social, healthcare, and governmental services for special needs populations.			✓
(f) Plan for the needs of an aging population and the resulting impacts on social services, housing, and healthcare delivery.			✓
(g) Improve coordination among the police, the courts, and the public in the administration of social and healthcare services.			✓
(h) Support programs that address needs of veterans.			✓
(i) Support programs that address the needs of immigrants.			✓
Implementing Actions:			
(a) Invest in programs designed to improve the general welfare and quality of life of Native Hawaiians.			✓
(b) Assist and facilitate the State Department of Public Safety and others in efforts to strengthen programs and facilities that will improve the mental and social health of incarcerated people and assist in prison inmates' successful transition back into Maui County communities.			✓
(c) Develop and maintain a comprehensive index that will measure the health and wellness needs of families.			✓
(d) Provide heliports countywide for emergency health and safety purposes.			✓
Analysis: **Not Applicable.**			
Objective:			
(3) Strengthen public-awareness programs related to healthy lifestyles and social and medical services.			✓
Policies:			
(a) Expand public awareness about personal safety and crime prevention.			✓
(b) Encourage residents to pursue education and training for careers in the healthcare, social services, and community-development fields.			✓
(c) Expand public awareness and promote programs to achieve healthy eating habits and drug-free lifestyles.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
Analysis: **Not Applicable.**			
E. EXPAND HOUSING OPPORTUNITIES FOR RESIDENTS			
Goal: Quality, island-appropriate housing will be available to all residents.	✓		
Objective:			
(1) Reduce the affordable housing deficit for residents.	✓		
Policies:			
(a) Ensure that an adequate and permanent supply of affordable housing, both new and existing units, is made available for purchase or rental to our resident and/or workforce population, with special emphasis on providing housing for low- to moderate-income families, and ensure that all affordable housing remains affordable in perpetuity.	✓		
(b) Seek innovative ways to lower housing costs without compromising the quality of our island lifestyle.			✓
(c) Seek innovative methods to secure land for the development of low- and moderate- income housing.			✓
(d) Provide the homeless population with emergency and transitional shelter and other supportive programs.			✓
(e) Provide for a range of senior-citizen and special needs housing choices on each island that affordably facilitates a continuum of care and services.			✓
(f) Support the Department of Hawaiian Home Lands' development of homestead lands.			✓
(g) Manage property-tax burdens to protect affordable resident homeownership.			✓
(h) Explore taxation mechanisms to increase and maintain access to affordable housing.			✓
(i) Improve awareness regarding available affordable homeowner's insurance.			✓
(j) Redevelop commercial areas with a mixture of affordable residential and business uses, where appropriate.			✓
(k) Ensure residents are given priority to obtain affordable housing units developed in their communities, consistent with all applicable regulations.	✓		
(l) Establish pricing for affordable housing that is more reflective of Maui County's workforce than the United States Housing and Urban Development's median-income estimates for Maui County.			✓
(m) Develop neighborhoods with a mixture of accessible and integrated community facilities and services.			✓
(n) Provide alternative regulatory frameworks to facilitate the use of Kuleana lands by the descendants of Native Hawaiians who received those lands pursuant to the Kuleana Act of 1850.			✓
(o) Work with lending institutions to expand housing options and safeguard the financial security of homeowners.			✓
(p) Promote the use of the community land trust model and other land-lease and land- financing options.			✓
(q) Support the opportunity to age in place by providing accessible and appropriately designed residential units.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
Analysis: **The proposed project will comply with the County Residential Workforce Housing Policy (Chapter 2.96, MCC) by utilizing the Residential Workforce Housing credits, which were acquired from A&B Wailea LLC, the previous owner of the property.**			
Objective:			
(2) Increase the mix of housing types in towns and neighborhoods to promote sustainable land use planning, expand consumer choice, and protect the County's rural and small town character.	✓		
Policies:			
(a) Seek innovative ways to develop 'ohana cottages and accessory-dwelling units as affordable housing.			✓
(b) Design neighborhoods to foster interaction among neighbors.	✓		
(c) Encourage a mix of social, economic, and age groups within neighborhoods.			✓
(d) Promote infill housing in urban areas at scales that capitalize on existing infrastructure, lower development costs, and are consistent with existing or desired patterns of development.	✓		
(e) Encourage the building industry to use environmentally sustainable materials, technologies, and site planning.	✓		
(f) Develop workforce housing in proximity to job centers and transit facilities.			✓
(g) Provide incentives to developers and owners who incorporate green building practices and energy-efficient technologies into their housing developments.	✓		
Implementing Actions:			
(a) Revise laws to support neighborhood designs that incorporate a mix of housing types that are appropriate for island living.			✓
Analysis: **The proposed project will involve the development of 57 single-family residential condominium units. The project will comply with the applicable provisions of Chapter 2.96. MCC by utilizing the Residential Workforce Housing credits. The proposed project will incorporate energy efficiency measures, guided by the project's sustainability principles.**			
Objective:			
(3) Increase and maintain the affordable housing inventory.	✓		
Policies:			
(a) Recognize housing as a basic human need, and work to fulfill that need.	✓		
(b) Prioritize available infrastructure capacity for affordable housing.			✓
(c) Improve communication, collaboration, and coordination among housing providers and social-service organizations.			✓
(d) Study future projected housing needs, monitor economic cycles, and prepare for future conditions on each island.			✓
(e) Develop public-private and nonprofit partnerships that facilitate the construction of quality affordable housing.			✓
(f) Streamline the review process for high-quality, affordable housing developments that implement the goals, objectives, and policies of the General Plan.			✓
(g) Minimize the intrusion of housing on prime, productive, and potentially productive agricultural lands and regionally valuable agricultural lands.	✓		

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(h) Encourage long-term residential use of existing and future housing to meet residential needs.	✓		
Implementing Actions:			
(a) Develop policies to even out the peaks and valleys in Maui County's construction-demand cycles.			✓
Analysis: **The project will comply with applicable provisions of Chapter 2.96. MCC by utilizing the Residential Workforce Housing credits obtained from A&B Wailea LLC, the previous owner of the property. It is noted that the proposed project is located within the UGB where adequate public facilities and services are already available, such as water and wastewater services. The proposed project will not utilize valuable agricultural lands.**			
Objective:			
(4) Expand access to education related to housing options, homeownership, financing, and residential construction.			✓
Policies:			
(a) Broaden access to information about County, State, and Federal programs that provide financial assistance to renters and home buyers.			✓
(b) Expand access to information about opportunities for homeownership and self-help housing.			✓
(c) Educate residents about making housing choices that support their individual needs, the needs of their communities, and the health of the islands' natural systems.			✓
(d) Improve home buyers' education on all aspects of homeownership.			✓
Analysis: **Not Applicable.**			
F. STRENGTHEN THE LOCAL ECONOMY			
Goal: Maui County's economy will be diverse, sustainable, and supportive of community values.	✓		
Objective:			
(1) Promote an economic climate that will encourage diversification of the County's economic base and a sustainable rate of economic growth.			✓
Policies:			
(a) Support economic decisions that create long-term benefits.	✓		
(b) Promote lifelong education, career development, and technical training for existing and emerging industries.			✓
(c) Invest in infrastructure, facilities, and programs that foster economic diversification.			✓
(d) Support and promote locally produced products and locally owned operations and businesses that benefit local communities and meet local demand.			✓
(e) Support programs that assist industries to retain and attract more local labor and facilitate the creation of jobs that offer a living wage.			✓
(f) Encourage work environments that are safe, rewarding, and fulfilling to employees.	✓		
(g) Support home-based businesses that are appropriate for and in character with the community.			✓
(h) Encourage businesses that promote the health and well-being of the residents, produce value-added products, and support community values.			✓
(i) Foster an understanding of the role of all industries in our economy.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(j) Support efforts to improve conditions that foster economic vitality in our historic small towns.			✓
(k) Support and encourage traditional host-culture businesses and indigenous agricultural practices.			✓
(l) Support public and private entities that assist entrepreneurs in establishing locally operated businesses.			✓
Implementing Actions:			
(a) Develop regulations and programs that support opportunities for local merchants, farmers, and small businesses to sell their goods and services directly to the public.			✓
(b) Monitor the carrying capacity of the islands' social, ecological, and infrastructure systems with respect to the economy.			✓
Analysis: **The proposed project will create both short-term and long-term employment opportunities during construction and operation phases of the residential community. The proposed project will ensure that the work environments are safe, rewarding, and fulfilling to employees.**			
Objective:			
(2) Diversify and expand sustainable forms of agriculture and aquaculture.			✓
Policies:			
(a) Support programs that position Maui County's agricultural products as premium export products.			✓
(b) Prioritize the use of agricultural land to feed the local population, and promote the use of agricultural lands for sustainable and diversified agricultural activities.			✓
(c) Capitalize on Hawai'i's economic opportunities in the ecologically sensitive aquaculture industries.			✓
(d) Assist farmers to help make Maui County more self-sufficient in food production.			✓
(e) Support ordinances, programs, and policies that keep agricultural land and water available and affordable to farmers.			✓
(f) Support a tax structure that is conducive to the growth of the agricultural economy.			✓
(g) Enhance County efforts to monitor and regulate important agricultural issues.			✓
(h) Support education, research, and facilities that strengthen the agricultural industry.			✓
(i) Maintain the genetic integrity of existing food crops.			✓
(j) Encourage healthy and organic farm practices that contribute to land health and regeneration.			✓
(k) Support cooperatives and other types of nontraditional communal farming and efforts.			✓
(l) Encourage methods of monitoring and controlling genetically modified crops to prevent adverse effects.			✓
(m) Work with the State to ease the permitting process for the revitalization of traditional fish ponds.			✓
Implementing Actions:			
(a) Redirect efforts in the Office of Economic Development to further facilitate the development of the agricultural section and to monitor agricultural legislation and issues.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(b) Publicly identify, with signage and other means, the field locations of all genetically modified crops.			✓
(c) Create agricultural parks in areas distant from genetically modified crops.			✓
Analysis: **Not Applicable.**			
Objective:			
(3) Support a visitor industry that respects the resident culture and the environment.			✓
Policies:			
(a) Promote traditional Hawaiian practices in visitor-related facilities and activities.			✓
(b) Encourage and educate the visitor industry to be sensitive to island lifestyles and cultural values.			✓
(c) Encourage a spirit of welcome for residents at visitor facilities, such as by offering kamaʻaina incentives and discount programs.			✓
(d) Support the renovation and enhancement of existing visitor facilities.			✓
(e) Support policies, programs, and a tax structure that redirect the benefits of the visitor industry back into the local community.			✓
(f) Encourage resident ownership of visitor-related businesses and facilities.			✓
(g) Develop partnerships to provide educational and training facilities to residents employed in the visitor industry.			✓
(h) Foster an understanding of local cultures, customs, and etiquette, and emphasize the importance of the Aloha Spirit as a common good for all.			✓
(i) Support the diversification, development, evolution, and integration of the visitor industry in a way that is compatible with the traditional, social, economic, spiritual, and environmental values of island residents			✓
(j) Improve collaboration between the visitor industry and the other sectors of Maui County's economy.			✓
(k) Perpetuate an authentic image of the Hawaiian culture and history and an appropriate recognition of the host culture.			✓
(l) Support the programs and initiatives outlined in the Maui County Tourism Strategic Plan 2006-2015.			✓
(m) Promote water conservation, beach conservation, and open-space conservation in areas providing services for visitors.			✓
(n) Recognize the important contributions that the visitor industry makes to the County's economy, and support a healthy and vibrant visitor industry.			✓
Analysis: **Not Applicable.**			
Objective:			
(4) Expand economic sectors that increase living-wage job choices and are compatible with community values.	✓		
Policies:			
(a) Support emerging industries, including the following: • Health and wellness industry; • Sports and recreation industry; • Film and entertainment industry; • Arts and culture industry; • Renewable-energy industry; • Research and development industry; • High-technology and knowledge-based industries; • Education and training industry; • Ecotourism industry; and • Agritourism industry.	✓		

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
Analysis: **The proposed project will create both short-term and long-term employment opportunities during the construction and operation phases of the residential community, which will increase living-wage job choices and are compatible with community values. It is noted that the project will encourage homeowners to install rooftop solar PV panels and an EV charger on their homes, which will support the renewable energy industry.**			
G. IMPROVE PARKS AND PUBLIC FACILITIES			
Goal: A full range of island-appropriate public facilities and recreational opportunities will be provided to improve the quality of life for residents and visitors.			✓
Objective:			
(1) Expand access to recreational opportunities and community facilities to meet the present and future needs of residents of all ages and physical abilities.			✓
Policies:			
(a) Protect, enhance, and expand access to public shoreline and mountain resources.			✓
(b) Expand and enhance the network of parks, multi-use paths, and bikeways.	✓		
(c) Assist communities in developing recreational facilities that promote physical fitness.			✓
(d) Expand venue options for recreation and performances that enrich the lifestyles of Maui County's people.			✓
(e) Expand affordable recreational and after-school programs for youth.			✓
(f) Encourage and invest in recreational, social, and leisure activities that bring people together and build community pride.	✓		
(g) Promote the development and enhancement of community centers, civic spaces, and gathering places throughout our communities.	✓		
(h) Expand affordable access to recreational opportunities that support the local lifestyle.			✓
Implementing Actions:			
(a) Identify and reserve lands for cemeteries, and preserve existing cemeteries on all islands, appropriately accommodating varying cultural and, faith-based traditions.			✓
Analysis: **The proposed project will include multi-modal paths on main roads within the proposed community to encourage walking and biking, which will connect to Wailea Alanui Drive and Kapili Street. An amenity center, proposed as part of the project, will include community spaces to bring people together. The proposed project donated land to the County for a future park next to Wailea Fire Station.**			
Objective:			
(2) Improve the quality and adequacy of community facilities.	✓		
Policies:			
(a) Provide an adequate supply of dedicated shelters and facilities for disaster relief.			✓
(b) Provide and maintain community facilities that are appropriately designed to reflect the traditions and customs of local cultures.	✓		
(c) Ensure that parks and public facilities are safe and adequately equipped for the needs of all ages and physical abilities to the extent reasonable.	✓		

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(d) Maintain, enhance, expand, and provide new active and passive recreational facilities in ways that preserve the natural beauty of their locations.	✓		
(e) Redesign or retrofit public facilities to adapt to major shifts in environmental or urban conditions to the extent reasonable.			✓
Analysis: **As discussed previously, the proposed amenity center will include various community spaces for the residents and visitors of the Wailea Resort SF-S Residential Project. The amenity center will be equipped for the needs of all ages and physical abilities to the extent reasonable. The County of Maui's Urban Design Review Board (UDRB) will review the project design to ensure that the proposed homes, as well as the amenity center are appropriately designed.**			
Objective:			
(3) Enhance the funding, management, and planning of public facilities and park lands.	✓		
Policies:			
(a) Identify and encourage the establishment of regulated and environmentally sound campgrounds.			✓
(b) Manage park use and control access to natural resources in order to rest sensitive places and utilize the resources in a sustainable manner.			✓
(c) Provide public-recreational facilities that are clean and well-maintained.	✓		
(d) Develop partnerships to ensure proper stewardship of the islands' trails, public lands, and access systems.			✓
(e) Ensure that there is an adequate supply of public restrooms in convenient locations.			✓
Implementing Actions:			
(a) Encourage the State to allow for overnight fishing along the shoreline in accordance with management plans and regulations.			✓
(b) Develop and regularly update functional plans, including those relating to public facilities, parks, and campgrounds.			✓
(c) Develop and adopt local level-of service standards for public facilities and parks.			✓
(d) Identify, acquire, and develop lands for parks, civic spaces, and public uses.	✓		
Analysis: **As discussed previously, the proposed amenity center will include community spaces for the residents and visitors of the Wailea Resort SF-S Residential Project. The amenity center will be adequately maintained and cleaned for the users.**			
H. DIVERSIFY TRANSPORTATION OPTIONS			
Goal: Maui County will have an efficient, economical, and environmentally sensitive means of moving people and goods.			✓
Objective:			
(1) Provide an effective, affordable, and convenient ground-transportation system that is environmentally sustainable.			✓
Policies:			
(a) Execute planning strategies to reduce traffic congestion.			✓
(b) Plan for the efficient relocation of roadways for the public benefit.			✓
(c) Support the use of alternative roadway designs, such as traffic-calming techniques and modern roundabouts.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(d) Increase route and mode options in the ground-transportation network.	✓		
(e) Ensure that roadway systems are safe, efficient, and maintained in good condition.	✓		
(f) Preserve roadway corridors that have historic, scenic, or unique physical attributes that enhance the character and scenic resources of communities.	✓		
(g) Design new roads and roadway improvements to retain and enhance the existing character and scenic resources of the communities through which they pass.	✓		
(h) Promote a variety of affordable and convenient transportation services that meet countywide and community needs and expand ridership of transit systems.			✓
(i) Collaborate with transit agencies, government agencies, employers, and operators to provide planning strategies that reduce peak-hour traffic.			✓
(j) Develop and expand an attractive, island-appropriate, and efficient public transportation system.			✓
(k) Provide and encourage the development of specialized transportation options for the young, the elderly, and persons with disabilities.			✓
(l) Evaluate all alternatives to preserve quality of life before widening roads.			✓
(m) Encourage businesses in the promotion of alternative transportation options for resident and visitor use.			✓
(n) Support the development of carbon-emission standards and an incentive program aimed at achieving County carbon-emission goals.			✓
Implementing Actions:			
(a) Create incentives and implement strategies to reduce visitor dependence on rental cars.			✓
(b) Establish efficient public-transit routes between employment centers and primary workforce residential areas.			✓
(c) Create attractive, island-appropriate, conveniently located park-and-ride and ride- share facilities.			✓
Analysis: **The proposed project will include multi-modal paths on main roads within the proposed community to encourage walking and biking. The roadway network within the proposed residential community will be designed to ensure efficiency and residents' safety and will be maintained by the homeowners association. It is noted that a View Analysis has been conducted for the project to ensure that makai/mauka views from adjacent roadways and public vantage points will not be significantly impacted.**			
Objective:			
(2) Reduce the reliance on the automobile and fossil fuels by encouraging walking, bicycling, and other energy-efficient and safe alternative modes of transportation.	✓		
Policies:			
(a) Make walking and bicycling transportation safe and easy between and within communities.	✓		
(b) Require development to be designed with the pedestrian in mind.	✓		
(c) Design new and retrofit existing rights-of-way with adequate sidewalks, bicycle lanes, or separated multi-use transit corridors.	✓		

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(d) Support the development of a countywide network of bikeways, equestrian trails, and pedestrian paths.	✓		
(e) Support the reestablishment of traditional trails between communities, to the ocean, and through the mountains for public use.			✓
(f) Encourage educational programs to increase safety for pedestrians and bicyclists.			✓
Implementing Actions:			
(a) Design, build, and modify existing bikeways to improve safety and separation from automobiles.	✓		
(b) Increase enforcement to reduce abuse of bicycle and pedestrian lanes by motorized vehicles.			✓
(c) Identify non-motorized transportation options as a priority for new sources of funding.			✓
Analysis: **As previously discussed, the proposed project will incorporate multi-modal paths on main roads of the proposed community to encourage walking and bicycling, which will connect to Wailea Alanui Drive and Kapili Street.**			
Objective:			
(3) Improve opportunities for affordable, efficient, safe, and reliable air transportation.			✓
Policies:			
(a) Discourage private helicopter and fixed-wing landing sites to mitigate environmental and social impacts.			✓
(b) Encourage the use of quieter aircraft and noise-abatement procedures for arrivals and departures.			✓
(c) Encourage the modernization and maintenance of air-transportation facilities for general-aviation activities.			✓
(d) Encourage a viable and competitive atmosphere for air carriers to expand service and ensure sufficient intra-County flights and affordable fares for consumers.			✓
(e) Continue to support secondary airports, and encourage the State to provide them with adequate funding.			✓
(f) During Community Plan updates, explore the use of the smaller airports.			✓
(g) Encourage the State to provide efficient, adequate, and affordable parking and transit connections within and around airports.			✓
Analysis: **Not Applicable.**			
Objective:			
(4) Improve opportunities for affordable, efficient, safe, and reliable ocean transportation.			✓
Policies:			
(a) Support programs and regulations that reduce the disposal of maritime waste and prevent spills into the ocean.			✓
(b) Encourage the upgrading of harbors to resist damage from natural hazards and disasters.			✓
(c) Encourage the State to study the use of existing harbors and set priorities for future use.			✓
(d) Explore all options to protect the traditional recreational uses of harbors, and mitigate harbor-upgrade impacts to recreational uses where feasible.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(e) Encourage the upgrading of harbors and the separation of cargo and bulk materials from passenger and recreational uses.			✓
(f) Encourage the State to provide for improved capacity at shipping, docking, and storage facilities.			✓
(g) Encourage the State to provide adequate parking facilities and transit connections within and around harbor areas.			✓
(h) Encourage the redevelopment and revitalization of harbors while preserving historic and cultural assets in harbor districts.			✓
(i) Encourage the State to provide adequate facilities for small-boat operations, including small-boat launch ramps, according to community needs.			✓
(j) Support the maintenance and cleanliness of harbor facilities.			✓
(k) Support the redevelopment of harbors as pedestrian-oriented gathering places.			✓
Analysis: **Not Applicable.**			
Objective:			
(5) Improve and expand the planning and management of transportation systems.			✓
Policies:			
(a) Encourage progressive community design and development that will reduce transportation trips.	✓		
(b) Require new developments to contribute their pro rata share of local and regional infrastructure costs.	✓		
(c) Establish appropriate user fees for private enterprises that utilize public transportation facilities for recreational purposes.			✓
(d) Support the revision of roadway-design criteria and standards so that roads are compatible with surrounding neighborhoods and the character of rural areas.			✓
(e) Plan for multi-modal transportation and utility corridors on each island.			✓
(f) Support designing all transportation facilities, including airport, harbor, and mass- transit stations, to reflect Hawaiian architecture.			✓
(g) Utilize transportation-demand management as an integral part of transportation planning.			✓
(h) Accommodate the planting of street trees and other appropriate landscaping in all public rights-of-way.			✓
Analysis: **The proposed project will develop multi-modal paths on main roads of the proposed community and will be linked to Wailea Alanui Drive and Kapili Street to reduce vehicular transportation trips. Pursuant to the Memorandum of Agreement (MOA) dated March 14, 2016 and its subsequent amendment with the State Department of Transportation (HDOT), the Applicant will contribute its required regional fair share improvements for the Wailea Resort Masterplan. It is noted that the required planned improvements will not be triggered by the proposed project and will be implemented at the appropriate time in accordance with the MOA. The project's 57 units will count towards the 150-unit trigger needed to implement the planned improvements.**			
I. IMPROVE PHYSICAL INFRASTRUCTURE			
Goal: Maui County's physical infrastructure will be maintained in optimum condition and will provide for and effectively serve the needs of the County through clean and sustainable technologies.	✓		
Objective:			

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(1) Improve water systems to assure access to sustainable, clean, reliable, and affordable sources of water.	✓		
Policies:			
(a) Ensure that adequate supplies of water are available prior to approval of subdivision or construction documents.	✓		
(b) Develop and fund improved water-delivery systems.			✓
(c) Ensure a reliable and affordable supply of water for productive agricultural uses.			✓
(d) Promote the reclamation of gray water, and enable the use of reclaimed, gray, and brackish water for activities that do not require potable water.	✓		
(e) Retain and expand public control and ownership of water resources and delivery systems.			✓
(f) Improve the management of water systems so that surface-water and groundwater resources are not degraded by overuse or pollution.	✓		
(g) Explore and promote alternative water-source-development methods.			✓
(h) Seek reliable long-term sources of water to serve developments that achieve consistency with the appropriate Community Plans.			✓
Implementing Actions:			
(a) Develop a process to review all applications for desalination.			✓
Analysis: **The proposed project will connect to the County of Maui's water system. The proposed project is located beyond the service limits of the existing R-1 distribution system. The project's irrigation system for common areas will be designed to facilitate the future connection to the R-1 distribution system when it becomes available.**			
Objective:			
(2) Improve waste-disposal practices and systems to be efficient, safe, and as environmentally sound as possible.	✓		
Policies:			
(a) Provide sustainable waste-disposal systems and comprehensive, convenient recycling programs to reduce the flow of waste into landfills.	✓		
(b) Support innovative and alternative practices in recycling solid waste and wastewater and disposing of hazardous waste.			✓
(c) Encourage vendors and owners of automobile, appliance, and white goods to participate in the safe disposal and recycling of such goods, and ensure greater accountability for large waste producers.			✓
(d) Develop strategies to promote public awareness to reduce pollution and litter, and encourage residents to reduce, reuse, recycle, and compost waste materials.	✓		
(e) Pursue improvements and upgrades to existing wastewater and solid-waste systems consistent with current and future plans and the County's Capital Improvement Program.			✓
Implementing Actions:			
(a) Establish recycling, trash-separation, and materials recovery programs and facilities to reduce the flow of waste into landfills.	✓		
(b) Study the feasibility of developing environmentally safe waste-to-energy facilities.			✓
(c) Utilize taxes and fees as means to encourage conservation and recycling.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(d) Implement and regularly update the Integrated Solid Waste Management Plan.			✓
(e) Phase out the use of injection wells.			✓
Analysis: **The proposed project will implement sustainable design features, including reduction of construction waste through efficient design and material use and encouraging residents of the proposed community responsible waste disposal, recycling, and reuse practices.**			
Objective:			
(3) Significantly increase the use of renewable and green technologies to promote energy efficiency and energy self-sufficiency.	✓		
Policies:			
(a) Promote the use of locally renewable energy sources, and reward energy efficiency.	✓		
(b) Consider tax incentives and credits for the development of sustainable- and renewable-energy sources.			✓
(c) Expand education about energy conservation and self-sufficiency.			✓
(d) Encourage small-scale energy generation that utilizes wind, sun, water, biowaste, and other renewable sources of energy.	✓		
(e) Expand renewable-energy production.	✓		
(f) Develop public-private partnerships to ensure the use of renewable energy and increase energy efficiency.			✓
(g) Require the incorporation of locally appropriate energy-saving and green building design concepts in all new developments by providing energy efficient urban design guidelines and amendments to the Building Code.			✓
(h) Encourage the use of sustainable energy to power vehicles.	✓		
(i) Promote the retrofitting of existing buildings and new development to incorporate energy-saving design concepts and devices.			✓
(j) Encourage green footprint practices.	✓		
(k) Reduce Maui County's dependence on fossil fuels and energy imports.	✓		
(l) Support green building practices such as the construction of buildings that aim to minimize carbon dioxide production, produce renewable energy, and recycle water.	✓		
(m) Promote and support environmentally friendly practices in all energy sectors.	✓		
Implementing Actions:			
(a) Adopt an energy-efficiency policy for Maui County government as a model for other jurisdictions.			✓
(b) Adopt a Green Building Code, and support green building practices.			✓
Analysis: **In accordance with the project's sustainability principles, homes within the proposed project will be designed to be rooftop solar PV and EV charger-ready and buyers of the homes will determine when they would like to implement these measures. In addition,**			

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
various energy efficiency measures will be incorporated to minimize energy use and GHG emissions.			
Objective:			
(4) Direct growth in a way that makes efficient use of existing infrastructure and to areas where there is available infrastructure capacity.	✓		
Policies:			
(a) Capitalize on existing infrastructure capacity as a priority over infrastructure expansion.	✓		
(b) Planning for new towns should only be considered if a region's growth is too large to be directed into infill and adjacent growth areas.			✓
(c) Utilize appropriate infrastructure technologies in the appropriate locations.			✓
(d) Promote land use patterns that can be provided with infrastructure and public facilities in a cost-effective manner.	✓		
(e) Support catchment systems and on-site wastewater treatment in rural areas and aggregated water and wastewater systems in urban areas if they are appropriately located.			✓
Implementing Actions:			
(a) Develop a streamlining system for urban infill projects.			✓
(b) Identify appropriate areas for urban expansion of existing towns where infrastructure and public facilities can be provided in a cost-effective manner.	✓		
Analysis: **County infrastructure services are readily available in the vicinity of the proposed project. The proposed project site has been identified by both the State Land Use Commission and the County of Maui's MIP as an appropriate location for urban growth, located in close proximity to existing infrastructure and services.**			
Objective:			
(5) Improve the planning and management of infrastructure systems.	✓		
Policies:			
(a) Provide a reliable and sufficient level of funding to enhance and maintain infrastructure systems.	✓		
(b) Require new developments to contribute their pro rata share of local and regional infrastructure costs.	✓		
(c) Improve coordination among infrastructure providers and planning agencies to minimize construction impacts.	✓		
(d) Maintain inventories of infrastructure capacity, and project future infrastructure needs.			✓
(e) Require social-justice and -equity issues to be considered during the infrastructure-planning process.			✓
(f) Discourage the development of critical infrastructure systems within hazard zones and the tsunami-inundation zone to the extent practical.	✓		
(g) Ensure that infrastructure is built concurrent with or prior to development.	✓		
(h) Ensure that basic infrastructure needs can be met during a disaster.			✓
(i) Locate public facilities and emergency services in appropriate locations that support the health, safety, and welfare of each community and that minimize delivery inefficiencies.			✓
(j) Promote the undergrounding of utility and other distribution lines for health safety, and aesthetic reasons.	✓		

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
Implementing Actions:			
(a) Develop and regularly update functional plans for infrastructure systems.			✓
(b) Develop, adopt, and regularly update local or community-sensitive level-of service standards for infrastructure systems.			✓
Analysis: **As applicable, the Applicant will pay code required assessments towards wastewater treatment plant expansion costs, as well as its regional fair share commitments to roadway improvements in the Wailea Resort Master Plan area. It is noted that all utilities within the project area will be installed underground. Necessary infrastructure improvements to service the proposed project will be provided by the Applicant concurrently with development except for planned roadway improvements, which will be implemented at the appropriate time as called for in the MOA dated March 16, 2016, and its subsequent amendment. The Applicant will coordinate with infrastructure providers and various agencies to ensure services are provided in a timely manner and to minimize potential construction impacts.**			
J. PROMOTE SUSTAINABLE LAND USE AND GROWTH MANAGEMENT			
Goal: Community character, lifestyles, economies, and natural assets will be preserved by managing growth and using land in a sustainable manner.	✓		
Objective:			
(1) Improve land use management and implement a directed-growth strategy.	✓		
Policies:			
(a) Establish, map, and enforce urban- and rural-growth limits.	✓		
(b) Direct urban and rural growth to designated areas.	✓		
(c) Limit the number of visitor-accommodation units and facilities in Community Plan Areas.	✓		
(d) Maintain a sustainable balance between the resident, part-time resident, and visitor populations.	✓		
(e) Encourage redevelopment and infill in existing communities on lands intended for urban use to protect productive farm land and open-space resources.	✓		
(f) Discourage new entitlements for residential, resort, or commercial development along the shoreline.	✓		
(g) Restrict development in areas that are prone to natural hazards, disasters, or sea-level rise.	✓		
(h) Direct new development in and around communities with existing infrastructure and service capacity, and protect natural, scenic, shoreline, and cultural resources.	✓		
(i) Establish and maintain permanent open space between communities to protect each community's identity.	✓		
(j) Support the dedication of land for public uses.	✓		
(k) Preserve the public's rights of access to and continuous lateral access along all shorelines.			✓
(l) Enable existing and future communities to be self-sufficient through sustainable land use planning and management practices.	✓		
(m) Protect summits, slopes, and ridgelines from inappropriate development.	✓		
Implementing Actions:			

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(a) Regularly update urban- and rural-growth boundaries and their maps.			✓
(b) Establish transfer and purchase of development rights programs.			✓
(c) Develop and adopt a green infrastructure plan.			✓
(d) Develop studies to help determine a sustainable social, environmental, and economic carrying capacity for each island.			✓
(e) Identify and define resort-destination areas.	✓		
Analysis: **The proposed project is located within Wailea Resort, an area established in the MIP as a resort destination and designated within the UGB. The project area is currently vacant and undeveloped, but is appropriately designated and zoned for residential use. It is noted that the Applicant satisfied the project's parks assessment through the donation of a 5.75-acre parcel, identified as TMK (2)3-9-038:26, to the County for use as a fire station and a park.**			
Objective:			
(2) Improve planning for and management of agricultural lands and rural areas.			✓
Policies:			
(a) Protect prime, productive, and potentially productive agricultural lands to maintain the islands' agricultural and rural identities and economies.			✓
(b) Provide opportunities and incentives for self-sufficient and subsistence homesteads and farms.			✓
(c) Discourage developing or subdividing agriculturally designated lands when non-agricultural activities would be primary uses.			✓
(d) Conduct agricultural-development planning to facilitate robust and sustainable agricultural activities.			✓
Implementing Actions:			
(a) Inventory and protect prime, productive, and potentially productive agricultural lands from competing non-agricultural land uses.			✓
Analysis: **Not applicable.**			
Objective:			
(3) Design all developments to be in harmony with the environment and to protect each community's sense of place.	✓		
Policies:			
(a) Support and provide incentives for green building practices.	✓		
(b) Encourage the incorporation of green building practices and technologies into all government facilities to the extent practicable.			✓
(c) Protect and enhance the unique architectural and landscape characteristics of each Community Plan Area, small town, and neighborhood.	✓		
(d) Ensure that adequate recreational areas, open spaces, and public-gathering places are provided and maintained in all urban centers and neighborhoods.	✓		
(e) Ensure business districts are distinctive, attractive, and pedestrian-friendly destinations.			✓
(f) Use trees and other forms of landscaping along rights-of-way and within parking lots to provide shade, beauty, urban-heat reduction, and separation of pedestrians from automobile traffic in accordance with community desires.	✓		
(g) Where appropriate, integrate public-transit, equestrian, pedestrian, and bicycle facilities, and public rights-of-way as design elements in new and existing communities.	✓		

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(h) Ensure better connectivity and linkages between land uses.	✓		
(i) Adequately buffer and mitigate noise and air pollution in mixed-use areas to maintain residential quality of life.	✓		
(j) Protect rural communities and traditional small towns by regulating the footprint, locations, site planning, and design of structures.			✓
(k) Support small-town revitalization and preservation.			✓
(l) Facilitate safe pedestrian access, and create linkages between destinations and within parking areas.	✓		
Implementing Actions:			
(a) Establish design guidelines and standards to enhance urban and rural environments.			✓
(b) Provide funding for civic-center and civic-space developments.			✓
(c) Establish and enhance urban forests in neighborhoods and business districts.			✓
Analysis: **The proposed project will be designed with respect of the character of the neighboring residential developments to preserve Wailea's sense of place. The proposed project will incorporate various sustainable design features to avoid and mitigate adverse impacts to environmental resources. Appropriate shade trees and landscaping throughout the project will be provided to reduce the heat island effect and provide visual buffers. Multi-modal paths in main roads of the proposed community will be provided to link the project area to Wailea Alanui Drive and Kapili Street to integrate the project with the Wailea Resort.**			
Objective:			
(4) Improve and increase efficiency in land use planning and management.	✓		
Policies:			
(a) Assess the cumulative impact of developments on natural ecosystems, natural resources, wildlife habitat, and surrounding uses.	✓		
(b) Ensure that new development projects requiring discretionary permits demonstrate a community need, show consistency with the General Plan, and provide an analysis of impacts.	✓		
(c) Encourage public and private partnerships to preserve lands of importance, develop housing, and meet the needs of residents.			✓
(d) Promote creative subdivision designs that implement best practices in land development, sustainable management of natural and physical resources, increased pedestrian and bicycle functionality and safety, and the principles of livable communities.	✓		
(e) Coordinate with Federal, State, and County officials in order to ensure that land use decisions are consistent with County plans and the vision local populations have for their communities.			✓
(f) Enable greater public participation in the review of subdivisions.			✓
(g) Improve land use decision making through the use of land- and geographic information systems.			✓
Implementing Actions:			
(a) Institute a time limit and sunsetting stipulations on development entitlements and their implementation.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
Analysis: **The proposed project intends to fulfill a portion of existing and future needs for housing in the region. The proposed project will incorporate BMPs in land development and sustainable management of natural and physical resources through project design, land use compatibility, and sustainable design features. The proposed project will be linked to the Wailea Resort and adjacent neighborhoods through multi-modal paths on main roads within the community. It is noted that discretionary permits, including a Special Management Area (SMA) Use Permit and Planned Development (PD) Step II approvals, will be obtained for the proposed project, which will involve a public hearing.**			
K. STRIVE FOR GOOD GOVERNANCE			
Objective:			
(1) Strengthen governmental planning, coordination, consensus building, and decision making.			✓
Policies:			
(a) Plan and prepare for the effects of social, demographic, economic, and environmental shifts.			✓
(b) Plan for and address the possible implications of Hawaiian sovereignty.			✓
(c) Encourage collaboration among government agencies to reduce duplication of efforts and promote information availability and exchange.			✓
(d) Expand opportunities for the County to be involved in and affect State and Federal decision making.			✓
(e) Plan and prepare for large-scale emergencies and contingencies.			✓
(f) Improve public awareness about preparing for natural hazards, disasters, and evacuation plans.			✓
(g) Improve coordination among Federal, State, and County agencies.			✓
Implementing Actions:			
(a) Develop policies, regulations, and programs to protect and enhance the unique character and needs of the County's various communities.			✓
(b) Evaluate and if necessary, recommend modifications to the County Charter that could result in a possible change to the form of governance for Maui County.			✓
(c) Study and evaluate the feasibility and implications of voting in Maui County Council elections.			✓
(d) Study and evaluate the feasibility of authorizing town governments in Maui County.			✓
Analysis: **Not Applicable.**			
Objective:			
(2) Promote civic engagement.	✓		
Policies:			
(a) Foster consensus building through in-depth, innovative, and accessible public participatory processes.	✓		
(b) Promote and ensure public participation and equal access to government among all citizens.	✓		
(c) Encourage a broad cross-section of residents to volunteer on boards and commissions.			✓
(d) Encourage the State to improve its community-involvement processes.			✓
(e) Support community-based decision making.	✓		
(f) Expand advisory functions at the community level.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
(g) Expand opportunities for all members of the public to participate in public meetings and forums.	✓		
(h) Facilitate the community's ability to obtain relevant documentation.	✓		
(i) Increase voter registration and turnout.			✓
Implementing Actions:			
(a) Implement two-way communication using audio-visual technology that allows residents to participate in the County's planning processes.			✓
(b) Ensure and expand the use of online notification of County business and public meetings, and ensure the posting of all County board and commission meeting minutes.			✓
(c) Explore funding mechanisms to improve participation by volunteers on boards and commissions.			✓
(d) Develop a project-review process that mandates early and ongoing consultation in and with communities affected by planning and land use activities.	✓		
Analysis: **The Applicant has met with key stakeholders and various community organizers, including the Kihei Community Association (KCA), the South Maui Advisory Committee (SMAC), and the Wailea Community Association (WCA)'s Design Review Committee, and will continue to promote civic engagement. It is noted that the proposed project has been approved by the WCA's Design Review Committee at the September 26, 2019 meeting. See Appendix "I". In addition, the proposed project will undergo public review pursuant to the Chapter 343, HRS, EA and Chapter 11-200.1, Hawai'i Administrative Rules (HAR), Environmental Impact Rules.**			
Objective:			
(3) Improve the efficiency, reliability, and transparency of County government's internal processes and decision making.			✓
Policies:			
(a) Use advanced technology to improve efficiency.			✓
(b) Simplify and clarify the permitting process to provide uniformity, reliability, efficiency, and transparency.			✓
(c) Improve communication with Lana'i and Moloka'i through the expanded use of information technologies, expanded staffing, and the creation and expansion of government-service centers.			✓
(d) Ensure that laws, policies, and regulations are internally consistent and effectuate the intent of the General Plan.			✓
Implementing Actions:			
(a) Update the County Code to be consistent with the General Plan.			✓
(b) Identify and update County regulations and procedures to increase the productivity and efficiency of County government.			✓
(c) Develop local level-of-service standards for infrastructure, public facilities, and services.			✓
(d) Implement plans through programs, regulations, and capital improvements in a timely manner.			✓
(e) Expand government online services.			✓
Analysis: **Not Applicable.**			
Objective:			
(4) Adequately fund in order to effectively administer, implement, and enforce the General Plan.			✓

COUNTYWIDE POLICY PLAN (Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.)	S	N/S	N/A
Policies:			
(a) Adequately fund, staff, and support the timely update and implementation of planning policy, programs, functional plans, and enforcement activities.			✓
(b) Ensure that the County's General Plan process provides for efficient planning at the County, island, town, and neighborhood level.			✓
(c) Encourage ongoing professional development, education, and training of County employees.			✓
(d) Encourage competitive compensation packages for County employees to attract and retain County personnel.			✓
(e) Enable the County government to be more responsive in implementing our General Plan and Community Plans.			✓
(f) Review discretionary permits for compliance with the Countywide Policy Plan.	✓		
(g) Strengthen the enforcement of County, State, and Federal land use laws.			✓
Implementing Actions:			
(a) Establish penalties to ensure compliance with County, State, and Federal land use laws.			✓
Analysis: **The proposed project is consistent with the applicable provisions of the Countywide Policy Plan as analyzed in this section.**			
Objective:			
(5) Strive for County government to be a role model for implementing cultural and environmental policies and practices.			✓
Policies:			
(a) Educate residents on the benefits of sustainable practices.			✓
(b) Encourage the retention and hiring of qualified professionals who can improve cultural and environmental practices.			✓
(c) Incorporate environmentally sound and culturally appropriate practices in government operations and services.			✓
(d) Encourage all vendors with County contracts to incorporate environmentally sound and culturally appropriate practices.			✓
Analysis: **Not Applicable.**			

E. MAUI ISLAND PLAN

The Maui Island Plan (MIP) is applicable to the island of Maui only, providing more specific policy-based strategies for population, land use, transportation, public and community facilities, water and wastewater systems, visitor destinations, urban design, and other matters related to future growth.

As provided by Chapter 2.80B, MCC, the MIP shall include the following components:

1. *An island-wide land use strategy, including a managed and directed growth plan*
2. *A water element assessing supply, demand and quality parameters*
3. *A nearshore ecosystem element assessing nearshore waters and requirements for preservation and restoration*
4. *An implementation program which addresses the County's 20-year capital improvement requirements, financial program for implementation, and action implementation schedule*
5. *Milestone indicators designed to measure implementation progress of the MIP*

It is noted that Ordinance No. 4004, which adopted the MIP on December 28, 2012 does not address the component relating to the implementation program. Chapter 2.80B of the MCC, relating to the General Plan, was amended via Ordinance No. 3979 on October 5, 2012, to provide that the implementation program component be adopted no later than one (1) year following the effective date of Ordinance No. 4004. In December 2013 and March 2014, the Council approved time extensions for approval and adoption of the implementation chapter of the MIP. The implementation program component of the MIP was adopted as Ordinance No. 4126 on May 29, 2014.

The MIP addresses a number of planning categories with detailed policy analysis and recommendations which are framed in terms of goals, objectives, policies and implementing actions. These planning categories address the following areas:

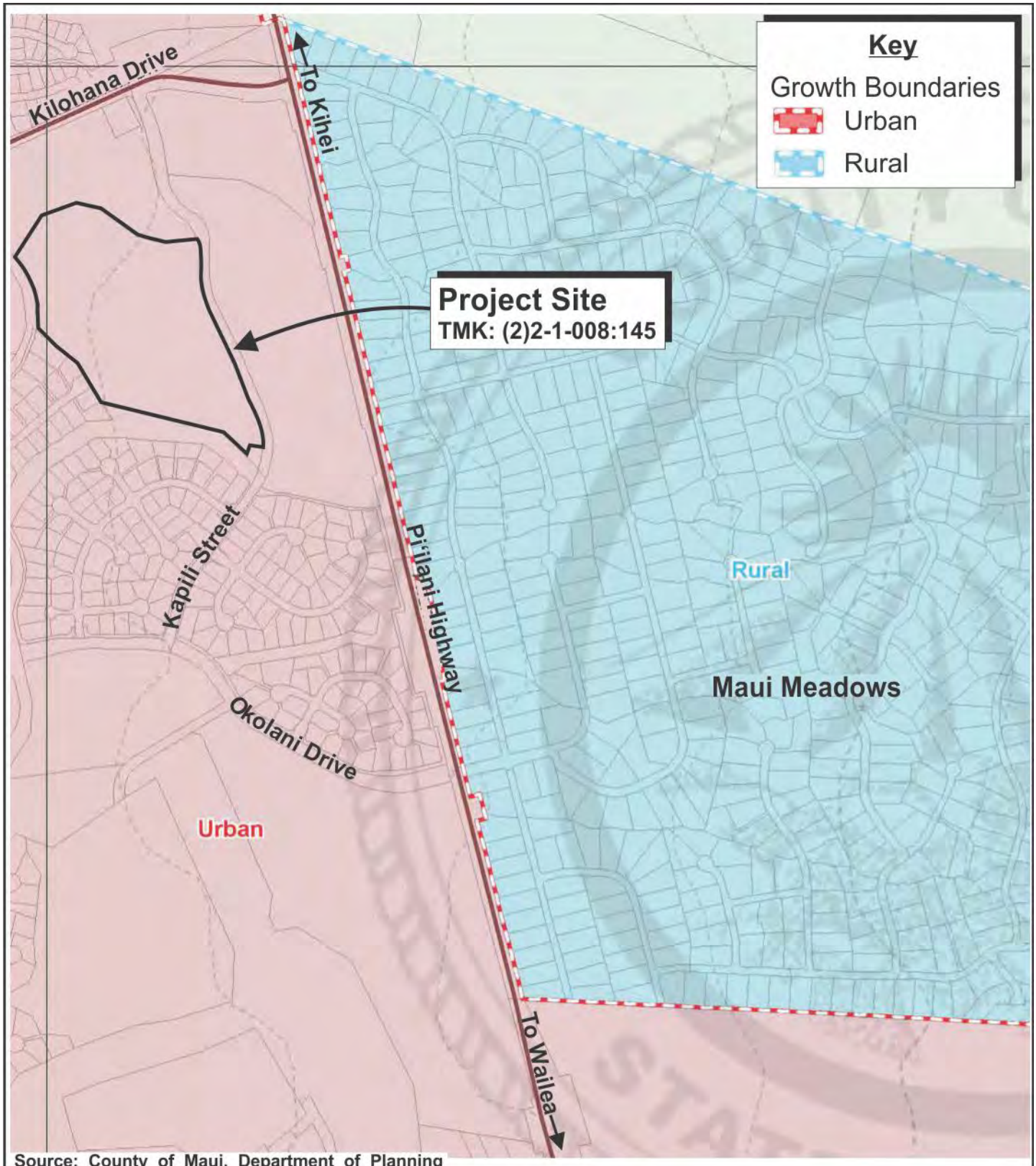
1. *Population*
2. *Heritage Resources*
3. *Natural Hazards*
4. *Economic Development*
5. *Housing*
6. *Infrastructure and Public Facilities*

7. Land Use

Additionally, an essential element of the MIP is its directed growth plan which provides a management framework for future growth in a manner that is fiscally, environmentally, and culturally prudent. Among the directed growth management tools developed through the MIP process are maps delineating UGB, small town boundaries and rural growth boundaries. The respective boundaries identify areas appropriate for future growth and their corresponding intent with respect to development character.

The proposed project is located within the UGB depicted in MIP Directed Growth Boundaries Map. See **Figure 12**. In this regard, it is consistent with the directed growth strategy defined via growth maps adopted in the MIP.

In addition, the proposed project has been reviewed with respect to pertinent goals, objectives, policies and implementing actions of the MIP. The analysis is presented in the table below.



Source: County of Maui, Department of Planning

Figure 12 Proposed Wailea Resort SF-S Residential Project

Maui Island Plan Map

NOT TO SCALE

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor\SF-S PERMITTING\Applications\Figures\Maui Island Plan map

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
CHAPTER 1 – POPULATION			
Goal:			
1.1 Maui's people, values, and lifestyles thrive through strong, healthy, and vibrant island communities.	✓		
Objective:			
1.1.1 Greater retention and return of island residents by providing viable work, education, and lifestyle options.	✓		
Policies:			
1.1.1.a Expand programs that enable the community to meet the education, employment, housing, and social goals of youth and young adults.			✓
1.1.1.b Expand housing, transportation, employment, and social opportunities to ensure residents are able to comfortably age within their communities.	✓		
1.1.1.c Measure and track resident satisfaction through surveys and community indicators.			✓
1.1.1.d Support funding for transportation, housing, health care, recreation, and social service programs that help those with special needs (including the elderly and disabled).			✓
Analysis: **The proposed project will create both short-term and long-term employment opportunities during construction and operation of the proposed residential community. The project will comply with Chapter 2.96, MCC, Residential Workforce Housing Policy by utilizing Residential Workforce Housing credits.**			
CHAPTER 2 – HERITAGE RESOURCES			
CULTURAL, HISTORICAL, AND ARCHAEOLOGICAL RESOURCES ISSUES			
Goal:			
2.1 Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions.	✓		
Objective:			
2.1.1 An island culture and lifestyle that is healthy and vibrant as measured by the ability of residents to live on Maui, access and enjoy the natural environment, and practice Hawaiian customs and traditions in accordance with Article XII, Section 7, Hawai'i State Constitution, and Section 7-1, Hawai`i Revised Statutes (HRS).	✓		
Policies:			
2.1.1.a Perpetuate the spirit of aloha and celebrate the host Hawaiian culture and other ethnic cultures.	✓		
2.1.1.b Perpetuate a respect for diversity and recognize the broad blending of cultures and ethnicities as vital to the quality of life on Maui.	✓		
2.1.1.c Ensure traditional public access routes, including native Hawaiian trails, are maintained for public use.			✓
2.1.1.d Support the education of visitors and new residents about the customs and etiquette of the Hawaiian culture, as well as other cultures.	✓		

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Analysis: **An AIS and CIA were carried out to ensure the proposed project will not adversely impact historic and cultural resources. It is noted that the project will incorporate various sustainability strategies to honor native Hawaiian culture and art and educate new residents of the community.**			
Objective:			
2.2 A more effective and efficient planning and review process that incorporates the best available cultural resources inventory, protection techniques, and preservation strategies.	✓		
Policies:			
2.1.2.a Ensure that the island has a comprehensive and up-to-date inventory of historic and archaeological resources, and their cultural significance.	✓		
2.1.2.b Require the update of existing planning and regulatory mechanisms to protect the natural, cultural, scenic, and historic resources within designated Heritage Areas (see Cultural Resources Overlay/Scenic Corridor Protection Technical Reference Map).			✓
2.1.2.c Ensure that cultural, historic, and archaeological resources are protected for the benefit of present and future generations.	✓		
Objective:			
2.3 Enhance the island's historic, archaeological, and cultural resources.	✓		
Policies:			
2.1.3.a Identify and pursue a listing of the properties and sites on the State and National Register of Historic Places.			✓
2.1.3.b Support the use of easements, dedications, and other mechanisms to acquire, maintain, and protect lands with cultural, archaeological, and historic significance.			✓
2.1.3.c Support regulations to require developers, when appropriate, to prepare an Archaeological Inventory Survey, Cultural Impact Assessment, and Ethnographic Inventories that are reviewed and commented upon by the Office of Hawaiian Affairs, Native Hawaiian advisory bodies, the State Historic Preservation Division (SHPD), and the Office of Environmental Quality Control, and systematically comply with the steps listed in SHPD's administrative rules, including consultation and monitoring during construction phases of projects.	✓		
2.1.3.d Promote the rehabilitation and adaptive reuse of historic sites, buildings, and structures.			✓
2.1.3.e Encourage property owners to register historic and archaeological sites on the State and National Register.			✓
2.1.3.f Support opportunities for public involvement with the intent to facilitate the protection and restoration of historic and archeological sites, including consultation with stakeholders.	✓		
2.1.3.g Encourage the resolution of land title questions relating to Land Commission Awards and Royal patents.			✓
2.1.3.h Ensure compliance with historic preservation laws, and discourage demolition of properties that are determined to be eligible for listing on the National or State Register of Historic Places.	✓		

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Analysis: **An AIS and CIA have been carried out on the proposed project to ensure protection of archaeological and cultural resources. It is noted that the Applicant has conducted meetings with key stakeholders and various community organizers, including the KCA, the SMAC, and the WCA's Design Review Committee. The proposed project will undergo public review pursuant to the Chapter 343, HRS environmental review process, as well as public hearing and review during the SMA and PD review and approval processes.**			
SHORELINE, REEFS, AND NEARSHORE WATERS			
Goal:			
2.2 An intact, ecologically functional system of reef, shoreline, and nearshore waters that are protected in perpetuity.	✓		
Objective:			
2.2.1 A more comprehensive and community-based ICZM program.			✓
Policies:			
2.2.1.a Encourage a management system that protects and temporarily rests the reef ecosystems from overuse.			✓
2.2.1.b Support the establishment of additional MMAs and reef replenishment areas.			✓
2.2.1.c Work with appropriate agencies and community members to protect any special managed conservation areas from overuse and ensure that surrounding land uses do not contribute to the degradation of the natural resources, such as ʻAhihi-Kinaʻu Natural Area Reserve, Honolua-Mokulēʻia Bay Marine Life Conservation District, and Mākena State Park.			✓
2.2.1.d Incorporate the following into the MIP, where consistent with the MIP:			✓
(1) Beach Management Plan for Maui;			✓
(2) Coastal Nonpoint Pollution Control Program Management Plan;			✓
(3) Implementation Plan for Polluted Runoff Control; and			✓
(4) Ocean Resource Management Plan.			✓
2.2.1.e Support greater coordination among governmental agencies involved with the protection of the island's marine resources.			✓
Objective:			
2.2.2 Improved reef health, coastal water quality, and marine life.	✓		
Policies:			
2.2.2.a Create additional mechanisms where needed to contain and control runoff and pollution.	✓		
2.2.2.b Allow extraction of high quality, Class A, low silt sands only when they will be used to protect or restore Maui's shorelines and beaches.			✓
2.2.2.c Carefully manage beach nourishment activities to protect the coastal and marine ecosystem.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
2.2.2.d Require, where appropriate, a buffer between landscaped areas and the shoreline, gulches, and streams to reduce the runoff of fertilizers, pesticides, herbicides, and other pollutants into coastal waters.	✓		
2.2.2.e Strictly regulate shoreline armoring in accordance with adopted Shoreline Rules, with an intent to protect the coastal and marine ecosystem.			✓
2.2.2.f Support greater protection of Keālia Pond National Wildlife Refuge through the following:			✓
(1) Enhancement of marine ecosystems;			✓
(2) Beach and sand dune resoration; and			✓
(3) Expansion of habitat for Maui's threatened or endangered sea turtles, birds, and other species.			✓
2.2.2.g Support the development of regulations to prevent the excessive depletion of fish stocks due to non-sustainable practices and gear such as SCUBA spear-fishing and lay nets, within the context of nearshore ecosystems.			✓
2.2.2.h Encourage the State to conduct a regular census of fish populations and monitor coral health.			✓
2.2.2.i Encourage the State to significantly increase the number of park rangers, enforcement officers, and marine biologists to protect coastal resources.			✓
2.2.2.j Encourage the State to prohibit the collection and exportation of fish, coral, algae, and other marine species for the ornamental and aquarium trade.			✓
Objective:			
2.2.3 Water quality that meets or exceeds State Clean Water Act standards.			✓
Policies:			
2.2.3.a Reduce the amount of impervious surface and devise site plan standards that aim to minimize storm runoff and NPS pollution.			✓
2.2.3.b Support the revision of existing regulations to require an Erosion and Sedimentation Control Plan (ESCP) for development activities that may pose a threat to water quality.			✓
2.2.3.c Require an on-site monitoring program, where applicable, when grading may pose a threat to water quality or when recommended in the ESCP.			✓
2.2.3.d Avoid development actions that impair Maui's reef systems and remove identified stressors.	✓		
2.2.3.e Phase out cesspools and restrict the use of septic systems in ecologically sensitive coastal areas by converting to environmentally-friendly alternative sewage treatment systems, and connecting to central sewerage systems when and where feasible.			✓
2.2.3.f Prohibit the development of new wastewater injection wells, except when unavoidable for public health and safety purposes.			✓
2.2.3.g Ensure that the County upholds its affirmative duty under the Clean Water Act by monitoring and reducing point and NPS pollution to help safeguard coastal waters.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Objective:			
2.2.4 Acquire additional shoreline lands and shoreline access rights.			✓
Policies:			
2.2.4.a Promote the use of conservation easements, land trusts, transfer and purchase of development rights, and mitigation banking.			✓
2.2.4.b Require the dedication of public beach and rocky shoreline access ways to and along the shoreline where it serves a practical public interest as a condition of development or subdivision approval; future subdivisions and developments shall be consistent with and effectuate, to the extent practicable, the *Shoreline Access Inventory Update - Final Report* (March 2005), and its updates.			✓
2.2.4.c Incorporate the *Shoreline Access Inventory Update - Final Report* (March 2005), and its regular updates, into this plan.			✓
2.2.4.d Identify access points while further acquiring key shoreline parcels and easement rights to enhance and protect beach access and shoreline recreation.			✓
Analysis: **The proposed project is not located in close proximity to the shoreline. Nevertheless, construction BMPs as well as a comprehensive drainage system, including LID measures, will be implemented to channel stormwater runoff into drainage detention basins and subsurface storage chambers in order to protect downstream properties and nearshore water quality.**			
WATERSHEDS, STREAMS, AND WETLANDS ISSUES			
Goal:			
2.3 Healthy watersheds, streams, and riparian environments.	✓		
Objective:			
2.3.1 Greater protection and enhancement of watersheds, streams, and riparian environments.			✓
Policies:			
2.3.1.a All present and future watershed management plans shall incorporate concepts of ahupuaʻa management based on the interconnectedness of upland and coastal ecosystems/species.			✓
2.3.1.b Continue to support and be an active member of watershed partnerships.			✓
2.3.1.c Support the establishment of regional water trusts, composed of public and private members, to manage water resources.			✓
2.3.1.d Support regulations to require developments to utilize ahupuaʻa management practices.			✓
2.3.1.e Work with private and non-profit entities to educate the public about the connection between upland activities within the watershed and the impacts on nearshore ecosystems and coral reefs.			✓
2.3.1.f Provide adequate funding and staff to develop and implement watershed protection plans and policies, including acquisition and management of watershed resources and land.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
2.3.1.g Encourage the State to mandate instream assessment to provide adequate water for native species.			✓
2.3.1.h Maui will protect all watersheds and streams in a manner that guarantees a healthy, sustainable riparian environment.	✓		
Objective:			
2.3.2 Decreased NPS and point source pollution.			✓
Policies:			
2.3.2.a Enforce water pollution related standards and codes.			✓
2.3.2.b Support the use of LID Techniques such as those described in the State of Hawai‘i LID Practitioner’s Guide (June 2006), as amended.	✓		
2.3.2.c Encourage farmers and ranchers to use agricultural BMPs to address NPS pollution.			✓
Objective:			
2.3.3 Preserve existing wetlands and improve and restore degraded wetlands.			✓
Policies:			
2.3.3.a Prohibit the destruction and degradation of existing upland, mid-elevation, and coastal wetlands.			✓
2.3.3.b Support and fund wetland protection and improvement, and restoration of degraded wetlands.			✓
2.3.3.c Where applicable, require developers to provide a wetland protection buffer and/or other protective measures around and between development and wetland resources.			✓
Objective:			
2.3.4 Greater preservation of native flora and fauna biodiversity to protect native species.	✓		
Policies:			
2.3.4.a Work with appropriate agencies to eliminate feral ungulate populations and invasive species.			✓
2.3.4.b Encourage the State to provide adequate funding to preserve biodiversity, protect native species, and contain or eliminate invasive species.			✓
2.3.4.c Support the work of conservation groups and organizations that protect, reestablish, manage, and nurture sensitive ecological areas and threatened indigenous ecosystems.			✓
Objective:			
2.3.5 Limited development in critical watershed areas.			✓
Policies:			
2.3.5.a Discourage development and subdivision of land within critical watersheds and in areas susceptible to high erosion and sediment loss.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
2.3.5.b Designate critical watershed areas as conservation lands.			✓
2.3.5.c Strongly encourage new subdivisions and developments that are proximate to environmentally sensitive watershed resources to prepare and implement CSD plans.			✓
Objective:			
2.3.6 Enhance the vitality and functioning of streams, while balancing the multiple needs of the community.			✓
Policies:			
2.3.6.a Protect and enhance natural streambeds and discourage stream alteration.			✓
2.3.6.b Work with appropriate agencies to establish minimum stream flow levels and ensure adequate stream flow to sustain riparian ecosystems, traditional kalo cultivation, and self-sustaining ahupuaʻa.			✓
2.3.6.c Respect and participate in the resolution of native Hawaiian residual land and water rights issues (kuleana lands, ceded lands, and historic agricultural and gathering rights).			✓
2.3.6.d Ensure that stream flows implement laws and policies found in the State Constitution and Water Code.			✓
2.3.6.e Work with appropriate agencies and stakeholders to establish minimum stream flow levels, promote actions to support riparian habitat and the use of available loʻi, and maintain adequate flows for the production of healthy kalo crops.			✓
Analysis: **The proposed project is not located near any wetlands, streams or waterways. LID measures, such as bioretention strips, have been incorporated into the project's drainage system to protect downstream properties and nearshore water quality. It is noted that a Biological Resources Survey has been prepared for the project and appropriate mitigation measures will be implemented to protect native flora and fauna species.**			
WILDLIFE AND NATURAL AREAS			
Goal:			
2.4 Maui's natural areas and indigenous flora and fauna will be protected.	✓		
Objective:			
2.4.1 A comprehensive management strategy that includes further identification, protection, and restoration of indigenous wildlife habitats.			✓
Policies:			
2.4.1.a Identify and inventory the following:			
(1) Natural, recreational, and open space resources;	✓		
(2) Flora and fauna with medium, high, and very high concentrations of threatened or endangered species; and	✓		
(3) Location and extent of invasive species.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
2.4.1.b Require flora and fauna assessment and protection plans for development in areas with concentrations of indigenous flora and fauna; development shall comply with the assessment and protection plan and shall use the avoidance, minimization, and mitigation approach respectively, with an emphasis on avoidance.			✓
2.4.1.c Support the implementation of Hawai`i's Comprehensive Wildlife Conservation Strategy (October 2005).			✓
Objective:			
2.4.2 A decrease in invasive species through programs and partnerships that eradicate undesirable species and protect native habitat.			✓
Policies:			
2.4.2.a Prevent the introduction of invasive species at all of Maui's airports and harbors.			✓
2.4.2.b Encourage the State to increase funding in support of invasive species interception, control, and eradication.			✓
2.4.2.c Encourage the State to develop programs that allow students to participate in invasive species eradication projects.			✓
Objective:			
2.4.3 Greater protection of sensitive lands, indigenous habitat, and native flora and fauna.	✓		
Policies:			
2.4.3.a Secure an interconnected network of sensitive lands, greenways, watercourses, and habitats.			✓
2.4.3.b Protect Maui's sensitive lands (see Sensitive Lands on Protected Areas Diagrams).	✓		
2.4.3.c Promote innovative environmental-planning methods and site-planning standards that preserve and re-establish indigenous flora and fauna habitat, to preserve and restore connected habitat corridors and open space.	✓		
2.4.3.d Utilize protection tools such as conservation easements, land trusts, land banks, Purchase of Developments Rights (PDRs), Transfer of Development Rights (TDRs), and other stewardship tools to acquire natural areas			✓
2.4.3.e Encourage discussions with communities to designate heritage areas that protect recreational and cultural lifestyles and resources.			✓
2.4.3.f Support the expansion of Haleakalā National Park, and the creation of new national parks, where appropriate and supported by local communities.			✓
2.4.3.g Encourage reforestation efforts that increase native species' habitat.			✓
2.4.3.h Utilize the Natural Area Partnership Program (NAPP) and other programs to protect natural lands.			✓
2.4.3.i Support increased dedicated funding for the acquisition, protection, restoration, or preservation of important natural areas or open space through the following: grants from the Land and Water Conservation Fund; dedicated funding from real property taxes or other appropriate revenues; bond issues; real estate			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
transfer tax; revenues from the Transient Accommodations Tax; development mitigation fees; and other appropriate funding sources.			
Analysis: **As discussed previously, a Biological Resources Survey has been carried out to ensure the proposed project will not adversely impact protected and endangered species or their habitats. The proposed project area is not located on or near sensitive lands on protected areas. The proposed landscape plan will include native and indigenous plants to the extent practical.**			
SCENIC RESOURCES			
Goal:			
2.5 Maui will continue to be a beautiful island steeped in coastal, mountain, open space, and historically significant views that are preserved to enrich the residents' quality of life, attract visitors, provide a connection to the past, and promote a sense of place.	✓		
Objective:			
2.5.1 A greater level of protection for scenic resources.	✓		
Policies:			
2.5.1.a Protect views to include, but not be limited to, Haleakalā, ʻĪao Valley, the Mauna Kahalawai (West Maui Mountains), Puʻu Ōʻlaʻi, Kahoʻolawe, Molokini, Molokaʻi, and Lānaʻi, Mauna Kea, Mauna Loa, sea stacks, the Pacific Ocean, and significant water features, ridgelines, and landforms.	✓		
2.5.1.b Identify, preserve, and provide ongoing management of important scenic vistas and open space resources, including mauka-to-makai and makai-to-mauka view planes.	✓		
2.5.1.c Protect "night sky" resources by encouraging the implementation of ambient light ordinances and encouraging conversion of all sources that create excessive light pollution, affecting our ability to view the stars.	✓		
2.5.1.d Protect ridgelines from development where practicable to facilitate the protection of public views.			✓
2.5.1.e Protect scenic resources along Maui's scenic roadway corridors.	✓		
Objective:			
2.5.2. Reduce impacts of development projects and public-utility improvements on scenic resources.	✓		
Policies:			
2.5.2.a Enforce the policies and guidelines of the SMA regarding the protection of views.	✓		
2.5.2.b Require any new subdivision of land, development, or redevelopment adjacent to a "high" or "exceptional" scenic corridor to submit an impact assessment of the project's scenic impacts; this assessment shall use the avoidance, minimization, and mitigation steps respectively, with an emphasis on avoidance.			✓
2.5.2.c Require appropriate building setbacks and limits on wall heights to protect views along scenic corridors.	✓		
2.5.2.d Encourage the State of Hawai`i Board of Land and Natural Resources to deny any development within the State Conservation District that interferes with a scenic landscape or disrupts important open space resources.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
2.5.2.e Require Urban Design and Review Board (UDRB) review and approval of utility poles, facilities, and other visible infrastructure improvements along scenic corridors.	✓		
2.5.2.f Ensure little or no effect on scenic resources from utility improvements, primarily power poles.	✓		
2.5.2.g Protect scenic vistas from intrusion by power poles.	✓		
Objective:			
2.5.3 Greater protection of and access to scenic vistas, access points, and scenic lookout points.			✓
Policy:			
2.5.3.a Protect, enhance, and acquire access to Maui's scenic vistas and resources.			✓
Analysis: **A View Analysis has been prepared for the proposed project to ensure there are no significant adverse impacts on makai/mauka views from adjacent roadways. All utilities within the project area will be placed underground. Open space buffers and landscaping will be provided along roadways to maintain visual resources in and around the project site. It is noted that the project will also be reviewed by the UDRB.**			
CHAPTER 3 – NATURAL HAZARDS			
Goal:			
3.1 Maui will be disaster resilient.			✓
Objective:			
3.1.1 Increased inter-agency coordination.			✓
Policy:			
3.1.1.a Reinforce the island's preparedness capacity by:			✓
(1) Applying the latest data-gathering techniques/technology;			✓
(2) Pursuing funding opportunities;			✓
(3) Improving monitoring and advance warning systems;			✓
(4) Fostering public awareness; and			✓
(5) Working with external agencies to coordinate disaster mitigation and response.			✓
Objective:			
3.1.2 Greater protection of life and property.			✓
Policies:			
3.1.2.a Identify critical infrastructure, lifelines, roads, and populations that are vulnerable to coastal hazards, and encourage strategic retreat and relocation to safer areas.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
3.1.2.b Consider the location of dams, reservoirs, holding ponds, and other water-containing entities that are upstream of inhabited areas to anticipate, avoid, and mitigate inundation risks, and discourage new development in areas where possible inundation hazards may exist.			✓
3.1.2.c Strengthen current development standards to minimize destruction of land and property.			✓
3.1.2.d Encourage the use of construction techniques that reduce the potential for damage from natural hazards.			✓
3.1.2.e Increase the County's resilience to drought.			✓
3.1.2.f Increase food and energy security through local production and storage.			✓
Objective:			
3.1.3 A more coordinated emergency response system that includes clearly defined and mapped evacuation routes.			✓
Policy:			
3.1.3.a Identify and expand shelter facilities and evacuation routes away from areas susceptible to natural hazards.			✓
Objective:			
3.1.4 A more educated and involved public that is aware of and prepared for natural hazards.			✓
Policies:			
3.1.4.a Promote public education and involvement related to natural hazards awareness and preparedness.			✓
3.1.4.b Coordinate a multi-agency effort to establish and promote a comprehensive public education program that will focus on practical approaches to preparedness, damage prevention, and hazard mitigation.			✓
Analysis: **Not applicable.**			
CHAPTER 4 – ECONOMIC DEVELOPMENT			
ECONOMIC DIVERSIFICATION			
Goal:			
4.1 Maui will have a balanced economy composed of a variety of industries that offer employment opportunities and well-paying jobs and a business environment that is sensitive to resident needs and the island's unique natural and cultural resources.	✓		
Objective:			
4.1.1 A more diversified economy.			✓
Policies:			
4.1.1.a Encourage an economy that is driven by innovation, research and development, and human resource development, including but not limited to, increasing technology- and knowledge-based sectors to be a major component in Maui County's economic base.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
4.1.1.b Support the creation of new jobs and industries that provide a living wage.	✓		
4.1.1.c Facilitate and expedite permits and approvals.			✓
4.1.1.d Develop linkages and partnerships among international research and development activities and Maui businesses.			✓
Objective:			
4.1.2 Increase activities that support principles of sustainability.	✓		
Policies:			
4.1.2.a Support industries that are sustainable, and culturally and environmentally sensitive.	✓		
4.1.2.b Encourage and support local businesses.			✓
4.1.2.c Substitute imports with locally-produced services and products where practicable.			✓
4.1.2.d Support the development of economic development clusters in targeted industry sectors.			✓
4.1.2.e Encourage all businesses to save energy, water, and other resources.	✓		
Objective:			
4.1.3 Improve the island's business climate.			✓
Policies:			
4.1.3.a Upgrade, maintain the quality of, and improve access to telecommunications infrastructure.			✓
4.1.3.b Ensure an adequate supply of affordable workforce housing.	✓		
4.1.3.c Develop neighborhoods and communities that are attractive to the workforce of a diversified economy.	✓		
4.1.3.d Encourage, nurture, and reward entrepreneurship and innovation.			✓
4.1.3.e Encourage employers to establish incentive programs. Support flexibility in workforce policies compatible with business and quality of life goals.			✓
4.1.3.f Assist community development organizations with revitalization and development of neighborhoods and communities that are attractive to the workforce of a diversified economy.			✓
Analysis: **The proposed project will create both short-term and long-term employment opportunities during the construction and operation phases of the new community. Various sustainable design features, guided by the project's sustainability principles, will be implemented to promote sustainable development.**			
TOURISM			
Goal:			
4.2 A healthy visitor industry that provides economic well-being with stable and diverse employment opportunities.			✓
Objective:			

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
4.2.1 Increase the economic contribution of the visitor industry to the island's environmental well-being for the island's residents' quality of life.			✓
Policies:			
4.2.1.a Engage the visitor industry in the growth of emerging sectors where practicable.			✓
4.2.1.b Support the implementation of the Maui County TSP, when consistent with the MIP.			✓
4.2.1.c Focus economic growth in the visitor industry through enhanced visitor experiences and an emphasis on attracting higher-spending.			✓
4.2.1.d Provide a rich visitor experience, while protecting the island's natural beauty, culture, lifestyles, and aloha spirit.			✓
4.2.1.e Diversify the tourism industry by supporting appropriate niche activities such as ecotourism, cultural tourism, voluntourism, ag-tourism, health and wellness tourism, educational tourism, medical tourism, and other viable tourism-related businesses in appropriate locations.			✓
4.2.1.f Recognize the important economic contributions that the visitor industry makes and support a healthy and vibrant visitor industry.			✓
4.2.1.g Support the increased availability of kamaʻāina discount programs.			✓
Objective:			
4.2.2 Comprehensively manage future visitor-unit expansion.			✓
Policies:			
4.2.2.a Mitigate the impact of tourism on the host culture, natural environment, and resident lifestyles.			✓
4.2.2.b Allow, where permitted by the community plan, the development of business hotels and small, sensitively-designed inns.			✓
4.2.2.c Manage impacts from transient vacation rentals, hotels, bed and breakfast units, timeshares, and resort condominiums on residential communities, public infrastructure, and community facilities.			✓
4.2.2.d Discourage supplanting of existing island housing to visitor accommodations that may have a negative impact on long-term rental housing, price of housing, and price of land.			✓
4.2.2.e Allow the designation of retreat/mini-conference centers in appropriate locations through the community plan process.			✓
4.2.2.f Community plans should consider establishing standards such as limits on building size, room count, and the number of inns, if any, that will be allowed in small towns.			✓
Objective:			
4.2.3 Maximize residents' benefits from the visitor industry.			✓
Policies:			
4.2.3.a Promote a desirable island population by striving to not exceed an island-wide visitor population of roughly 33 percent of the resident population.			✓
4.2.3.b Use the required General Plan Annual Status Report to monitor trends related to residents and visitors.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Analysis: **Not Applicable.**			
AGRICULTURE			
Goal:			
4.3 Maui will have a diversified agricultural industry contributing to greater economic, food, and energy security and prosperity.			✓
Objective:			
4.3.1 Strive for at least 85 percent of locally-consumed fruits and vegetables and 30 percent of all other locally-consumed foods to be grown in-State.			✓
Policies:			
4.3.1.a Strive to substitute food/agricultural product imports with a reliable supply of locally produced food and agricultural products.			✓
4.3.1.b Facilitate and support the direct marketing/sale of the island's agricultural products to local consumers, through farmers markets and similar venues.			✓
4.3.1.c Encourage growing a diverse variety of crops and livestock to ensure the stewardship of our land while safeguarding consumer safety.			✓
4.3.1.d Work with the State to regulate and monitor genetically-modified-organism (GMO) crops to ensure the safety of all crops and label all GMO products.			✓
Objective:			
4.3.2 Maintain or increase agriculture's share of the total island economy.			✓
Policies:			
4.3.2.a Encourage the export of the island's agricultural products to offshore markets.			✓
4.3.2.b Support infrastructure investments at harbors, such as ferry service, airports, and other facilities for the rapid and cost-effective export of island-grown products.			✓
4.3.2.c Encourage the continued viability of sugar cane production, or other agricultural crops, in central Maui and all of Maui Island.			✓
4.3.2.d Work with the State to reduce excise taxes for commercial agricultural products produced within the State.			✓
4.3.2.e Coordinate with appropriate State and Federal Departments and agencies, private shipping companies, and farmers associations to assist in the rapid and cost-effective export of Maui's agricultural products to off-island markets.			✓
Objective:			
4.3.3 Expand diversified agriculture production at an average annual rate of 4 percent.			✓
Policies:			
4.3.3.a Promote the development of locally-grown and ecologically-sound biofuels, aquaculture, and forest products.			✓
4.3.3.b Support the development of farming associations/cooperatives.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
4.3.3.c Work with educational institutions and appropriate agencies to provide education and training for farm owners and entrepreneurs.			✓
Analysis: **Not Applicable.**			
EMERGING SECTORS			
Goal:			
4.4 A diverse array of emerging economic sectors.			✓
Objective:			
4.4.1 Support increased investment and expanded activity in emerging industries.			✓
Policies:			
4.4.1.a Support the development of and access to state-of-the-art voice, video, and data telecommunications systems and high-speed Internet.			✓
4.4.1.b Attract and assist industries to compete in high technology activities such as those related to renewable energy, green technologies, diversified agriculture, ocean sciences, health sciences, space technologies, and other knowledge-based industries.			✓
4.4.1.c Support new industries that are environmentally and culturally sensitive such as health and wellness, sports and outdoor activities, cultural activities, the arts, film-making, entertainment, and digital media.			✓
4.4.1.d Support a sustainable, culturally sensitive, astronomy industry.			✓
4.4.1.e Support the continued development of the Maui Research and Technology Park in Kīhei, as a center for research and development, education, and diversified economic development, as provided by the Maui County Code.			✓
4.4.1.f Work with appropriate organizations to support the development of high technology clusters around renewable energy, diversified agriculture, ocean sciences, health sciences, and other knowledge-based industries.			✓
Objective:			
4.4.2 Increase the development of renewable energy technologies that are supported by the local community.			✓
Policies:			
4.4.2.a Support the expansion of the renewable energy sector and the use of solar, wind, wave, and biofuel technologies.	✓		
4.4.2.b Provide incentives to encourage renewable energy development, the use of green energy technologies, and energy conservation.			✓
4.4.2.c Ensure an adequate supply of land and facilitate permitting to meet the needs for renewable energy technologies such as solar, wind, wave, biofuel, and other technologies, provided that environmental, view plane, and cultural impacts are addressed.			✓
4.4.2.d Support the Maui County Energy Alliance Plan where consistent with the MIP.			✓
Analysis: **In accordance with the project's overall guiding sustainability principles, the homes within the proposed project will be designed to be rooftop solar PV and EV charger-ready and buyers of the homes will determine when they would like to implement these measures.**			

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
SMALL BUSINESS DEVELOPMENT			
Goal:			
4.5 Small businesses will play a key role in Maui's economy.			✓
Objective:			
4.5.1 Increase the number of and revenue generated by small businesses and decrease the percentage of small business failures.			✓
Policies:			
4.5.1.a Provide incentives and support for small businesses and entrepreneurs that incorporate sustainable technologies and practices into their operations, utilize local materials, or produce and sell locally-made goods or services.			✓
4.5.1.b Assist traditional "mom and pop" business establishments.			✓
4.5.1.c Reduce barriers to small business development.			✓
4.5.1.d Require, where feasible, the government procurement of goods and services from locally-owned, small businesses.			✓
4.5.1.e Support community markets and venues that sell locally-made produce, goods, and services.			✓
Analysis: **Not Applicable.**			
HEALTH CARE SECTOR			
Goal:			
4.6 Maui will have a health care industry and options that broaden career opportunities that are reliable, efficient, and provide social well-being.			✓
Objective:			
4.6.1 Expand the economic benefits of the health care sector.			✓
Policies:			
4.6.1.a Encourage expanded services at MMMC and at other medical facilities.			✓
4.6.1.b Support expansion of federally qualified health centers with the direct involvement of the residents of the communities served.			✓
4.6.1.c Support the use of multimedia as a means to provide healthcare information.			✓
4.6.1.d Encourage digitalization of all diagnostic equipment at all facilities on Maui to enable sharing of data and more efficient use of limited provider workforce, consistent with data protection and patient privacy.			✓
4.6.1.e Support the expansion of telemedicine.			✓
4.6.1.f Encourage expansion and improved access to emergency care in all communities.			✓
Objective:			
4.6.2 Be more efficient in the delivery of health care services and in minimizing health care costs.			✓
Policies:			

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
4.6.2.a Support expansion of health care providers and facilities to improve access to quality care throughout the island.			✓
4.6.2.b Encourage the expansion of veteran health care services.			✓
4.6.2.c Allow home-based out-patient medical care that does not interfere with surrounding neighborhoods.			✓
Objective:			
4.6.3. Expand Maui's alternative health care services, including spiritual practices.			✓
Policies:			
4.6.3.a Support efforts to promote alternative medicine.			✓
4.6.3.b Allow small-scale home-alternative medicine businesses such as massage, chiropractic care, traditional Hawaiian healing, and acupuncture that do not interfere with surrounding neighborhoods.			✓
Analysis: **Not Applicable.**			
EDUCATION AND WORKFORCE DEVELOPMENT			
Goal:			
4.7 Maui will have effective education and workforce development programs and initiatives that are aligned with economic development goals.			✓
Objective:			
4.7.1 Improve preschool and K-12 education to allow our youth to develop the skills needed to successfully navigate the 21st century.			✓
Objective:			
4.7.1.a Encourage the State to implement programs such as:			
(1) Universally available preschool for children between the ages of one and five;			✓
(2) Mandatory kindergarten;			✓
(3) Mandatory K-5th grade classroom size limits of 1 teacher to 20 students;			✓
(4) Mandatory nutrition programs; and			✓
(5) Mandatory Native Hawaiian programs at all grade levels.			✓
4.7.1.b Encourage the DOE to extend the school day by at least an hour.			✓
4.7.1.c Encourage the State to increase funding for public education so that Hawaiʻi is among the top 10 states nationally as measured by investment per pupil.			✓
4.7.1.d Encourage the State to ensure teacher certifications relate to effective delivery and improved student performances, and develop an industry experience/equivalency certification to assure our DOE students have access to career technical education and training.			✓
4.7.1.e Encourage the UHMC to provide dormitory space for high school students.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
4.7.1.f Encourage the development and implementation of curriculum on native Hawaiian history, culture, and practices, in consultation with native Hawaiian groups and associations.			✓
Objective:			
4.7.2 Encourage an increase in the number of certificate recipients and associate, bachelors, and graduate degrees conferred.			✓
Policies:			
4.7.2.a Encourage the State to increase the number of articulation agreements between the UHMC and four-year universities, particularly the University of Hawai‘i at Manoa.			✓
4.7.2.b Encourage the State to expand accredited 2-year, 4-year, and graduate programs through the UHMC.			✓
4.7.2.c Encourage the education and training of our residents to meet the needs of a diversified economy.			✓
4.7.2.d Support education and training programs such as student internships, vocational training, and career development opportunities to ensure a highly skilled workforce			✓
4.7.2.e Work with educational institutions to improve and expand access to education and training through multiple modes, including distance learning.			✓
Objective:			
4.7.3 Strive to ensure that more of Maui’s jobs are developed in STEM-related sectors by 2030.			✓
Policies:			
4.7.3.a Support the development of STEM-related certificates and degrees at the two- and four year levels.			✓
4.7.3.b Support the education initiatives of the Maui Agricultural Development Plan.			✓
4.7.3.c Expand and seek funding for internships, mentoring, job shadowing, etc. to foster interest in health and green workforce careers.			✓
4.7.3.d Work with MEDB, UHMC, and other similar organizations to expand internship/education programs to support STEM careers.			✓
4.7.3.e Continue to partner with the MEDB and other similar organizations to recruit, assist, and retain emerging industries, research and development activities, and educational/workforce opportunities.			✓
Analysis: **Not Applicable.**			
CHAPTER 5 – HOUSING			
Goal:			
5.1 Maui will have safe, decent, appropriate, and affordable housing for all residents developed in a way that contributes to strong neighborhoods and a thriving island community.	✓		
Objective:			
5.1.1 More livable communities that provide for a mix of housing types, land uses, income levels, and age.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Policies:			
5.1.1.a Promote livable communities (compact/walkable/bikeable, access to transit) that provide for a mix of housing types and land uses, including parks, open space, and recreational areas.	✓		
5.1.1.b Promote planning approaches that provide a mix of multifamily and single-family housing units to expand housing choices.			✓
5.1.1.c Discourage gated communities.		✓	
5.1.1.d Provide incentives for the rehabilitation or adaptive reuse of historic structures to facilitate more housing choices.			✓
5.1.1.e Use planning and regulatory approaches to provide higher housing densities.			✓
Objective:			
5.1.2 Better monitoring, evaluation, and refinement of affordable housing policy in conjunction with the economic cycle.			✓
Policies:			
5.1.2.a Improve data on resident and nonresident housing.			✓
5.1.2.b Utilize the following approaches to promote resident housing and to minimize offshore market impacts:			
(1) Ensure that the future housing stock is composed of a mix of housing types (multifamily, small lots, ohana units, co-housing, cottage houses, etc.);			✓
(2) Encourage new housing in proximity to jobs and services, in places that are conducive/affordable to island residents; and	✓		
(3) Explore taxation alternatives and building fee structures.			✓
Objective:			
5.1.3 Provide affordable housing, rental or in fee, to the broad spectrum of our island community.	✓		
Policies:			
5.1.3.a Consider regulations that can help keep affordable housing available at affordable rents.			✓
5.1.3.b Seek to have ownership of affordable for-sale and rental housing vested in a non-profit community land trust, or other qualified housing provider, committed to keeping such housing affordable in perpetuity.			✓
5.1.3.c Facilitate the use of public lands in urban areas that are suitable for affordable housing.			✓
5.1.3.d Develop or support partnerships and initiatives that provide housing-related education/outreach.			✓
5.1.3.e Support the continuing efforts of the County and its community partners to:			
(1) Disseminate information on different housing/financial assistance programs (loans, grants, etc.) including information on housing rehabilitation/restoration/adaptive reuse;			✓
(2) Provide housing-related counseling including budget, credit, and financial planning assistance; and			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
(3) Create and maintain a comprehensive/master list of available affordable housing to help residents secure a unit that satisfies their need.			✓
Objective:			
5.1.4 Provide infrastructure in a more timely manner to support the development of affordable housing.			✓
Policies:			
5.1.4.a Prioritize the development of infrastructure that supports the development of affordable housing.			✓
5.1.4.b Utilize appropriate financing approaches and assistance tools to encourage the development of infrastructure and public facilities.			✓
5.1.4.c Tailor infrastructure requirements to correspond with appropriate level-of-service standards to help control housing costs and to maintain safety.			✓
Objective:			
5.1.5 A wider range of affordable housing options and programs for those with special needs.			✓
Policies:			
5.1.5.a Ensure that residents with special needs have access to appropriate housing.			✓
5.1.5.b Encourage housing to be built or rehabilitated to allow the elderly and those with special needs to live in their homes.			✓
5.1.5.c Ensure and facilitate programs to assist those with special needs from becoming homeless.			✓
5.1.5.d Promote programs that stimulate the production of sustainable homeless shelters and alternative housing technologies.			✓
5.1.5.e Support programs that offer home modification counseling on low-interest retrofit loans and grants to those with special needs.			✓
Objective:			
5.1.6 Reduce the cost to developers of providing housing that is affordable to families with household incomes 160 percent and below of annual median income.			✓
Policies:			
5.1.6.a Support fast-track processing procedures for the following housing-related entitlements: affordable housing projects/units; indigenous Hawaiian housing/units; and special-needs housing units (seniors, disabled, homeless, etc.).			✓
5.1.6.b Require the construction of affordable for-sale and rental housing units as part of the construction of new housing developments.	✓		
5.1.6.c Offer extra incentives in boom periods and withdraw incentives during slack periods.			✓
Objective:			
5.1.7 Increased preservation and promotion of indigenous Hawaiian housing and architecture.			✓
Policies:			

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
5.1.7.a Preserve, promote, and give priority to Hawaiian housing/architecture forms to preserve Hawaiian culture.			✓
5.1.7.b Provide for indigenous architecture as an allowable structure for native Hawaiian uses to include hula and lāʻau lapaʻau.			✓
Analysis: **The proposed project involves development of 57 single-family condominium units and related improvements. The proposed project will comply with applicable provisions of Chapter 2.96 MCC by utilizing Residential Workforce Housing credits for workforce housing units that have already been built. It is noted that the credits were acquired from A&B Wailea LLC, the previous owner of the property. The project area is located in proximity to existing jobs and services in Kīhei and Wailea.**			
CHAPTER 6 – INFRASTRUCTURE AND PUBLIC FACILITES			
SOLID WASTE			
Goal:			
6.1 Maui will have implemented the ISWMP thereby diverting waste from its landfills, extending their capacities.			✓
Objective:			
6.1.1 Meet our future solid waste needs with a more comprehensive planning and management strategy.			✓
Policies:			
6.1.1.a Update and publicize the ISWMP every ten years.			✓
6.1.1.b Strengthen inter-agency coordination including Planning and Environmental Management departments.			✓
6.1.1.c Divert waste from the landfills and educate the public about the recommendations of the ISWMP.			✓
6.1.1.d Minimize future active, unlined landfill cells to the extent feasible.			✓
Objective:			
6.1.2 Divert at least 60 percent of solid waste from the island's landfills.	✓		
Policies:			
6.1.2.a Require residents and commercial enterprises that generate waste to pay a fair proportion of disposal costs.			✓
6.1.2.b Encourage environmentally safe waste-to-energy solutions.			✓
6.1.2.c Facilitate the reduction of solid waste generated by packaging, food service products, construction waste, etc.	✓		
6.1.2.d Educate residents and visitors about the impacts of and methods to reduce, reuse, and recycle.	✓		
6.1.2.e Discourage the disposal of landfill leachate by diversion to wastewater treatment plants, where practicable.			✓
Analysis: **The proposed project has been designed to incorporate sustainable design features regarding solid waste management in accordance with the project's sustainability principles.**			

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
WASTEWATER			
Goal:			
6.2 Maui will have wastewater systems that comply with or exceed State and Federal regulations; meet levels-of-service needs; provide adequate capacity to accommodate projected demand; ensure efficient, effective, and environmentally sensitive operation; and maximize wastewater reuse where feasible.	✓		
Objective:			
6.2.1 A wastewater planning program capable of efficiently providing timely and adequate capacity to service projected demand where economically feasible and practicable.	✓		
Policies:			
6.2.1.a Encourage the use of renewable energy in support of wastewater treatment facilities.			✓
6.2.1.b Focus the expansion of wastewater systems to accommodate planned growth consistent with the MIP Directed Growth Strategy.	✓		
6.2.1.c Establish new wastewater treatment plant(s) outside the tsunami zone.			✓
Objective:			
6.2.2 Adequate levels of wastewater service with minimal environmental impacts.	✓		
Policies:			
6.2.2.a Meet or exceed all State and Federal standards regulating wastewater disposal or reuse.			✓
6.2.2.b Encourage tertiary treatment for all municipal wastewater that is disposed through deep injection wells. Phase out all municipal and private injection wells in coordination with water reuse programs, where feasible, by 2020.			✓
6.2.2.c Improve and upgrade the County's existing wastewater collection, treatment, and reuse facilities consistent with current and future plans and the County's CIP.			✓
6.2.2.d Maintain an ongoing sewer inspection program for public and private multi-user systems to identify potential problems and forecast each system's residual life.			✓
6.2.2.e Require all new developments to fund system improvements in proportion to the development impact and in accordance with the County's wastewater functional plan.	✓		
6.2.2.f Require appropriate funding mechanisms, such as a sinking fund, to adequately maintain or replace aging water-system components.			✓
6.2.2.g Strongly encourage the phase out of cesspools.			✓
Objective:			
6.2.3 Increase the reuse of wastewater.	✓		

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Policies:			
6.2.3.a Strengthen coordination between the Department of Water Supply (DWS) and the WWRD to promote reuse/recycling of wastewater.			✓
6.2.3.b Expand the reuse of wastewater from the Central Maui, Kīhei, Lahaina, and other wastewater systems.	✓		
Analysis: **Wastewater generated from the proposed project will be treated at the County Kihei Wastewater Reclamation Facility (KWRF). As may be required, the proposed project will pay assessment fees for treatment plant expansion costs in accordance with ordinances setting forth such fees. The proposed project is currently located beyond the service limits of the existing R-1 distribution system. The project's irrigation system for common areas will be designed to facilitate the future connection to the R-1 distribution system when it becomes available.**			
WATER			
Goal:			
6.3 Maui will have an environmentally sustainable, reliable, safe, and efficient water system.	✓		
Objective:			
6.3.1 More comprehensive approach to water resources planning to effectively protect, recharge, and manage water resources including watersheds, groundwater, streams, and aquifers.	✓		
Policies:			
6.3.1.a Ensure that DWS actions reflect its public trust responsibilities toward water.			✓
6.3.1.b Ensure the WUDP implements the State Water Code and MIP's goals, objectives, and policies.			✓
6.3.1.c Regularly update the WUDP, to maintain compliance with the General Plan.			✓
6.3.1.d Ensure that the County's CIP for water-source development is consistent with the WUDP and the MIP.			✓
6.3.1.e Where desirable, retain and expand public ownership and management of watersheds and fresh-water systems.			✓
6.3.1.f Encourage and improve data exchange and coordination among Federal, State, County, and private land use planning and water resource management agencies.			✓
Objective:			
6.3.2 Increase the efficiency and capacity of the water systems in striving to meet the needs and balance the island's water needs.			✓
Policies:			
6.3.2.a Ensure the efficiency of all water system elements including well and stream intakes, water catchment, transmission lines, reservoirs, and all other system infrastructure.			✓
6.3.2.b Encourage increased education about and use of private catchment systems where practicable for nonpotable uses.			✓
6.3.2.c Maximize the efficient use of reclaimed wastewater to serve nonpotable needs.	✓		

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.3.2.d Work with appropriate State and County agencies to achieve a balance in resolving the needs of water users in keeping with the water allocation priorities of the MIP.			✓
6.3.2.e Ensure water conservation through education, incentives, and regulations.	✓		
6.3.2.f Acquire and develop additional sources of potable water.			✓
Objective:			
6.3 Improve water quality and the monitoring of public and private water systems.			✓
Policy:			
6.3.3.a Protect and maintain water delivery systems.			✓
Analysis: **The proposed project will incorporate a comprehensive drainage system, utilizing LID measures, to protect groundwater resources from adverse impacts. As previously noted, the project's irrigation system for common areas will be designed to facilitate the future connection to the R-1 distribution system when it becomes available.**			
TRANSPORTATION			
Goal:			
6.4 An interconnected, efficient, and well-maintained, multimodal transportation system.	✓		
Objective:			
6.4.1 Provide for a more integrated island-wide transportation and land use planning program that reduces congestion and promotes more efficient (transit-friendly) land use patterns.			✓
Policies:			
6.4.1.a Plan for an integrated multi-modal transportation system comprised of public transit, bicycle, pedestrian, automobile, and other transportation modes.	✓		
6.4.1.b Refocus transportation investment from the construction of additional roadways only for the automobile to the expansion of a multimodal transportation system.			✓
6.4.1.c Encourage the use of "complete streets" design methods.	✓		
6.4.1.d Encourage employers to implement TDM strategies.			✓
Objective:			
6.4.2 Safe, interconnected transit, roadway, bicycle, equestrian, and pedestrian network.	✓		
Policies:			
6.4.2.a Ensure transit-, roadway-, and pedestrian-facilities design and level-of-service standards respect the unique character of our communities.	✓		
6.4.2.b Prioritize transportation improvements list to cost-effectively meet existing and future needs consistent with the MIP.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.4.2.c Require new development, where appropriate, to integrate sidewalks, pathways, bikeways, and transit infrastructure into new commercial and residential projects while enhancing community character.	✓		
6.4.2.d Identify and improve hazardous and substandard sections of roadways, drainage infrastructure, and bridges, provided that the historical integrity of the roads and bridges are protected.			✓
6.4.2.e Consider identification, acquisition where appropriate, and utilization of abandoned right of-ways for bikeways, pedestrian pathways, and open-space networks.			✓
6.4.2.f Support the implementation of the *Central Maui Pedestrian & Bicycle Master Plan* (March 2012), when consistent with the MIP.			✓
Objective:			
6.4.3 An island-wide, multimodal transportation system that respects and enhances the natural environment, scenic views, and each community's character.			✓
Policies:			
6.4.3.a Ensure that the roadway and transit alignments respect the natural environment and scenic views.	✓		
6.4.3.b Ensure that roadways and transit systems in rural areas and small towns enhance community character.			✓
6.4.3.c Design all transit systems to respect visual corridors and Maui's character.			✓
Analysis: **The proposed project will include multi-modal paths on main roads of the community which will connect to Wailea Alanui Drive and Kapili Street. A TIAR has been prepared for the project and indicated that the project is not anticipated to result in significant adverse impacts to the traffic conditions in the project's vicinity. Refer to Appendix "H".**			
TRANSIT			
Goal:			
6.5 An island-wide transit system that addresses the needs of residents and visitors and contributes to healthy and livable communities.			✓
Objective:			
6.5.1 An integrated transit system that better serves all mobility needs of Maui's residents and visitors.			✓
Policies:			
6.5.1.a Maximize access to public transit in town centers, commercial districts, and employment centers.			✓
6.5.1.b Expand regional and inter-regional transit services, where appropriate, in heavily traveled corridors and within communities			✓
6.5.1.c Increase the frequency of current service, add additional bus routes as demand requires, and transition to nonpolluting transit vehicles, as funding permits.			✓
6.5.1.d Provide adequate transit infrastructure (e.g., bus pullouts, waiting benches and shelters, signs) along existing and future transit right-of-ways.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.5.1.e Require new development where appropriate, to provide right-of-ways (ROWs) to accommodate transit circulation and support facilities.			✓
6.5.1.f Identify, protect, and preserve, or acquire corridors for future inter-community transit use, including but not limited to, rail and also multimodal use corridors.			✓
6.5.1.g Establish transit corridors by planning for and securing right-of-way when appropriate for alternative modes of transportation (such as rail and water ferry service).			✓
6.5.1.h Pursue improvements and upgrades to the existing transit system consistent with updated MDOT planning studies/transit plans (within the framework of comprehensive island-wide multimodal transportation plans).			✓
6.5.1.i Increase inter-agency coordination between the Department of Planning, State Department of Transportation, County Department of Public Works, and other applicable agencies.			✓
Objective:			
6.5.2 Plan for a more diversified and stable funding base to support transportation goals.			✓
Policies:			
6.5.2.a Support alternative methods and sources of funding transportation improvements (including impact fees, higher taxes, fare adjustments, dedicated sources of funding, and assessments).	✓		
6.5.2.b Collaborate with public-private entities or nonprofit organizations to reduce public transit operational expenses.			✓
6.5.2.c Coordinate with appropriate Federal, State, and County agencies to fund transportation projects in areas where growth is anticipated.			✓
Analysis: **Pursuant to the MOA dated March 14, 2016 and its subsequent amendment with the State DOT, the proposed project will contribute the required regional fair share improvements for the Wailea Resort Masterplan. It is noted that the planned improvements will not yet be triggered by this project and will be implemented at the appropriate time in accordance with the MOA and its subsequent amendment.**			
PARKS			
Goal:			
6.6 Maui will have a diverse range of active and passive recreational parks, wilderness areas, and other natural-resource areas linked, where feasible, by a network of greenways, bikeways, pathways, and roads that are accessible to all.	✓		
Objective:			
6.6.1 More effective, long-range planning of parks and recreation programs able to meet community needs.			✓
Policies:			
6.6.1.a Support, consistent with the MIP, the implementation of open-space and recreational plans, such as the *Pali to Puamana Parkway* Master Plan and the *Upcountry Greenways Master Plan*.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.6.1.b Utilize the ahupuaʻa approach by integrating mauka-to-makai natural landscapes into an island-wide parks and recreation functional plan.			✓
6.6.1.c Provide a balanced mix of passive and active parks, including neighborhood, community, and regional parks, in each community plan area.			✓
6.6.1.d Support the expansion of Haleakala National Park, where supported by affected communities.			✓
6.6.1.e Support loʻi and dryland taro restoration in County, State, and Federal parks.			✓
6.6.1.f Encourage private landowners to dedicate land to Federal, State, or County governments, or nonprofit land trusts, for parks and open-space protection consistent with the MIP.			✓
6.6.1.g Strengthen inter-agency coordination including State and County departments, such as resolving joint use of facilities and properties.			✓
6.6.1.h Work with the State to prepare and implement a master management plan for ʻĀhihi-Kīnaʻu and La Perouse-Keoneʻōʻio Bay to Kanaloa Point region.			✓
Objective:			
6.6.2 Achieve parks and recreation opportunities to meet the diverse needs of our community.			✓
Policies:			
6.6.2.a Establish appropriate level-of-service standards at the neighborhood, community, and regional levels.			✓
6.6.2.b Identify and acquire parks and recreational facilities that address existing park inadequacies and complement and enhance neighborhoods, communities, and natural land features.			✓
6.6.2.c Design park facilities to preserve and enhance natural site characteristics, maximize views, protect environmental and cultural sites, and minimize water demands.			✓
6.6.2.d Acquire lands along the shoreline, between coastal roadways and the ocean.			✓
6.6.2.e Encourage the development of regional parks, district parks, and greenways in a manner that helps to contain sprawl, provide separation between distinct communities, or offer open space within urban communities.			✓
6.6.2.f Require large master-planned communities that incorporate a mixture of park facilities pursuant to parks standards and functional plans.			✓
6.6.2.g Support appropriate areas for cultural parks (e.g., Kepaniwai) in each community plan area.			✓
6.6.2.h Incorporate community input to determine the appropriate location, design, and long-term stewardship of parks and recreation facilities.			✓
6.6.2.i Manage commercial activities at public parks to minimize impacts to residents.			✓
6.6.2.j Support public-private partnerships to implement the acquisition and development of parks when consistent with the General Plan.			✓
6.6.2.k Support a coordinated program to improve, operate, and maintain joint-use facilities and grounds.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Objective:			
6.6.3 An expanded network of greenways, trails, pathways, and bikeways.	✓		
Policies:			
6.6.3.a Link existing and future park sites, natural areas, the shoreline, and residential areas with a network of bikeways, pedestrian paths, trails, and greenways.	✓		
6.6.3.b Support the implementation of plans and programs that facilitate pedestrian mobility and access to active and passive recreation areas and sites.			✓
6.6.3.c Collaborate with the State and private land owners to ensure perpetual access and proper stewardship of traditional trails and access systems.			✓
6.6.3.d Facilitate the development of well-managed noncommercial campgrounds throughout the island.			✓
6.6.3.e Consider requiring commercial bike rental businesses to provide funding that supports a mauka-to-makai Haleakalā bikeway improvement program.			✓
6.6.3.f Ensure ADA compliance and seek opportunities to make all parks and recreational facilities accessible to people with disabilities.			✓
***Analysis:* As noted previously, the proposed project will include multi-modal paths on main roads to encourage walking and bicycling, which will connect to Wailea Alanui Drive and Kapili Street. The project has been designed to protect the scenic beauty of the Wailea Resort area and approximately 20 percent of the project area will be retained as open space.**			
PUBLIC FACILITIES			
Goal:			
6.7 Maui will have adequate public facilities that meet the diverse needs of residents.			✓
Objective:			
6.7.1 More effective planning for public facilities to meet community needs.			✓
Policies:			
6.7.1.a Ensure the development and update of island-wide public facilities functional plans that incorporate prioritized facilities, programs, and a financial component.			✓
6.7.1.b Establish appropriate level-of-service standards for public facilities provided by the County.			✓
6.7.1.c Pursue improvements and upgrades of County public facilities consistent with the public facilities functional plan.			✓
6.7.1.d Recognize Wailuku Town as Maui's Civic Center and support the revitalization of the Civic Center District by consolidating government office spaces, enhancing landscape beautification, and providing adequate public parking.			✓
6.7.1.e Support, with community input, the relocation of the Maui Community Correctional Center from Wailuku to an appropriate location in Pu'unēnē.			✓
6.7.1.f Adequately plan and fund public safety facilities (fire, police, ambulance, civil defense) to meet community needs.			✓
6.7.1.g Increase joint facilities utilization and program coordination between State and County agencies such as baseyards, communication centers, recreational facilities, etc., where feasible.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.7.1.h Focus future expenditures for additional government office space, parking, and related facilities in Wailuku's Civic Center District.			✓
6.7.1.i Encourage continuous and safe walkways for children within one mile of each school.			✓
6.7.1.j Encourage public-private partnerships to identify and resolve public facility plan shortcomings when consistent with the General Plan.			✓
6.7.1.k Incorporate community/area residents' input to determine the appropriate location and design of public facilities.			✓
Analysis: **Not Applicable.**			
SCHOOLS AND LIBRARIES			
Goal:			
6.8 Maui will have school and library facilities that meet residents' needs and goals.			✓
Objective:			
6.8.1 Assist in providing appropriate school and library facilities in a timely manner and in strategic locations.			✓
Policies:			
6.8.1.a Work in partnership with all educational institutions to meet current and future needs including appropriate location, timing, and design of future facilities.			✓
6.8.1.b Allow for the expansion and intensification of uses at the UHMC including satellite campuses operating in remote areas.			✓
6.8.1.c Encourage the DOE to build and maintain smaller, community-oriented schools.			✓
6.8.1.d Encourage better cooperation by the State and County for use of State and County facilities.			✓
6.8.1.e Encourage the State to upgrade, modernize, and expand school facilities, including those in remote communities.			✓
6.8.1.f Work with the State to develop a master plan for the expansion of UHMC in accordance with the MIP.			✓
6.8.1.g Support partnerships (public/private/nonprofit) to build and staff new schools and improve existing facilities.			✓
6.8.1.h Work with the BOE HSPLS to provide centralized library services (including telecommunications) to all areas of Maui.			✓
6.8.1.i Work with the State to expedite planning and construction of Kīhei High School, including the integration of the high school with the Maui Research and Technology Park.			✓
6.8.1.j Work with the State to identify intermediate school sites in Central Maui and other areas where needed.			✓
Objective:			
6.8.2 Provide a more expansive network of safe and convenient pedestrian-friendly streets, trails, pathways, and bikeways between neighborhoods and schools where appropriate.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Policies:			
6.8.2.a Encourage the State to build new school facilities in appropriate locations that minimize time and distance for students to travel to and from school.			✓
6.8.2.b Encourage the State to implement the Safe Routes to School initiative with funding commitments to help the County plan and fund projects that ensure safe access routes to school.			✓
Analysis: **Not Applicable.**			
HEALTH CARE			
Goal:			
6.9 All of Maui residents will have the best possible health care to include healthy living, disease prevention, as well as acute and long-term care.			✓
Objective:			
6.9.1 Greater autonomy to the Maui region in their efforts to improve medical care on the island.			✓
Policies:			
6.9.1.a Encourage the State to give greater autonomy to the Maui region in their efforts to improve medical care on the island.			✓
6.9.1.b Support innovative financial solutions, such as capital partnerships, joint ventures, and consolidations for MMMC and other health institutions.			✓
6.9.1.c Support MMMC as a major core medical center that provides a greater range of services.			✓
6.9.1.d Support the immediate development of a critical access hospital in West Maui.			✓
6.9.1.e Support the expansion of regional critical-access facilities, where allowed by Federal regulations.			✓
6.9.1.f Improve medical service to remote and outlying regions.			✓
6.9.1.g Support transportation services for dialysis patients and community dialysis programs.			✓
6.9.1.h Work with the State to determine the feasibility of appropriate medical facilities in South Maui and Hāna, including the possible reestablishment of a small community hospital in Hāna, the establishment of a hospital in South Maui, and assist the State in securing funding to meet Maui's health care needs.			✓
Objective:			
6.9.2 An expansion of long-term care facilities and long-term care alternatives to meet the needs of our aging population.			✓
Policies:			
6.9.2.a Support efforts to increase Maui's long-term care bed capacity to cover current and future needs, close to large population centers.			✓
6.9.2.b Recognize that facilities for low-income elders who need long-term care are a needed form of affordable and subsidized housing.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.9.2.c Evaluate the needs of the long-term disabled and provide planning support for their care, if there is a need for long-term care facilities.			✓
6.9.2.d Consider long-term care facilities as a major potential employment base and encourage the recruitment and training of potential employees.			✓
Objective:			
6.9.3 More support to home-care and community-based programs so they become alternatives to traditional nursing homes.			✓
Policies:			
6.9.3.a Support the establishment of a program to assist the elderly and people with disabilities to remain in their homes or in a home-like setting.			✓
6.9.3.b Support the establishment of senior and adult-day-care centers and senior housing.			✓
6.9.3.c Continue to support existing senior centers (e.g. Kaunoa), and establish new senior centers that will provide day-care sites and programs for the disabled and elderly.			✓
6.9.3.d Support funding alternatives for community-based services that assist home-care efforts.			✓
6.9.3.e Encourage the State to adopt the recommendations contained within the Legislative Reference Bureau's report entitled "Gimme a Break: Respite Care Services in Other States," (December 2007) where appropriate, feasible, and consistent with the MIP.			✓
Objective:			
6.9.4 Improved preventative medicine and primary health care.			✓
Policies:			
6.9.4.a Develop and utilize health-status benchmarks to measure prevention and primary health care service delivery.			✓
6.9.4.b Support programs that provide family planning assistance.			✓
Analysis: **Not Applicable.**			
ENERGY			
Goal:			
6.10 Maui will meet its energy needs through local sources of clean, renewable energy, and through conservation.	✓		
Objective:			
6.10.1 Reduce fossil fuel consumption. Using the 2005 electricity consumption as a baseline, reduce by 15 percent in 2015; 20 percent by 2020; and 30 percent by 2030.	✓		
Policies:			
6.10.1.a Support energy efficient systems, processes, and methods in public and private operations, buildings, and facilities.	✓		

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.10.1.b Support the Maui Solar Rooftop initiative.	✓		
6.10.1.c Support Hawai`i Energy and other Public Utility Commission (PUC) approved energy efficiency programs.			✓
Objective:			
6.10.2 Increase the minimum percentage of electricity obtained from clean, renewable energy sources. By 2015, more than 15 percent of Maui's electricity will be produced from locally-produced, clean, renewable energy sources, 25 percent by 2020, and 40 percent by 2030.	✓		
Policies:			
6.10.2.a Evaluate available renewable energy resource sites and applicable technologies.			✓
6.10.2.b Encourage the installation of renewable energy systems, where appropriate.	✓		
6.10.2.c Support the establishment of new renewable energy facilities at appropriate locations provided that environmental, view plane, and cultural impacts are addressed.			✓
6.10.2.d Encourage all new County facilities completed after January 1, 2015, to produce at least 15 percent of their projected electricity needs with onsite renewable energy.			✓
Objective:			
6.10.3 Increased use of clean, renewable energy.	✓		
Policies:			
6.10.3.a Support efforts in the PUC to upgrade Maui's power grid to integrate renewable energy from multiple sources and wheeling of electricity.			✓
6.10.3.b Encourage the PUC to work with the County to implement and expedite community supported renewable energy projects.			✓
6.10.3.c Encourage efforts to produce more renewable energy using distributed generation.			✓
6.10.3.d Encourage import substitution by MECO and the broader community to become more self-sufficient in energy production.			✓
6.10.3.e Educate the public on the economic and environmental benefits from the increased use of renewable energy.	✓		
6.10.3.f Encourage support from the Federal government, State, and the private sector for Maui's renewable energy objectives.	✓		
6.10.3.g Encourage incentives to support the development and use of renewable energy.			✓
Objective:			

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
6.10.4 More efficient distribution of power throughout the island while preserving island beauty.			✓
Analysis: **In accordance with the project's overall guiding sustainability principles, home designs within the proposed project will be rooftop solar PV and EV charger-ready and the home buyers will determine when they would like to install solar panels on their homes.**			
HARBORS AND AIRPORT			
Goal:			
6.11 Maui will have harbors and airports that will efficiently, dependably, and safely facilitate the movement of passengers and cargo.			✓
Objective:			
6.11.1 Upgraded harbor facilities to handle larger volumes of freight and passengers and additional small boat harbors.			✓
Policies:			
6.11.1.a Support the expansion and upgrade of Kahului Harbor through the following, provided that any expansion is respectful of cultural practices and existing recreational uses and supports improved water quality:			✓
(4) Accommodate increasing volumes of cargo;			✓
(5) Provide deeper pier depths and greater fuel-receiving and storing capacities; and			✓
(6) Ensure safe and efficient work areas, including separating passenger operations from fuel and cargo operations.			✓
6.11.1.b Work with public and private entities to provide adequate pier slips, utilities, repair facilities, and waste-disposal capabilities.			✓
6.11.1.c Encourage the State to safely separate passenger (cruise and ferry) operations from hazardous bulk fuels and heavy cargo transporting operations, while not decreasing harbor's capacity to safely support various recreational uses.			✓
6.11.1.d Encourage the State to develop cargo inspecting sites and facilities for efficient cargo and container processing and transportation and to prevent alien species entry.			✓
6.11.1.e Support a State and County task force to study the feasibility of a second commercial harbor on Maui.			✓
Objective:			
6.11.2 Establish more economically thriving and environmentally sensitive small boat harbors accommodating resident and business activity, including fishing, recreation, and tour boats.			✓
Policy:			
6.11.2.a Provide for needed shore-side facilities and capabilities to support small boat harbor users (e.g. repair facilities, parking, cold storage, and mass-transit connections).			✓
Objective:			

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.		S	N/S	N/A
6.11.3	Upgraded airport facilities and navigation aids to serve the needs of passengers, freight movements, and general aviation.			✓
Policies:				
6.11.3.a	Protect the island's airports from encroaching urbanization that may negatively impact the airport operations.			✓
6.11.3.b	Support State efforts to improve Kahului Airport operations to better serve passenger and cargo needs.			✓
6.11.3.c	Support State efforts to identify sites and plan to relocate and accommodate small and rotary wing aircraft.			✓
6.11.3.d	Encourage the State to improve airport safety including lighting, fuel transmission, fuel safety, etc.			✓
6.11.3.e	Consider expansion of rental car facilities in West and South Maui.			✓
6.11.3.f	Consider expansion of mass transit (bus, fixed-rail, shuttle, and taxis, bicycle, and pedestrian facilities) to and from Kahului Airport and not limited to passenger movements (allowing for luggage and cargo).			✓
6.11.3.g	Encourage the State to maintain airport capacity and to encourage more responsive air services to Hāna and Kapalua.			✓
Analysis:	**Not Applicable.**			
CHAPTER 7 – LAND USE				
AGRICULTURAL LANDS				
Goal:				
7.1	Maui will have a prosperous agricultural industry and will protect agricultural lands.			✓
Objective:				
7.1.1	Significantly reduce the loss of productive agricultural lands.			✓
Policies:				
7.1.1.a	Allow, where appropriate, the clustering of development on agricultural lands when approved as a CSD plan or similar approval mechanism.			✓
7.1.1.b	Require, where appropriate, the review and approval of CSD plans prior to the subdivision of agricultural land.			✓
7.1.1.c	Discourage developing or subdividing productive agricultural lands for residential uses in which the residence would be the primary use and any agricultural activities would be secondary uses.			✓
7.1.1.d	Consider requirements for public notification and review of the subdivision of agricultural land into four or more lots.			✓
7.1.1.e	Focus urban growth, to the extent practicable, away from productive and important agricultural lands.			✓
7.1.1.f	Strongly discourage the conversion of productive and important agricultural lands (such as sugar, pineapple, and other produce lands) to rural or urban use, unless justified during the General Plan update, or when other overriding factors are present.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
7.1.1.g Further develop the requirements for agricultural assessments found under Section 19.510, MCC.			✓
7.1.1.h Provide incentives for landowners to preserve and protect agricultural lands from development through the use of TDR/PDR, tax credits, easement programs, or similar means.			✓
7.1.1.i Promote the use of U.S.D.A. Farm and Ranch Lands Protection Program grants to fund the acquisition of conservation easements on eligible agricultural lands.			✓
7.1.1.j Require all major developments adjacent to agricultural lands to provide an appropriate and site-specific agricultural protection buffer as part of a required site plan.			✓
7.1.1.k Support and promote the viability of Maui's agricultural businesses through property tax incentives and other programs and subsidies.			✓
7.1.1.l Encourage future community plan efforts to identify lands within the County Agricultural zoning district that are primarily being used for large-lot residential or rural use and consider such lands for reclassification to an appropriate County Rural zone.			✓
Objective:			
7.1.2 Reduction of the island's dependence on off-island agricultural products and expansion of export capacity.			✓
Policies:			
7.1.2.a Coordinate with the agricultural community, associations/community groups, agricultural landowners, and the State to designate IALs.			✓
7.1.2.b Support an incentive package for productive Agricultural Lands which aims to ensure agricultural viability for small- and commercial-scale agricultural producers.			✓
7.1.2.c Actively look to acquire land and provide infrastructure to expand the agricultural park and establish new agricultural parks.			✓
7.1.2.d Support the designation of a research and development area within agricultural parks to help farmers stay attuned to new technology and research.			✓
7.1.2.e Support local cooperative extension services to facilitate timely technology transfer opportunities.			✓
7.1.2.f Support plans and programs to develop additional sources of water for irrigation purposes.			✓
7.1.2.g Consider appropriate subdivision requirements (gravel roads, above-ground utilities, etc.) in those subdivisions creating Agricultural Parks where lots are limited to agricultural production with no dwellings.			✓
7.1.2.h Support the recommendations, policies, and actions contained within the Maui Agricultural Development Plan, July 2009, when consistent with the MIP.			✓
7.1.2.i Allow water and tax discounts for legitimate farming operations on rural and agricultural land.			✓
7.1.2.j Give priority in delivery and use of agricultural water and agricultural land within County agricultural parks to cultivation of food crops for local consumption.			✓
7.1.2.k Support programs that control pests and diseases that affect agriculture.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
7.1.2.l Support the development of training and apprenticeship programs to encourage an adequate supply of agricultural workers.			✓
Objective:			
7.1.3 Support and facilitate connectivity between communities.			✓
Policies:			
7.1.3.a Evaluate the impact of gated communities on interconnectivity.			✓
7.1.3.b Discourage land use and urban design that impedes interconnectivity between adjacent communities.	✓		
Analysis: **The proposed project will be designed to be well connected with the surrounding streets and neighborhoods in Wailea Resort.**			
RURAL AREAS			
Goal:			
7.2 Maui will have a rural landscape and lifestyle where natural systems, cultural resources and farm lands are protected and development enhances and compliments the viability and character of rural communities.	✓		
Objective:			
7.2.1 Reduce the proliferation and impact of residential development outside of urban, small town, and rural growth boundaries.			✓
Policies:			
7.2.1.a Focus development to areas inside urban, small town, and rural growth boundaries to preserve natural, cultural, and agricultural resources.	✓		
7.2.1.b Encourage cluster development with a mandatory buffer requirement/clear edge at the interface of country towns, agricultural uses, and surrounding rural landscapes.			✓
7.2.1.c Encourage or require, where appropriate, CSDs and the use of green spaces/natural separations to protect the character of rural landscapes.			✓
7.2.1.d Encourage basic goods/services in business country towns.			✓
7.2.1.e Allow for mixed uses, including residential uses, within Business Country Town Districts.			✓
7.2.1.f Encourage the use of alternative stormwater management techniques that minimize land disturbance and preserve natural drainage features.			✓
7.2.1.g Encourage green belts, open space buffers, and riparian zones to minimize conflicts between agriculture and residential uses.			✓
7.2.1.h Evaluate the impact of gated communities on inter-connectivity.			✓
Objective:			
7.2.2 More appropriate service/infrastructure standards to enhance and protect the island's rural character and natural systems.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
Policies:			
7.2.2.a Minimize impermeable surfaces within rural areas.			✓
7.2.2.b Protect and support the character, economic viability, and historic integrity of Maui's small towns.			✓
7.2.2.c Use infrastructure, public service, and design standards that are appropriate to rural areas.			✓
7.2.2.d Discourage land use and urban design that impede interconnectivity between adjacent communities.	✓		
Analysis: **The proposed project site has been identified by both the State Land Use Commission and the County's MIP as an appropriate location for urban growth in close proximity to existing infrastructure and services.**			
URBAN AREAS			
Goal:			
7.3 Maui will have livable human-scale urban communities, an efficient and sustainable land use pattern, and sufficient housing and services for Maui residents.	✓		
Objective:			
7.3.1 Facilitate and support a more compact, efficient, human-scale urban development pattern.	✓		
Policies:			
7. 3.1.a Ensure higher-density compact urban communities, infill, and redevelopment of underutilized urban lots within Urban Growth Boundaries.	✓		
7.3.1.b Maintain a distinct separation between communities, such as but not limited to, Wailuku and Waikapū; Wailuku and Waiheʻe; Pukalani and Makawao; Pukalani and Kula; Makawao and Hāliʻimaile; Lahaina and Kāʻanapali; Kīhei and Māʻalaea; and Māʻalaea and Waikapū, to protect the character and identity of Maui's communities.			✓
7.3.1.c Strengthen evaluation requirements for new urban expansion, new towns, and major urban infill projects within urban growth areas. Tailor submittal requirements to reflect the impact or scale of different projects.			✓
7.3.1.d Ensure future amendments to urban growth boundaries achieve the following: (1) provide a beneficial extension of the existing community; (2) are in areas where it is cost-effective to provide and operate infrastructure/public service facilities; and (3) do not promote automobile-oriented land use patterns.			✓
7.3.1.e Evaluate the impact of gated communities on inter-connectivity.			✓
7.3.1.f Encourage the development and implementation of neighborhood design standards that are environmentally friendly, such as LEED for Neighborhood Development (LEED – ND) standards.			✓
7.3.1.g Discourage future pyramid zoning within the industrial zoning districts, while allowing accessory commercial uses and grandfathering existing uses.			✓
7.3.1.h Promote agriculture by encouraging community gardening, community-supported agricultural programs, and farmers markets within and adjacent to urban areas.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
7.3.1.i Discourage land use and urban design that impedes inter-connectivity between adjacent communities.			✓
Objective:			
7.3.2 Facilitate more self-sufficient and sustainable communities.	✓		
Policies:			
7.3.2.a When developing new communities, provide sufficient lands for commercial, appropriate industrial, educational, spiritual, and non-profit uses to serve the daily needs of community residents.			✓
7.3.2.b Site community facilities such as schools, parks, libraries, and community centers within walking and biking distance of residences.	✓		
7.3.2.c Facilitate self-sufficient communities and shorten commutes by:			
(1) Directing residential development to job-rich areas;	✓		
(2) Allowing for appropriate commercial development and community services to shorten commutes; and			✓
(3) Allowing home occupations or home-based businesses that are compatible with surrounding neighborhoods and lifestyles.			✓
7.3.2.d Ensure, where appropriate, that affordable employee housing and multi-modal transportation opportunities are located near major employment centers.			✓
7.3.2.e Discourage the establishment of bedroom communities where long commutes are required to employment centers.			✓
7.3.2.f Facilitate the development of housing by focusing projects in locations where land and infrastructure costs facilitate the development of affordably-priced housing.			✓
7.3.2.g Provide incentives to facilitate the development of multifamily housing.			✓
7.3.2.h Encourage the placement of rental housing projects in the same areas as for-sale housing to facilitate mixed-income communities.			✓
7.3.2.i Develop communities that provide sufficient parks, schools, libraries, and other essential public facilities and services to serve resident needs.	✓		
7.3.2.j Promote agriculture by encouraging community gardening, edible landscaping, community-supported agricultural programs, and farmers markets within and adjacent to urban areas.			✓
Objective:			
7.3.3 Strengthen the island's sense of place.	✓		
Policies:			
7.3.3.a Protect and enhance the unique architectural and landscape characteristics of each community.	✓		
7.3.3.b Encourage Hawaiian architecture and tropical building designs.	✓		
7.3.3.c Support the continued revitalization of historic country towns, Wailuku Town, and Kahului's commercial core and harbor-front without displacing traditional, cultural, recreational and customary uses.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.	S	N/S	N/A
7.3.3.d Strongly encourage the preservation of buildings, structures, and sites of historic significance.			✓
7.3.3.e Require community input through Design Workshops for major new urban expansion, new towns, and major urban infill projects.			✓
7.3.3.f Require design enhancement, landscaping, and integration of park and rides, bicycle parking areas, and mass-transit infrastructure to mitigate the effect of parking lots and structured parking on the urban landscape.			✓
7.3.3.g Ensure that safe and attractive public spaces (e.g., plazas, parks, town/village squares) are provided throughout the island's urban areas.	✓		
Objective:			
7.3.4 Strengthen planning and management for the visitor industry to protect resident quality of life and enhance the visitor experience.			✓
Policies:			
7.3.4.a Discourage the conversion of hotel units to timeshares and fractional ownership.			✓
7.3.4.b Monitor and manage the amount of, and impacts from, timeshares and fractional ownership.			✓
7.3.4.c Manage short-term rentals and bed-and-breakfast homes through a permitting and regulatory process in accordance with adopted ordinances and community plan policies.			✓
7.3.4.d Limit large-scale resort development to the four existing resort destination areas of Wailea, Mākena, Kapalua and Kāʻanapali. "Large Scale Resort" is defined as complexes that include multiple accommodation facilities, activity businesses, retail complexes, and other amenities.			✓
Objective:			
7.3.5 Ensure that Maui's planning and development review process becomes more transparent, efficient, and innovative.			✓
Policies:			
7.3.5.a Encourage greater community involvement in land use planning and decision making.	✓		
7.3.5.b Establish a predictable and timely development review process that facilitates the approval of projects that meet planning and regulatory requirements.			✓
7.3.5.c Increase inter-agency coordination between the Department of Planning and all State and County agencies responsible for infrastructure and public facilities provision, particularly as it relates to the mitigation of long-term cumulative impacts resulting from development projects.			✓
7.3.5.d Provide greater certainty and transparency in the development review process.	✓		
7.3.5.e Expand and maintain land use and geographic information system databases for improved decisions, and make data and products available to the public.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.		S	N/S	N/A
Analysis: **The proposed project involves the development of 57 single-family condominium residences within the MIP's UGB. The project has been designed with a residential layout and building massing to be consistent with the surrounding uses in the Wailea Resort. The project has been reviewed by the KCA, the SMAC, and the WCA's Design Committee, and will undergo public review process pursuant to the Chapter 343, HRS, EA process pursuant to Chapter 11-200.1, HAR, Environmental Impact Statement Rules.**				
CHAPTER 8 – DIRECTED GROWTH PLAN				
URBAN AND SMALL TOWN GROWTH AREA				
Goal:				
8.1	Maui will have well-serviced, complete, and vibrant urban communities and traditional small towns through sound planning and clearly defined development expectations.	✓		
Policies:				
8.1.a	The County, with public input, will be responsible for designating new growth areas where infrastructure and public facilities will be provided, consistent with the policies of the MIP and in accordance with State and County infrastructure plans.			✓
8.1.b	Amendments to a UGB or STB shall be reviewed as a MIP amendment. A UGB or STB shall only be expanded if the island-wide inventory (maintained by the Department of Planning) of existing land uses (residential, commercial, industrial) indicates that additional urban density land is necessary to provide for the needs of the projected population growth within ten years of that inventory; or, during the decennial update of the MIP.			✓
8.1.c	Community plans shall provide for urban density land use designations only within UGBs and Small Towns. The County may only support and approve State Urban Land Use Designations for areas within UGBs, STBs, and Rural Villages.	✓		
8.1.d	The unique character and function of existing small towns shall be protected to retain and preserve their sense of place.			✓
8.1.e	New development shall be consistent with the UGBs, STBs, and all other applicable policies of the MIP. New urban-density development shall not be allowed outside of a UGB or STB.	✓		
8.1.f	The County, as a condition of development approval, shall require developers of privately owned infrastructure systems to provide financial insurance (bonding, etc.) for the operation and maintenance of these systems.			✓
8.1.g	The County shall implement a zoning program to comprehensively redistrict and rezone lands within UGBs according to updated community plan policies and map designations.			✓
8.1.h	The County will seek to focus capital improvements (schools, libraries, roads, and other infrastructure and public facilities) within the UGBs and STBs in accordance with the MIP.			✓

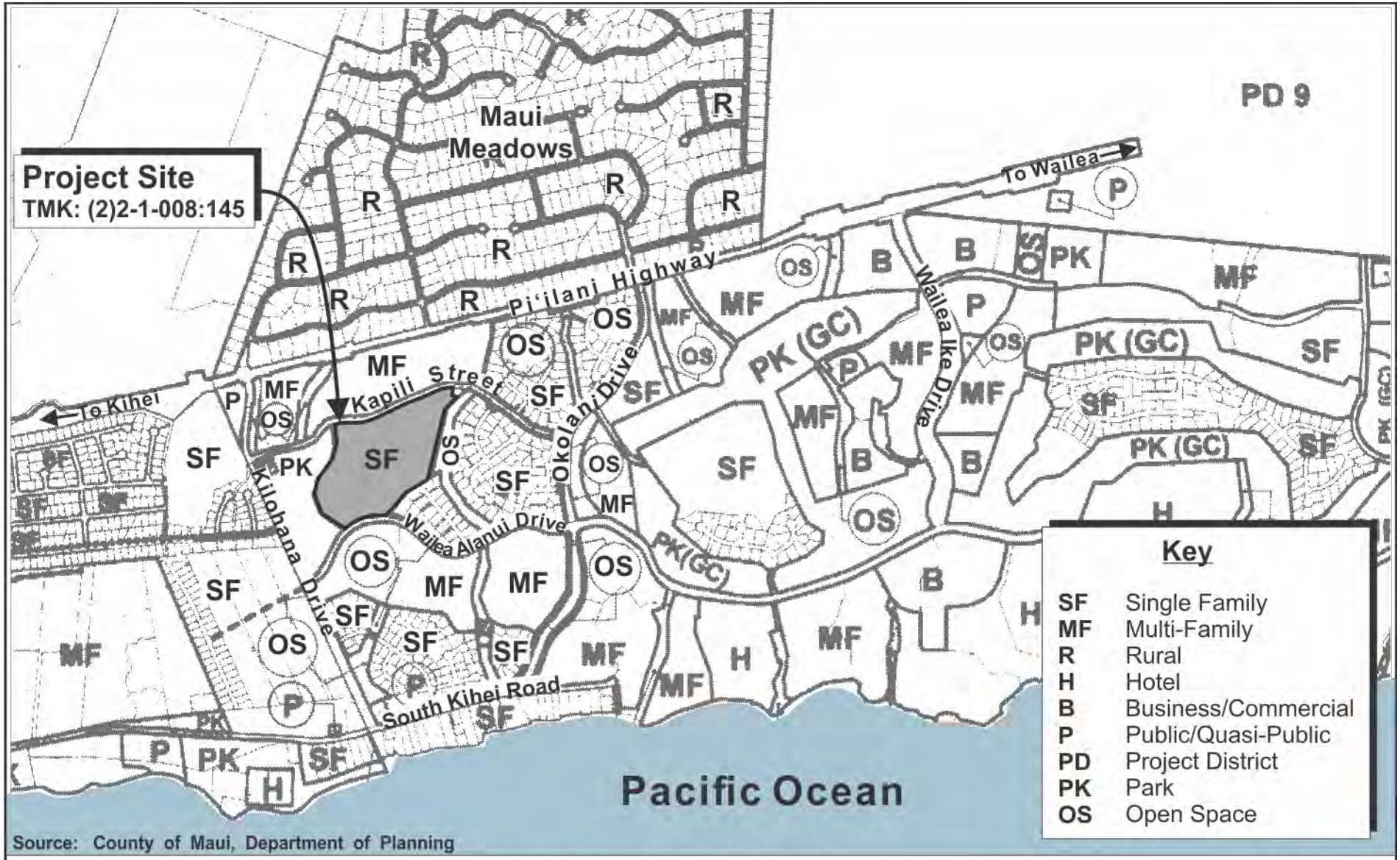
Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.		S	N/S	N/A
8.1.i	The County will promote (through incentives, financial participation, expedited project review, infrastructure/public facilities support, etc.) appropriate urban infill, redevelopment and the efficient use of buildable land within UGBs to avoid the need to expand the UGBs.			✓
8.1.j	The MIP's UGBs and STBs shall not be construed or implemented to prohibit the construction of a single-family dwelling on any existing parcel where otherwise permitted by law.			✓
Analysis: **As discussed previously, the project site has been identified by both the State Land Use Commission and the County's MIP as an appropriate location for urban-scale growth in close proximity to existing infrastructure and services.**				
RURAL GROWTH AREA				
Goal:				
8.2	Maui will maintain opportunities for agriculture and rural communities through sound planning and clearly defined development expectations.			✓
Policies:				
8.2.a	Amendments to a RGB shall be reviewed as an MIP amendment. A RGB shall only be expanded if an island-wide inventory of existing land uses (residential, commercial, industrial) indicates that additional lands are necessary to provide for the needs of the projected population growth within ten years of that inventory; or, during the decennial update of the MIP.			✓
8.2.b	New development shall be consistent with RGB and all other applicable policies and requirements of the MIP. Public, quasi-public, civic, and limited commercial or industrial uses may be allowed in the RGB when the proposed uses demonstrate a public need and are consistent with the Community Plan and zoning.			✓
8.2.c	Environmental protection and compatibility will be a top priority in rural growth areas.			✓
8.2.d	All development within rural growth areas should avoid encroachment upon prime agricultural land.			✓
8.2.e	Rural growth areas include Rural Residential Areas and Rural Villages. Rural residential areas may be designated when they are located in association with or on the border of urban growth areas or Small Towns; and/or when they provide for complete, self-sufficient rural communities with a range of uses to be developed at densities that do not require urban infrastructure.			✓
8.2.f	Community plans shall provide for rural density land use designations only within RGBs; provided that limited community plan urban designations may be allowed within Rural Villages. New rural growth areas shall not be located where urban expansion may ultimately become necessary or desirable. New rural-density development shall not be allowed outside of a RGB.			✓
8.2.g	New rural growth areas intended to be complete, self-sufficient rural communities must be located a significant distance from existing urban areas, distinctly separated by agricultural or open lands.			✓
8.2.h	Urban-scale infrastructure and public facilities shall not be provided in rural areas except as described in the defined Level-of-Service (LOS) standards. There should be no expectations of urban services in rural areas.			✓

Maui Island Plan Goals, Objectives and Policies Key: S = Supportive, N/S = Not Supportive, N/A = Not applicable.		S	N/S	N/A
8.2.i	Urban development standards shall not be required within RGBs except in fulfillment of Federal law.			✓
8.2.j	The unique character and function of existing small towns and rural communities shall be protected to retain and preserve their sense of place.			✓
8.2.k	Preserve rural landscapes in which natural systems, cultural resources, and agricultural lands are protected and development compliments rural character and contributes to the viability of communities and small towns.			✓
8.2.l	The MIP's RGBs shall not be construed or implemented to prohibit the construction of a single family dwelling on any existing parcel where otherwise permitted by law.			✓
8.2.m	The County shall implement a zoning program to comprehensively redistrict and rezone lands within RGBs, and to implement community plan policies and map designations.			✓
8.2.n	At the time of zoning from agricultural to rural, Council will consider prohibiting restrictions on agricultural activity.			✓
Analysis:	**Not Applicable.**			
PROTECTED AREA POLICY				
8.3.a	The Protected Areas in Diagrams E-1, NW-1, N-1, NE-1, S-1, SE-1, and WC-1 should be concurrently reviewed with Table 8-2 and with any proposed land uses that may result in an adverse impact on a Protected Area. The County Council and the Administration should be notified if a Protected Area may be compromised by a development proposal.			✓
Analysis:	**Not Applicable.**			

F. KIHEI-MAKENA COMMUNITY PLAN

The project site is located within the Kihei-Makena Community Plan region, one (1) of nine (9) community plan regions established in the County of Maui. Each region's growth and development is guided by a Community Plan. The County's Community Plan reflects current and anticipated conditions in the Kīhei-Mākena region and advances planning goals, objectives, policies, and implementation considerations to guide decision-making in the region. The primary purpose of the Community Plan is to outline a detailed agenda for carrying out these policies and objectives. The Kihei-Makena Community Plan was adopted by the County of Maui and became effective in 1998. The Community Plan land use map designates the subject property as "SF, Single-Family". See **Figure 13**. The proposed project is in compliance with the community plan land use designations.

The proposed project is consistent with the following goals, objectives, and policies of the Kihei-Makena Community Plan as outlined below.



Source: County of Maui, Department of Planning

Figure 13 Proposed Wailea Resort SF-S Residential Project NOT TO SCALE

Kihei-Makena Community Plan

Prepared for: Wailea Resort SF-S Partners LP

MUNEKIYO HIRAGA

Ledcor/SF-S Permitting/Applications/Figures/Kihei Makena Comm Plan

LAND USE

Goal:

A well-planned community with land use and development patterns designed to achieve the efficient and timely provision of infrastructural and community needs while preserving and enhancing the unique character of Ma`alaea, Kihei, Wailea and Makena as well as the region's natural environment, marine resources and traditional shoreline uses.

Objectives and Policies:

* * *

b. Identify priority growth areas to focus public and private efforts on the provision of infrastructure and amenities to serve existing residents and to accommodate new growth.

Response: The proposed project site is located within the UGB as designated within the MIP. Furthermore, the project site is located on land with appropriate existing land use designations with respect to the Kihei-Makena Community Plan and Maui County Zoning to support the proposed development.

ENVIRONMENT

Goal:

Preservation, protection, and enhancement of Kihei-Makena's unique and fragile environmental resources.

Objectives and Policies

* * *

4. Storm water run-off from proposed developments shall not adversely affect the marine environment and nearshore and offshore water quality.

Response: A comprehensive drainage system, including LID measures, such as bioretention strips, will be installed as part of the project development to capture and retain all post-development runoff.

HOUSING AND URBAN DESIGN

Goal:

A variety of attractive, sanitary, safe and affordable homes for Kihei's residents, especially for families earning less than the median income for families within the County. Also, a built environment which provides complementary and aesthetically pleasing physical and visual linkages with the natural environment.

Objectives and Policies

a. *Provide an adequate variety of housing choices and range of prices for the needs of Kihei's residents, especially for families earning less than the median income for families within the County, through the project district approach and other related programs. Choices can be increased through public/private sector cooperation and coordinated development of necessary support facilities and services.*

b. *Require a mix of affordable and market-priced housing in all major residential projects, unless the project is to be developed exclusively as an affordable housing project.*

* * *

e. *Implement landscaped setbacks for future multi-family and commercial areas. Developments shall provide space for landscaped pedestrian ways and bikeways.*

f. *Incorporate the principles of xeriscaping in all future landscaping.*

g. *Encourage the use of native plants in landscaping in the spirit of Act 73, Session Laws of Hawaii, 1992.*

Response:

As discussed previously, the proposed project will utilize Residential Workforce Housing credits to comply with Chapter 2.96, MCC, the County's Residential Workforce Housing Policy. The credits from the previous development of residential workforce housing were acquired from A&B Wailea LLC, the previous owner of the property. The Applicant understands and respects the importance of scenic vistas, particularly towards the ocean and mountains. A View Analysis has been prepared for the project to ensure that makai/mauka views from adjacent roadways and public vantage points are not significantly adversely impacted. Refer to **Appendix "B"**. Multi-modal paths will be incorporated on main roads of the project site to encourage walking and bicycling. A landscaping plan utilizing native plants, where feasible, will be implemented as part of the proposed project.

PHYSICAL AND SOCIAL INFRASTRUCTURE

Goal:

Provision of facility systems, public services and capital improvement projects in an efficient, reliable, cost effective, and environmentally sensitive manner which accommodates the needs of the Kihei-Makena community, and fully supports present and planned land uses, especially in the case of project district implementation.

Allow no development for which infrastructure may not be available concurrent with the development's impacts.

Response: The Applicant will construct all infrastructure improvements necessary for the proposed project in an efficient, reliable, cost effective, and environmentally sensitive manner. The SDOT's MOA, dated March 14, 2016, and its subsequent amendment encompass the subject property. As such, the Applicant or its assigns will pay the regional fair share for the planned regional transportation improvements in Wailea Resort. It is noted that the planned improvements will not be triggered by the proposed project and will be implemented at the appropriate time in accordance with the MOA and its subsequent amendment. The proposed 57 units will count towards the 150 units needed to trigger the regional planned improvements. In addition, pursuant to Ordinance 2694, which conditionally zoned the subject parcel as "R-3 Residential District", the parks assessment has been satisfied for the subject property by donating a 5.75-acre parcel, identified as TMK (2)3-9-038:026, to the County for use as a fire station and a park.

a. Drainage

Objectives and Policies:

1. *Design drainage systems that protect coastal water quality by incorporating best management practices to remove pollutants from runoff. Construct and maintain, as needed, sediment retention basins and other best management practices to remove sediments and other pollutants from runoff.*

Response: A comprehensive drainage system, including LID measures, such as bioretention strips, will be installed as part of the project development to capture and retain all post-developoment runoff on the project site.

b. Energy and Public Utilities

Objectives and Policies:

a. *Promote energy efficiency as the energy resource of first choice, and increase energy efficiency in all sectors of the community.*

***

c. Promote environmentally and culturally sensitive use of renewable energy resources like biomass, solar, wind, and hydroelectric energy in all sectors of the community.

Response: In accordance with the project's overall guidling sustainability principles, various energy efficient measures will be implemented, where feasible, in the proposed project. In addition, homes within the proposed project will be

designed to be rooftop solar PV and EV charger-ready. The buyers of the homes will be encouraged to implement these measures in order to reduce the dependence on imported fuel for energy generation and reduce GHG emissions.

URBAN DESIGN STANDARDS

The proposed project was evaluated with respect to the following Urban Design Standards listed within the Kihei-Makena Community Plan:

Building Form

Limit resort development throughout the region to thirty-five (35) feet in building height for sites near the shoreline. Building height limits may gradually be increased up to seventy-five (75) feet for inland resort development provided that important mauka/Makai vistas are maintained, and impacts to coastal resources are minimized. Resort community planning and design shall integrate recreational amenities with adequate shoreline setback and public shoreline access provisions.

Response: The homes and amenity center within the proposed project will be single-story, well below the 30 feet allowed in the "R-3, Residential" district. The intent of the project design is to allow the proposed residential community that draws upon the region's heritage and responds to the unique climate and setting. The landscaping plan has been crafted to fit within this context and utilizes native plants, where available and feasible.

G. PLANNED DEVELOPMENT APPROVAL

All lands in the Wailea Resort, including the subject property, are in a Planned Development area and governed by MCC Section 19.32, Planned Development (PD). The PD approval process involves three (3) steps before the Maui Planning Commission.

Step I: Establishes location, size, and brief description of the development

Step II: Establishes preliminary plan of the development, showing among other things, a preliminary proposal for drainage, streets, utilities, grading, landscaping, open spaces, lots, land uses, recreational and community facilities, buildings and structures, and programming

Step III: Establishes an unified site and building program which shall include, among other things, construction plans

The Wailea Resort was approved as a PD pursuant to Chapter 19.32 of the MCC by Ordinance No. 752 on April 19, 1973. The establishment of the Wailea Resort also involved a PD Step 1 approval.

It is noted that a Change of Zoning (CIZ) was approved for the subject property in September 1998 by Ordinance No. 2694, which established the current underlying zoning as R-3, Residential Zoning District. Refer to **Appendix "A"**.

Given that the project will be developed in accordance with existing zoning, a PD Step II application is being submitted concurrently with the Special Management Area (SMA) Use Permit application for processing by the Department of Planning. The MPC will review the Step II application, which will include a review of preliminary proposals for drainage, grading, landscaping, open spaces, land uses and community and recreational facilities, concurrently with the SMA application.

This EA document serves as the project's technical supporting information for the request for a PD Step II approval. The preliminary development plans are provided herein as **Appendix "B"**. The plans have been prepared to meet the PD standards of development as set forth in Section 19.32.030 of the MCC, as follows:

Standards of Development

1. *The development shall meet all the construction standards and requirements of the various governmental agencies.*

Response: The proposed project will be developed in accordance with applicable governmental standards.

2. *Not less than twenty percent of the total area of the tract shall be common protected open space, integrated with the lot layout and street system in order to maximize its park-like effect. Common protected open space shall mean open space to be owned in common by the individual owners within the development and maintained in open space for their common use and enjoyment.*

Response: The open space, common areas total approximately 201,250 s.f., or 20 percent of the total area. Refer to **Appendix "B"**.

3. *Each building and structure shall be individually designed by a registered architect to conform with the intent of the planned development.*

Response: Each building and structure of the proposed development will be designed by a registered architect. The plans for the proposed project has been reviewed and approved by the WCA Design Review Committee to ensure conformity with the intent of the Wailea Resort PD. It is noted that the County of Maui's UDRB will also review the project's preliminary plans and landscape plan to ensure that the project design will fit into the surrounding environment in the Wailea Resort.

4. *Landscaping of the entire development, including along streets, within lots and in the open spaces shall be provided.*

Response: The landscape plan for the proposed development provides additional landscaping enhancements. The landscape plans have been prepared by a licensed landscape architect and will be reviewed by the Department of Planning, MPC, and the County of Maui's UDRB. Refer to **Exhibit "B"**.

5. Adequate recreational and community facilities shall be provided.

Response: An amenity center, which includes a mail room, barbecue facility, pool and/or hot tub, and other community gathering places for the residents within the community, will be developed as part of the proposed project. As well, there will be multi-modal paths on main roads within the project area which will connect to Wailea Alanui Drive and Kapili Street.

6. *Provision shall be made for adequate and continuing management of all open spaces and community facilities to insure proper maintenance and policing. Documents to said effect shall be required.*

Response: The owners' association fees and management personnel will ensure adequate and continuing management of all open spaces and community facilities.

H. HAWAI'I COASTAL ZONE MANAGEMENT PROGRAM

The Hawai'i 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 Hawai'i's coastal zone. The subject property is within the County of Maui's SMA. See **Figure 14**. As such, the applicability of coastal zone management considerations has been reviewed and assessed.

1. Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

a. Improve coordination and funding of coastal recreational planning and management; and

b. Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:

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

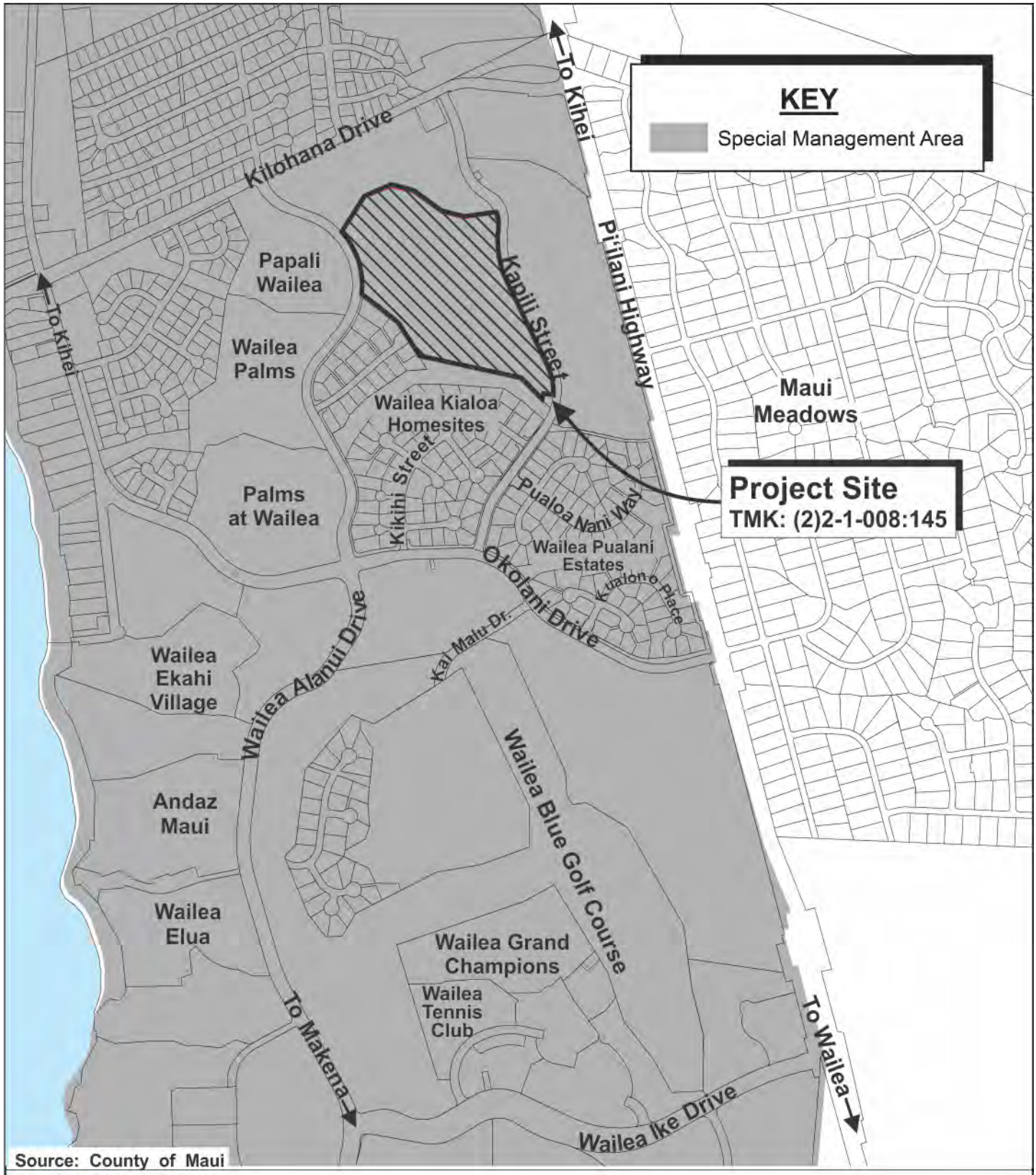


Figure 14 Proposed Wailea Resort SF-S Residential Project

Special Management Area Boundary Map

0 450 Feet
225 900

MUNEKIYO HIRAGA

Prepared for: Wailea Resort SF-S Partners LP

Ledcor\SF-S PERMITTING\Applications\Figures\SMA

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 nonpoint 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.

Response: The project site is located inland approximately 0.4 mile from the nearest coastline. As such, the proposed action is not expected to impact coastal recreational opportunities or affect existing public access to the shoreline.

2. Historic/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 archaeological 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: The proposed project is not anticipated to have an adverse effect on historical or cultural resources. An AIS and a CIA have been conducted to assess the presence and/or absence of any historical, archaeological, and cultural resources on the proposed project site. The AIS concluded that no further archaeological work is recommended for the seven (7) temporary sites identified within the project site. The CIA indicated there were no currently active traditional and customary practices identified in association with cultural resources in the project site. Refer to **Appendix "E"** and **Appendix "F"**.

3. Scenic and Open Space Resources

Objective:

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: As indicated previously, the project is not located on or near the shoreline. A View Analysis has been conducted to ensure that the proposed project will not adversely impact coastal scenic and open space resources. Refer to **Appendix "B"**. The proposed project will also maintain approximately 20 percent of the project area in open space.

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 project is located inland, away from the coastal ecosystems and is, therefore, not anticipated to have adverse impacts on coastal/shoreline resources, including reefs and marine resources. A comprehensive drainage system, including LID measures, such as bioretention strips, will be implemented as part of the project to ensure that pre- and post-construction runoff is appropriately captured, minimizing any impact on coastal waters.

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 industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and

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

i. Use of presently designated locations is not feasible;

ii. Adverse environmental effects are minimized; and

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

Response: The proposed project is not a coastal dependent development. The project site is located inland from the shoreline. The proposed project will stimulate the economy through the generation of short-term and long-term employment opportunities and new spending in the local economy. The proposed project does not contravene the objective and policies for economic use of Maui's coastal zones.

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 source 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 currently falls within Zone X (unshaded), 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.

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. In addition, tsunami inundation parameters do not apply to the subject project.

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 or 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: Opportunities for agency and public review of the proposed action are provided through the notification, review and public hearing processes pursuant to the SMA Use Permit and PD requirements, as well as Chapter 343, HRS. It is noted that the Applicant presented the project to the KCA on October 1, 2019 and to the SMAC on October 24, 2019. In addition, the WCA Design Committee approved the project plans at its September 26, 2019 meeting. Refer to **Appendix "I"**.

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: The project has, and will continue to address public awareness, education, and participation objectives. As noted previously, the Applicant had presented the project to the KCA on October 1, 2019 and to the SMAC on October 24, 2019. In addition, the WCA Design Committee approved the project plans at its September 26, 2019 meeting. Refer to **Appendix "I"**. Further opportunities for agency and public review of the proposed action are provided through the notification review and public hearing processes pursuant to the SMA Use Permit and Chapter 343, HRS.

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;

c. Minimize the construction of public erosion-protection structures seaward of the shoreline;

d. Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor; and

e. Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.

Response: The project site is located inland, approximately 0.4 mile from the nearest shoreline and is not anticipated to impact the public use of shoreline resources.

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 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 §205A.30.5(1) Prohibitions 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.

Further, artificial lighting provided by a government agency or its authorized users for government operations, security, public safety, or navigational

needs shall make reasonable efforts to properly position or shield lights to minimize adverse impacts.

Response: All construction operations will be carried out during daylight hours. Upon completion, outdoor lights will be shielded and will not directly illuminate any shoreline or ocean waters. All outdoor lighting will comply with the County's Outdoor Lighting ordinance.

I. HRS 205A-26 SPECIAL MANAGEMENT AREA GUIDELINES

The proposed project is consistent with the State's guidelines for issuance of a SMA Use Permit by the MPC, as set forth in HRS, Chapter 205A-26:

(1) All development in the special management area shall be subject to reasonable terms and conditions set by the authority in order to ensure:

(A) Adequate access, by dedication or other means, to publicly owned or used beaches, recreation areas, and natural reserves is provided to the extent consistent with sound conservation principles;

(B) Adequate and properly located public recreation areas and wildlife preserves are reserved;

(C) Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources; and

(D) Alterations to existing land forms and vegetation, except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, wind damage, storm surge, landslides, erosion, siltation, or failure in the event of earthquake.

(2) No development shall be approved unless the authority has first found:

(A) That the development will not have any substantial adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interests. Such adverse effects shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect, and the elimination of planning options;

(B) That the development is consistent with the objectives, policies, and special management area guidelines of this chapter and any guidelines enacted by the legislature; and

(C) That the development is consistent with the county general plan and zoning. Such a finding of consistency does not preclude concurrent processing where a general plan or zoning amendment may also be required.

(3) The authority shall seek to minimize, where reasonable:

(A) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough or lagoon;

(B) Any development which would reduce the size of any beach or other area usable for public recreation;

(C) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management areas and the mean high tide line where there is no beach;

(D) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast; and

(E) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

J. MAUI PLANNING COMMISSION SPECIAL MANAGEMENT AREA RULES AND REGULATIONS

As noted above, the project site is located within the County of Maui's SMA. Refer to **Figure 14**. The Rules and Regulations of the Maui Planning Commission, Chapter 202 were established in order to implement HRS, Chapter 205A-26 relating to Coastal Zone Management and Special Management Areas. In addition to establishing procedures for processing of SMA applications and procurement of related permits, the rules assist the Commission in giving consideration to State policy regarding coastal zones.

This section addresses the project's relationship to applicable coastal zone management considerations as set forth in the Maui Planning Commission Rules and Regulations, Chapter 202, "Special Management Area Permit Procedures," which are provided for considering the significance of potential environmental and ecological effects of a proposed action. The criteria have been reviewed and analyzed with respect to the proposed project.

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

As noted previously, an AIS and a CIA have been carried out on the project site. The AIS concluded that no further archaeological work is recommended for seven (7) temporary sites identified within the project site. The CIA indicated there were no currently active traditional and customary practices identified in association with cultural resources in the project site. Refer to **Appendix "E"** and **Appendix "F"**. In addition, a Biological Resources Survey has been conducted for the project site. Appropriate mitigation measures will be implemented, as recommended by the Biological Resources Survey, to ensure that no rare, threatened, or endangered species or their habitats will be adversely affected by the proposed project.

2. **Significantly curtails the range of beneficial uses of the environment.**

The proposed project involves development of 57 single-family condominium residences, an amenity center, and related infrastructure improvements and will not curtail the range of beneficial uses of the environment.

Applicable dust control, noise control, and drainage control measures will be implemented during construction activities to minimize impacts to the surrounding environment.

3. **Conflicts with the County's or the State's long-term environmental policies or goals.**

As noted within this Chapter, the proposed project does not conflict with the Hawai'i State Plan, General Plan of the County of Maui, MIP, Kihei-Makena Community Plan, and Maui County Zoning. The proposed project is consistent with the property's underlying land use designations, which were established to guide development patterns, limiting the land uses considered to be compatible with the regional context and suitable for the regional environment.

4. **Substantially affects the economic or social welfare and activities of the community, County, or State.**

On a short-term basis, the project will support construction and construction-related industries, thereby increasing employment opportunities to result in a beneficial impact on the local economy during the period of construction. In the long term, there will be increased expenditures from continuous operation and maintenance of the project, as well as new spending by the residents of the proposed residential community. The project will also generate substantial revenue for both the State and County from General Excise Tax (GET), income tax, and real property tax. The proposed development is located within the Kihei-Makena Community Plan region, which offers a dry, mild climate and access to ocean based recreational resources. The proposed project is considered compatible with surrounding resort-related land uses; thus, the Wailea and Mākena areas will be complemented by the proposed action.

5. **Involves substantial secondary impacts, such as population changes and increased effects on public facilities, streets, drainage, sewage, and water systems, and pedestrian walkways.**

The proposed project is not anticipated to result in adverse, secondary impacts to population or public facilities or services. Proposed drainage improvements will accommodate the increase in runoff resulting from the proposed project. Water and wastewater infrastructure services will be provided by the County. The project

site is located within the UGB, as defined by the MIP, and, as such, increased effects on population changes and public facilities have been planned in the context of future land uses. As such, no substantial secondary impacts are anticipated on public facilities or services.

6. <u>In itself has no significant adverse effects but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.</u>

Although it is also located within the Wailea Resort, the proposed project is limited to the development of the 57 single-family residential condominium units and related improvements. The project is not a phase or increment of a larger total undertaking; a necessary precedent for a larger project; a commitment to some larger project; or one (1) of a series of individual actions planned by the Applicant within Wailea Resort in the reasonably foreseeable future. The proposed project will stand on its own and is not reliant upon or a trigger for any other development within Wailea Resort or elsewhere. The cumulative impacts of the proposed project, together with other reasonably foreseeable actions, will include slightly increased population, but not a significant change, and minimal infrastructural demands. However, the Applicant will provide the necessary infrastructure to serve the proposed project. Drainage, wastewater, water, and roadway improvements will be designed to meet applicable local, State, and Federal regulations. The engineering and traffic studies prepared for the proposed project have assessed potential impacts and designed infrastructure systems in the context of future planned regional growth. Given the foregoing, the proposed project is not anticipated to cumulatively have a considerable effect upon the environment, nor does it involve a commitment for larger actions.

7. <u>Substantially affects a rare, threatened, or endangered species of animal or plant, or its habitat.</u>

A Biological Resources Survey report was prepared to ensure that any sensitive flora/fauna resources within the project site would be identified and provided adequate protection. Refer to **Appendix "D"**. The survey concluded that with implementation of appropriate mitigation measures recommended by the survey, the proposed project will not have a significant impact on rare, threatened, or endangered species of animal or plant, or its habitat.

8. <u>Is contrary to the State plan, County's general plan, appropriate community plans, zoning and subdivision ordinances.</u>

Lands underlying the project site were previously committed for development with the establishment of the State Land Use Commission "Urban" District designation, inclusion in the UGB of the MIP, adoption of the "Single-Family" community plan

designation in the Kihei-Makena Community Plan, and "R-3, Residential" County zoning designation.

As discussed herein, the proposed project is in compliance with underlying land use designations and is not considered to be contrary to the State Plan, the County's General Plan, appropriate community plans, County zoning, or subdivision ordinances.

9. Detrimentally affects air or water quality or ambient noise levels.

Construction activities will result in short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling and installation of dust screens and timely revegetation of graded areas, will be implemented to minimize wind-blown emissions. In the short term, noise impacts will occur primarily from construction equipment. Equipment mufflers or other noise attenuating equipment, as well as proper vehicle maintenance and limiting construction hours to daylight hours will be used during construction activities. Construction noise impacts will be mitigated through compliance with the provisions of the State of Hawai'i, Department of Health Administrative Rules Title 11, Chapter 46, "Community Noise Control." These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels set forth in Chapter 46. In the long term, the proposed new community is not anticipated to detrimentally affect ambient noise levels and air quality.

A comprehensive drainage system, including LID measures, such as bioretention strips, will be implemented to capture the increase of runoff and minimize potential drainage impacts on downstream properties. Based on the foregoing, long-term impacts to air, ambient noise level, and water are not anticipated as a result of the proposed project.

10. Affects an environmentally sensitive area, such as flood plains, shoreline, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh waters, or coastal waters.

The project site is located within Flood Zone X (unshaded). Zone X designation denotes an area of low flood risk and minimal flooding with no development restrictions. The subject property is located inland, outside of the Tsunami Evacuation and Extreme Tsunami Evacuation Zones, erosion prone areas, and geologically hazardous land. Additionally, the proposed project does not directly front the shoreline and is not located within the 3.2-foot sea level rise exposure area. As such, the proposed project is not anticipated to significantly impact any environmentally sensitive areas.

11. <u>Substantially alters natural land forms and existing public views to and along the shoreline.</u>

The proposed project has been designed to complement and enhance existing development within Wailea Resort. Careful consideration has been given during the planning process to formulate a site plan that is both sensitive and appropriate to Wailea. A View Analysis has been prepared for the project to ensure that the project will not adversely affect the existing makai/mauka public views from adjacent roadways or public vantage points. Refer to **Appendix "B"**.

12. <u>Is contrary to the objectives and policies of chapter 205A, HRS.</u>

A review of the objectives and policies of Chapter 205A, HRS, is provided in its entirety in Section H of Chapter III of this EA document, which addresses the project's relationship to the Coastal Zone Management considerations. Based on the foregoing analysis, the project will appropriately and adequately mitigate impacts to SMA-relevant areas of interest. Accordingly, there are no significant adverse environmental impacts anticipated with the proposed project.

IV

SUMMARY OF ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

IV. SUMMARY OF ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed project may result in unavoidable short-term construction-related impacts which include noise-generated impacts associated with construction of the proposed improvements. Construction of the proposed project will be carried out in compliance with State Department of Health Community Noise Control standards. Furthermore, Best Management Practices (BMPs), such as equipment mufflers and regular maintenance, will be employed to mitigate noise-related impacts. In addition, there may be temporary air quality impacts associated with dust generated from site work and exhaust emissions discharged by construction equipment. These impacts will be mitigated by BMPs for minimizing dust and providing erosion control.

The cumulative impacts of the proposed project, together with other reasonably foreseeable actions, will include increased population and infrastructural demands. The Applicant will provide necessary infrastructure to serve the project. Drainage, wastewater, water, and roadway improvements will be designed to meet applicable local, State, and Federal regulations. The engineering and traffic studies prepared for the project assessed potential impacts and have designed infrastructure systems in the context of future projected regional growth.

Project implementation will require commitments of land, labor, material, and fuel resources. Lands underlying the project site have been previously committed for development purposes by the establishment of the State Land Use “Urban” District, and the Maui Island Plan’s (MIP) Urban Growth Boundary (UGB), as well as the Kihei-Makena Community Plan and county zoning designations. Labor, material, and fuel resources expended during construction are deemed justified when considered in relation to the existing land use designations for the property and the construction-related and long-term employment that will be generated through operation of the project.

In summary, the proposed action is not anticipated to create any significant, long-term adverse environmental effects which cannot be avoided, or require an irreversible and irretrievable commitment of resources.

ALTERNATIVES ANALYSIS

V

V. ALTERNATIVES ANALYSIS

A. NO ACTION ALTERNATIVE

The project site is currently vacant and undeveloped. The no action alternative would involve a continuation of the underutilized nature of the site. The no action alternative is not considered a viable scenario in the context of the property's location within the Wailea Resort area, as well as its underlying State land use, Maui Island Plan (MIP), Kihei-Makena Community Plan (KMCP), and Maui County zoning land use designations.

B. DEFERRED ACTION ALTERNATIVE

Similar to the no action alternative, the deferred action alternative would involve the continued underutilization of the project site and would not implement the intended land uses and nature of development set forth by the properties' existing land use designations. As such, the deferred alternative is not considered a viable scenario.

C. PREFERRED ALTERNATIVE

The Applicant has placed a high priority on designing a project that is both sensitive and place-appropriate given the existing topographic conditions and limitations of the property, location of the site within the overall Wailea Resort area, as well as the neighboring community. Several design alternatives were considered by the Applicant and its design team with different site plan configurations. Careful consideration was given to view planes and open space and consistency with the existing architectural fabric of the Wailea Resort. These factors were considered through evaluation of County of Maui zoning regulations, the Urban Design Standards of the KMCP, Planned Development (PD) Development Standards, and the Wailea Community Association (WCA) Design Committee Rules. The preferred alternative represents the culmination of this multi-pronged design review process.

SIGNIFICANCE CRITERIA ASSESSMENT

VI

VI. SIGNIFICANCE CRITERIA ASSESSMENT

The proposed action involves the construction of a residential community, which includes 57 single-family residential condominium units, an amenity center, and related infrastructure improvements.

The proposed project also involves improvements to Wailea Alanui Drive, a County right-of-way. The use of County lands requires compliance with Chapter 343, Hawai‘i Revised Statutes (HRS), and Chapter 200.1 (Title 11), Hawai‘i Administrative Rules (HAR). As defined under Chapter 343, HRS, “significant effect” means the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State’s environmental policies or long-term environmental goals as established by law, or adversely affect the economic welfare, social welfare, or cultural practices of the community and State. The analysis required to determine whether a proposed action may have a significant effect requires that every aspect of the proposed action, expected primary and secondary consequences, and the cumulative as well as the short-term and long-term effects are evaluated in accordance with the Significance Criteria of Section 11-200.1-12 of the Administrative Rules. Discussion of the proposed project’s conformance to the Significance Criteria is provided below:

1. <u>Irrevocably commit a natural, cultural, or historic resource.</u>

The project site, located within the Wailea Resort, is currently vacant and undeveloped. The proposed project will complement existing residential and resort-related uses found throughout the Wailea community. As discussed in Chapter II, this project does not involve an irrevocable commitment to loss or destruction of any natural resources. A Biological Resources Survey has been prepared as part of assessing the potential impact of the project and appropriate mitigation measures will be implemented to ensure that no rare, threatened, or endangered species or their habitats will be adversely affected. Refer to **Appendix “D”**.

As also discussed in Chapter II, appropriate surveys have been conducted to address potential impacts on historic/cultural resources. The Cultural Impact Assessment (CIA) identified no cultural practices occurring within the project site. Refer to **Appendix “F”**. The Archaeological Inventory Survey (AIS) report for the project site concluded that no further archaeological work is recommended for seven (7) temporary sites identified within the project site. Refer to **Appendix “E”**.

With implementation of the mitigation measures, the proposed project is not anticipated to involve an irrevocable commitment to loss or destruction of any natural or cultural resources.

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

The proposed project will not curtail the range of beneficial uses of the environment.

"Environment" means humanity's surroundings, inclusive of all the physical, economic, cultural, and social conditions that exist within the area affected by a proposed action, including land, human, and animal communities, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.

The subject property is located within the Urban Growth Boundary (UGB) of the Maui Island Plan and has the appropriate land use designations in place (with respect to the State Land Use District, the Kihei-Makena Community Plan (KMCP), and Maui County Zoning) to allow for the proposed development. The proposed project will provide 57 single-family condominium units to offset market demand in an existing resort area in close proximity to previously established communities. It will be a residential community within the existing Wailea Resort area that will create jobs and encourage spending, both in the short term for construction contractors and supplies, and in the long term for employees and new residents of the new residential community. As a resort residential community, the proposed project seeks to support the local housing market population by providing residential accommodations. Through this, the local economy will benefit from job creation and new residents' spending.

Further, the proposed project has been designed to complement and enhance existing development within the Wailea Resort. Careful consideration has been given to the placement of buildings during the planning process to arrive at a site plan that is both sensitive and place appropriate to the Wailea community. The project's design employs architectural styles and materials commonly found in Hawaiʻi. The intent is to allow the new community to blend into the landscape and to create a design that draws upon the region's heritage and responds to both climate and setting. The buildings will not exceed maximum height limits as established by the KMCP or underlying zoning designations. The landscaping plan has been crafted to fit within this context and utilize native plants, where available and feasible.

Development of detailed engineering and architectural plans for the project will allow for the identification of a comprehensive program of Best Management Practices (BMPs) to minimize any construction-related impacts.

3. **Conflict with the State's environmental policies or long-term environmental goals established by law.**

The proposed project does not conflict with the State's environmental policies or long-term environmental goals established by law. As discussed in Chapter III, the proposed project is consistent with the property's underlying land use designations, which were established to guide development patterns in the region.

4. **Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.**

On a short-term basis, the project will have a beneficial impact on the economic welfare of the community. During development, the project will support construction and construction-related industries, thereby increasing employment opportunities to result in a beneficial impact on the local economy during the period of construction. From a long-term perspective, the project will provide long-term job opportunities for operation and maintenance of the residential community.

It is noted that approximately 90 percent of the proposed single-family condominium homes are anticipated to be utilized as part-time residences and, as such, a substantial adverse effect on social welfare is not anticipated. As indicated previously, the CIA identified no cultural practices occurring within the project site. In this regard, cultural practices are not anticipated to be impacted as a result of the project.

5. **Have a substantial adverse effect on public health.**

During the construction period, appropriate BMPs will be implemented to mitigate potential air quality and noise impacts and to ensure that air quality and noise levels stay within the regulatory limits. Following construction, the proposed project will not have an adverse effect on public health.

6. **Involve adverse secondary impacts, such as population changes or effects on public facilities.**

The proposed project does not involve adverse secondary impacts. Secondary impacts are effects which are caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseeable. The proposed project will provide 57 single-family condominium residential units for sale. As noted previously, buyer profiles indicate that approximately 90 percent of the units will be utilized as part-time residences. The buyer profiles are not anticipated to significantly change upon re-sale of units and thus it is not foreseeable that there are any substantial secondary impacts as a result of the proposed action.

The population in the Kīhei-Mākena region has seen steady growth over the last 20 years and the population is projected to increase through 2030. The proposed development will provide residential product offerings to keep pace with the projected growth in the region. Considering the occupancy characteristics, the proposed project being located in an area designated for development, and in close proximity to existing residential, resort, and commercial facilities, will not cause a significant change in the population. All onsite/offsite infrastructure necessary to support the proposed project will be funded and installed by the Applicant. Based on the anticipated buyer profile, no substantial changes or effects on public facilities are likely.

The proposed Wailea Resort SF-S Residential Project will spur economic development opportunities through the development of residential uses. The proposed project will result in new spending in the region by new residents and income generation for employees of the residential community. As discussed in Chapter II, the Applicant will provide the necessary infrastructure to serve the proposed project. Drainage, wastewater, water, and roadway improvements will be designed to meet applicable local, State, and Federal regulations. The engineering and traffic reports prepared for the proposed project assessed potential impacts and have designed infrastructure systems in the context of future projected regional growth. Refer to **Appendix "C"** and **Appendix "H"**.

Based on the foregoing, this project does not involve significant adverse secondary impacts, such as population changes or effects on public facilities.

7. <u>Involve a substantial degradation of environmental quality.</u>

Construction activities will create temporary short-term nuisances related to noise and dust. Appropriate BMPs, including dust control and noise mitigation measures, will be implemented by the contractor to ensure that potential impacts generated in connection with construction are minimized.

As previously discussed, the proposed project does not involve a substantial degradation of environmental quality.

8. <u>Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions.</u>

Although it is located within the Wailea Resort, the proposed project is limited to the development of the Wailea Resort SF-S Residential Project site. The project has independent utility and is not a phase or increment of a larger total undertaking by the Applicant; a necessary precedent for a larger project or a commitment to some larger project in the reasonably foreseeable future. The proposed project will stand on its own and is not reliant upon or a trigger for any other development

within Wailea Resort or elsewhere. The cumulative impacts of the proposed project, together with other reasonably foreseeable actions, will include increased population and infrastructural demands, but this will not have a considerable effect on the environment. The Applicant will provide the necessary infrastructure to serve the proposed project. Drainage, wastewater, water, and roadway improvements will be designed to meet applicable local, State, and Federal regulations. The engineering and traffic reports prepared for the proposed project have assessed potential impacts and designed infrastructure systems in the context of future projected regional growth. Refer to **Appendix "C"** and **Appendix "H"**. Given the foregoing, the proposed project is not anticipated to cumulatively have a substantial adverse effect upon the environment, nor does it involve a commitment for larger actions.

9. Have a substantial adverse effect on rare, threatened, or endangered species, or its habitat.

A Biological Resources Survey was conducted to ensure that any sensitive biological resources within the project site would be identified and provided adequate protection. Refer to **Appendix "D"**. The survey concluded that the proposed project will not have a significant adverse impact on native botanical resources. While not detected during the survey, the Endangered Hawaiian hoary bat, as well as seabirds such as the endangered dark rumped petrel and the wedge tailed shearwater, could occasionally occur in the vicinity of the project site. As recommended by the U.S. Fish and Wildlife Service (USFWS) and the Biological Resources Survey, the project will incorporate appropriate mitigation measures to avoid and minimize impacts to these species. In addition, based on the recommendations by the USFWS related to Blackburn's sphinx moth, all tree tobacco plants less than three (3) feet tall will be removed if found and the Applicant and/or its contractor will monitor the site every four (4) to six (6) weeks for new tree tobacco growth before, during, and after the proposed ground-disturbing activity.

In consideration of the foregoing, the proposed project is not anticipated to have a substantial adverse effect on a rare, threatened, or endangered species or its habitat.

10. Have a substantial adverse effect on air or water quality or ambient noise levels.

Construction activities will result in short-term air quality and noise impacts. BMPs, including erosion control and dust control measures (such as regular watering and sprinkling and installation of dust screens and timely revegetation of graded areas), will be implemented to minimize wind-blown emissions. Refer to **Appendix "C"**.

In the short- term, noise impacts will occur primarily from construction equipment. Equipment mufflers or other noise attenuating equipment as well as proper vehicle maintenance and limiting construction to daylight hours will be used during construction activities. Construction noise impacts will be mitigated through compliance with the provisions of the State of Hawaiʻi, Department of Health (DOH) Administrative Rules Title 11, Chapter 46, "Community Noise Control." These rules require a noise permit if the noise levels from construction activities are expected to exceed the allowable levels set forth in Chapter 46. In the long term, the proposed new community is not anticipated to significantly impact ambient noise levels.

In seeking to preserve marine water quality, a number of measures will be implemented during the construction and operational phases of the proposed project. During construction, the project will implement a BMP Plan approved by the DOH under a National Pollutant Discharge Elimination System (NPDES) permit. Further, the increase in stormwater associated with the project will be handled by a comprehensive drainage system that will be installed as part of the project. This drainage system will include Low Impact Design (LID) measures, such as bioretention strips, to increase permeability of surfaces within the new residential community and provide for additional retention and water quality treatment of stormwater runoff. Refer to **Appendix "C"**.

With implementation of foregoing mitigation measures, the proposed project is not anticipated to have a substantial adverse effect on air or water quality or ambient noise levels.

11. <u>Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.</u>

The project site is located inland (mauka) of the shoreline and is not considered to be a shoreline-abutting property. The project is located in Flood Zone X (unshaded), an area of minimal flood risk and outside of the tsunami evacuation zone and extreme tsunami evacuation zone.

The proposed project site is located inland of the 3.2-foot sea level rise exposure area and will not be adversely impacted by established sea level rise paramenters. The proposed project is not located within or near any other environmentally sensitive areas. Based on the foregoing, the proposed project is not anticipated to have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area, such as a flood plain, tsunami zone, sea level

rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

12. <u>Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies.</u>

The proposed project has been designed to complement and enhance existing development within the Wailea Resort. Careful consideration has been given during the planning process to formulate a site plan that is both sensitive and placed appropriate to Wailea. In particular, the project provides open space relief, landscaping, and building forms to complement existing developed properties and the surrounding environment. It is noted that pursuant to the requirements of the Planned Development Standards as set forth in Section 19.32.030 of Maui County Code (MCC), the proposed project will retain approximately 20 percent of the project area in open space.

The proposed buildings will not exceed the allowable height threshold as set forth by the MCC and as recommended in the KMCP. The site plan has been designed to create a new residential community that integrates with its surrounding environment.

The View Analysis provides 3-dimensional before and after perspectives of the proposed project from public vantage points located along adjacent roadways. As documented by the view studies, the proposed project is not anticipated to substantially affect scenic vistas or makai/mauka public views from adjacent roadways or public vantage points. Refer to **Appendix "B"**. There are no scenic vistas or viewplanes identified in County or State plans or studies in vicinity of the project site. As such, the proposed project is not anticipated to have a substantial adverse effect on any scenic vistas and viewplanes, during day or night, identified in county or state plans or studies.

13. <u>Require substantial energy consumption or emit substantial greenhouse gases.</u>

While the majority of construction-related activities utilize diesel operated construction equipment, there may be short-term electrical energy needs while the project is under construction. Short-term greenhouse gas emissions associated with construction activities are anticipated during the construction phase of the project. Following construction, energy consumption will be necessary for the operational phase of the project. Guided by the project's sustainability principles, energy conservation and efficiency measures will be incorporated into the project to reduce overall energy use and greenhouse gas emissions. In addition, homes within the proposed residential community will be rooftop solar photovoltaic (PV) and Electric Vehicle (EV) charger-ready and buyers of the homes will determine if

they would like to implement these measures. Coordination will be undertaken with Maui Electric Company to ensure that electrical service requirements are addressed and are available prior to project implementation. As such, this project will not require substantial energy consumption or emit substantial greenhouse gases.

Given the preceding analysis, it is anticipated that the proposed action will result in a Finding of No Significant Impact (FONSI).

LIST OF PERMITS AND APPROVALS

VII

VII. LIST OF PERMITS AND APPROVALS

State of Hawai‘i

1. Chapter 343, Hawai‘i Revised Statutes (HRS), Environmental Assessment
2. Department of Health (DOH) Community Noise Permit, as applicable
3. National Pollutant Discharge Elimination System (NPDES) Permit

County of Maui

1. Special Management Area (SMA) Use Permit
2. Planned Development (PD) Step II and Step III Approvals
3. Construction Permits (Building, Grading, Electrical, Plumbing, Work in County Right-of-Way)

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

VIII

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

The following agencies were consulted during preparation of the Draft Environmental Assessment (EA). Agency comments and responses to substantive comments are included herein.

FEDERAL AGENCIES

1. Mr. Kahana Stone, Soil Conservationist
   Natural Resources Conservation Service
   U.S. Department of Agriculture
   77 Hookele Street, Suite 202
   Kahului, HI 96732

2. Mr. Tunis McElwain, Acting Chief
   U.S. Department of the Army, Regulatory Branch
   U.S. Army Engineer District, Honolulu
   Regulatory Branch, Building 230
   Fort Shafter, HI 96858-5440

3. Ms. Alexis Strauss, Acting Regional Administrator
   U.S. Environmental Protection Agency Region 9
   75 Hawthorne Street
   San Francisco, CA 94105

4. Ms. Michelle Bogardus, Island Team Leader
   U. S. Fish and Wildlife Service
   300 Ala Moana Blvd., Rm. 3-122
   Honolulu, HI 96850

STATE AGENCIES

5. Major General Arthur "Joe" Logan, Adjutant General
   Hawai‘i State Civil Defense
   3949 Diamond Head Road
   Honolulu, HI 96816

6. Mr. Curt Otaguro, Comptroller
   State of Hawai‘i
   Department of Accounting and General Services
   1151 Punchbowl Street, #426
   Honolulu, HI 96813

7. Ms. Zenaida Fisher
   State of Hawai‘i
   Department of Business, Economic Development & Tourism, Director's Office
   250 S. Hotel Street, 5th Floor
   Honolulu, HI 96813

8. Ms. Christine Kishimoto, Superintendent
   State of Hawai‘i
   Department of Education
   P.O. Box 2360
   Honolulu, HI 96804

9. State of Hawai'i
   Department of Education
   Office of Planning
   3633 Waialae Avenue, Room C-209
   Honolulu, HI 96816

10. Mr. William Aila, Jr., Interim Chair
    State of Hawai‘i
    Department of Hawaiian Home Lands
    P.O. Box 1879
    Honolulu, HI 96805

11. Mr. Bruce Anderson, PhD, Director
    State of Hawai‘i
    Department of Health
    1250 Punchbowl St., Room 325
    Honolulu, HI 96813

12. State of Hawai‘i
Department of Health
Environmental Health Administration
P.O. Box 3378
Honolulu, HI 96801

13. Mr. Lene Ichinotsubo
State of Hawai‘i
Department of Health
Solid and Hazardous Waste Branch
2827 Waimano Road, Suite 100
Pearl City, HI 96782-1407

14. Ms. Patti Kitkowski
State of Hawai‘i
Department of Health
Maui Sanitation Branch
54 South High Street, Room 300
Wailuku, HI 96793

15. Ms. Suzanne Case, Chairperson
State of Hawai‘i
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

16. Dr. Alan Downer, Administrator
State of Hawai‘i
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, HI 96707

17. State of Hawai‘i
Department of Land and Natural Resources
State Historic Preservation Division, Maui
101 Maalaea Boat Harbor Road
Wailuku, HI 96793

18. Mr. Jade Butay, Director
State of Hawai‘i
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

19. Mr. Craig Hirai, Executive Director
State of Hawai‘i
Hawai‘i Housing Finance and Development Corporation
677 Queen Street
Honolulu, HI 96813

20. Mr. Scott Glenn, Director
State of Hawai‘i
Office of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, HI 96813

21. Dr. Kamana`opono Crabbe, Chief Executive Officer
State of Hawai'i
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu, HI 96817

22. Ms. Mary Alice Evans, Director
State of Hawai‘i
Office of Planning
P. O. Box 2359
Honolulu, HI 96804

23. Mr. Dan Orodenker, Executive Officer
State of Hawai‘i
State Land Use Commission
P.O. Box 2359
Honolulu, HI 96804

COUNTY AGENCIES

24. Mr. Eric Nakagawa, Director
County of Maui
Department of Environmental Management
2050 Main Street, Suite 2B
Wailuku, HI 96793

25. Chief David Thyne, Chief
County of Maui
Department of Fire and Public Safety
200 Dairy Road
Kahului, HI 96732

26. Lori Tsuhako, Director
Department of Housing and Human Concerns
2200 Main Street, Suite 546
Wailuku, HI 96793

27. Ms. Karla Peters, Director
County of Maui
Department of Parks and Recreation
700 Halia Nakoa Street, Unit 2F
Wailuku, HI 96793

28. Ms. Michele Chouteau McLean, Director
County of Maui
Department of Planning
2200 Main Street, Suite 315
Wailuku, HI 96793

29. Ms. Rowena Dagdag-Andaya, Director
County of Maui
Department of Public Works
200 South High Street
Wailuku, HI 96793

30. Mr. Marc Takamori, Director
County of Maui
Department of Transportation
David Trask Building, Suite 102
2145 Kaohu Street
Wailuku, HI 96793

31. Mr. Jeffrey Pearson, Director
County of Maui
Department of Water Supply
200 South High Street, 5th Floor
Wailuku, HI 96793

32. Mr. Herman Andaya, Emergency Management Officer
County of Maui
Emergency Management Agency
200 South High Street
Wailuku, HI 96793

33. Ms. Kay Fukumoto, Coordinator
County of Maui
Office of Economic Development
2200 Main Street, Suite 305
Wailuku, HI 96793

34. Mayor Michael Victorino
County of Maui
Office of the Mayor
200 South High Street
Wailuku, HI 96793

35. Chief Tivoli Faaumu, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, HI 96793

MAUI COMMUNITY ORGANIZATIONS

36. Hawaiian Telcom
60 South Church Street
Wailuku, HI 96793

37. Kīhei Community Association
P. O. Box 662
Kihei, HI 96753

38. Ms. Pamela Tumpap, Executive Director
Maui Chamber of Commerce
95 Mahalani Street, Suite 22A
Wailuku, HI 96793

39. Ms. Debbie Cabebe, Chief Executive Officer
Maui Economic Opportunity
99 Mahalani Street
Wailuku, HI 96793

40. Mr. Michael Grider, Manager, Engineering
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, HI 96733

41. Mr. Bud Pikrone
Wailea Community Association
555 Kaukahi Street, Suite 214
Kihei, HI 96753

42. Spectrum
158 Maʻa Street
Kahului, HI 96732

REFERENCES IX

IX. REFERENCES

County of Maui, Department of Planning, Maui Island Plan, December 2012.

County of Maui, Department of Planning, 2030 General Plan - Countywide Policy Plan, March 2010.

County of Maui, Department of Planning, Special Management Area Map, 2007.

County of Maui, Department of Planning, Kihei-Makena Community Plan, March 6, 1998.

County of Maui, Department of Planning, Socio-Economical Forecast, The Economic Projections for the Maui County General Plan 2030, 2006.

County of Maui, Online Resources, accessed July 2019.

County of Maui, Office of Economic Development; Maui County Data Book 2018, https://hisbdc.org/BusinessResearchLibrary/MauiCountyDataBook2018.aspx, accessed November 2019.

County of Maui; Emergency Management Agency; Tsunami Evacuation Maps; https://tsunami.coast.noaa.gov/#/, accessed November 2019.

Federal Emergency Management Agency, Flood Map Service; https://msc.fema.gov/portal/search?AddressQuery=Wailea%20Maui#searchresultsanchor, accessed November 2019.

Federal Environmental Protection Agency; Heat Island Effects; https://www.epa.gov/heat-islands, accessed November 2019.

Gale Cengage Learning, Complete Demographic Comparison Report, Accessed March 2020.

Gershman, Brickner & Bratton, Inc., Integrated Solid Waste Management Overview, 2009.

Hawaii Department of Health, Clean Air Branch, Hawaii Greenhouse Gas Emissions Report for 2015, Final Report, January 2019.

Hawaii Energy, “Average Energy Use Per Household by County”, https://dashboard.hawaii.gov/stat/goals/5xhf-begg/fgyu-2f7k/ydqr-r2fu, 2017, Accessed August 21, 2019Hawaii Public Utilities Commission, Report to the 2019 Legislature on Hawaii’s Renewable Portfolio Standards, December 2018.

Honolulu Star Advertiser, 37% of Hawaii’s labor force files unemployment claims, https://www.staradvertiser.com/2020/04/17/breaking-news/37-of-hawaiis-labor-force-filesunemployment-claims/, Accessed April 19, 2020.

IPCC (2007). Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. EXIT Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt,

M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

State of Hawaiʻi, Department of Education, School Enrollment, 2018-2019 School Year.

State of Hawaiʻi Department of Health, Air Quality Branch, Hawaiʻi Air Quality Data; https://air.doh.hawaii.gov/home/map, accessed November, 2019.

State of Hawaiʻi, Land Use Commission, State Land Use District, 2010.

State of Hawaiʻi, Office of Planning, Hawaii State Plan.

University of Hawaiʻi, School of Ocean and Earth Science Technology, Sea Level Rise Hawaiʻi, www.soest,hawaii,edu/coasts/sealevel, accessed November 2019.

U.S. Census Bureau, 2000 Census Summary File 1, 2000.

U.S. Census Bureau, 2010 Census Summary File 1, 2010.

U.S. Department of Agricultrue, Soil Conservation Service, Soil Survey of Islands of Kauaʻi, Oʻahu, Maui, Molokaʻi, and Lanaʻi, State of Hawaiʻi, in cooperation with the University of Hawaii, Agricultural Experiment Station, August 1972.

U.S. Energy Information Administration, Commercial Building Energy Consumption Survey, Table C14. Electricity consumption and expenditure intensities, 2012, May 2016.

U.S. Environmental Protection Agency, "GHG Reporting Program Data, 2017", https://ghgdata.epa.gov/ghgp/main.do, Accessed August 27, 2019.

U.S. Environmental Protection Agency, "Sources of Greenhouse Gas Emissions", https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions, 2018, Accessed August 21, 2019.

U.S. Environmental Protection Agency, "AVERT, U.S. national weighted average CO2 marginal emission rate, year 2017 data", 2018. Accessed August 21, 2019.

ORDINANCE NO. 2694

APPENDIX

A

For: Mayor's Office
ORDINANCE NO. 2694
Effective Date: Sept. 23, 1998

CIVIL DEFENSE
COUNSEL
FINANCE
FIRE
HUMAN CONCERNS
LIQUOR CONTROL
PARKS
PERSONNEL
PLANNING
POLICE
PROSECUTORS
PUBLIC WORKS
WATER SUPPLY
RICHARD HAAKE
DAVE DELEON
GEORGE
PAM
JEFF CHANG
GEORGINA
LLOYD
LEE DODSON
ROBBIE

ORDINANCE NO. 2694

'98 SEP 28 12:25

BILL NO. 69 (1998)

A BILL FOR AN ORDINANCE TO ESTABLISH R-3 RESIDENTIAL DISTRICT ZONING (CONDITIONAL ZONING) FOR PROPERTY LOCATED WITHIN THE WAILEA RESORT PLANNED DEVELOPMENT SITUATED AT WAILEA, KIHEI, MAUI, HAWAI'I

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

SECTION 1. Pursuant to Chapters 19.08 and 19.510, Maui County Code, R-3 Residential District zoning (conditional zoning) is hereby established for that certain parcel of land located in Wailea, Kihei, Maui, Hawai'i, identified for real property tax purposes by TMK No. 2-1-08: 115, comprised of approximately 23.193 acres, and more particularly described in Exhibit "A", which is attached hereto and made a part hereof, and in Land Zoning Map No. L-559, on file in the Office of the County Clerk of the County of Maui and which is by this reference made a part hereof.

SECTION 2. Pursuant to Section 19.510.050, Maui County Code, the zoning established by this ordinance is subject to the conditions set forth in Exhibit "B", which is attached hereto and made a part hereof, and the Unilateral Agreement and Declaration for Conditional Zoning, which is attached hereto and made a part hereof as Exhibit "C".

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

APPROVED AS TO FORM AND LEGALITY:

BRIAN T. MOTO
Deputy Corporation Counsel
County of Maui

lu:misc:07bill1:mnc

DESCRIPTION

LOT 298
(MAP 34)
LAND COURT APPLICATION 1804
TMK: (2)2-1-08:115

All of that certain parcel of land, being a portion of Grant 548 to J. Y. Kanehoa situated at Paeahu, Honuaula, Makawao, Island and County of Maui, State of Hawaii.

Beginning at a point at the southeasterly corner of this lot, on the westerly side of Kapili Street (Lot 296 of Land Court Application 1804, as shown on Map 34) said point being also the northeasterly corner of Lot 459 of Land Court Application 1804 (as shown on Map 49), the coordinates of said point of beginning referred to Government Survey Triangulation Station "PUU IO" being 10,022.51 feet North and 17,812.21 feet West and running by azimuths measured clockwise from True South:

1. 136° 00' 275.25 feet along Lot 459 of Land Court Application 1804 (as shown on Map 49) to a point;

2. 103° 00' 678.01 feet along same to a point;

3. 148° 00' 264.99 feet along Lots 357,454 and 356 of Land Court Application 1804 (as shown on Map 49) to a point;

4. 129° 00' 301.00 feet along Lots 356, 355 and 455 of Land Court Application 1804 (as shown on Map 49) to a point;

5. Thence along the easterly side of Wailea Alanui (Lot 89 of Land Court Application 1804, as shown on Map 24) on a curve to the left with a radius of 507.47 feet, the chord azimuth and distance being:
163° 12' 420.62 feet to a point;

Exhibit "A"

6. 214° 00' 270.64 feet along Lot 297 of Land Court Application 1804 (as shown on Map 34) to a point;

7. 249° 00' 189.95 feet along same to a point;

8. 284° 00' 150.00 feet along same to a point;

9. 307° 00' 225.00 feet along same to a point;

10. 285° 00' 155.00 feet along same to a point;

11. 262° 00' 205.46 feet along same to a point;

12. Thence along the westerly side of Kapili Street (Lot 296 of Land Court Application 1804, as shown on Map 34) on a curve to the right with a radius of 230.00 feet, the chord azimuth and distance being: 350° 31' 06" 114.25 feet to a point;

13. 4° 54' 32.65 feet along same to a point;

14. Thence along same on a curve to the left with a radius of 602.96 feet, the chord azimuth and distance being: 350° 03' 30" 308.89 feet to a point;

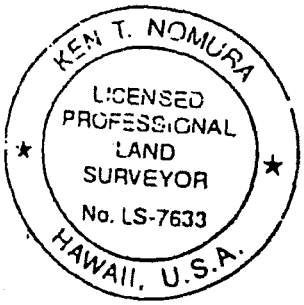
15. 335° 13' 607.59 feet along same to a point;

16. Thence along same on a curve to the right with a radius of 379.26 feet, the chord azimuth and distance being: 356° 33' 275.94 feet to the point of beginning and containing an Area of 23.193 Acres.

Prepared by A&B Properties, Inc.
Kahului, Maui, Hawaii

May 17, 1996

This work was prepared by me or under my supervision.



Registered Professional Land Surveyor No. LS-7633
Land Court Certificate No. 251

1. The density shall be restricted to 2.5 single-family dwelling units per acre.

2. The applicant, its successors and assigns, shall satisfy the parks assessment, pursuant to Section 18.16.320, Maui County Code, for the subject property and the other properties that were granted R-3 Residential District zoning and A-1 Apartment District zoning upon the date of enactment of this ordinance (TMK Nos. 2-1-08: portion of 118, portion of 120 and portion of 128), by donating no less than 3.0 acres of land near the intersection of Piilani Highway and Kilohana Drive in an exact location to be determined by the Maui County Department of Parks and Recreation through discussions with the applicant, its successors and assigns. In addition, the applicant, its successors and assigns shall donate to the County the approximately 2.0-acre site at the northwest corner of Piilani Highway and Kilohana Road, referenced as Matrix 22B (Fire Station) in the Kihei-Makena Community Plan (1998), for use as a fire station and/or fire and public services facility.

3. As required by the State Historic Preservation Division, the applicant, its successors and assigns, shall conduct an archaeological inventory survey, including any subsurface testing where appropriate, prior to any ground-altering activity, excavation or landscaping. If significant historic sites are located during such survey(s), then a mitigation plan shall be prepared for the review and approval of the State Historic Preservation Division.

4. The applicant, its successors and assigns, shall provide opportunities for pedestrian and/or bicycle access ways within the roadways fronting the subject property. If the property includes a design focal point, such as a central or main entryway or "pull off", schematic designs for said focal point(s) shall be submitted to the Maui County Department of Planning for consideration by the Maui Planning Commission in conjunction with the Special Management Area application for the subject property.

5. The applicant, its successors and assigns, shall contribute its pro-rata share of regional roadway improvements as determined by the State Department of Transportation and the Maui County Department of Public Works and Waste Management. The applicant, its successors and assigns, shall work with the Wailea Community Association to mitigate traffic problems within the resort resulting from the development of the subject property.

EXHIBIT "B"

THE ORIGINAL OF THE DOCUMENT
RECORDED AS FOLLOWS:
STATE OF HAWAII

BUREAU OF CONVEYANCES

DATE SEP 10 1998 TIME 1000

DOCUMENT NO. 98-134672

LAND COURT SYSTEM | REGULAR SYSTEM

After Recordation Return by Mail To:
Office of the County Clerk
County of Maui
200 S. High Street
Wailuku, Hawaii 96793

Total Number of Pages 9

(Affects TMK: 2-1-08:115)

UNILATERAL AGREEMENT AND DECLARATION FOR CONDITIONAL ZONING

THIS INDENTURE, made this August 13, 1998, by Wailea Resort Company, Ltd., a Hawaii corporation, 161 Wailea Ike Place, Kihei, Hawaii 96753, hereinafter referred to as the "Declarant", and who is the owner of that certain parcel of land located at Wailea, Maui, Hawaii, comprised of approximately 23.193 acres, and identified for real property tax purposes by Tax Map Key No. 2-1-08:115, hereinafter referred to as "Property".

W I T N E S S E T H :

WHEREAS, the Council of the County of Maui, State of Hawaii, hereinafter referred to as "Council", is considering the establishment of zoning for the Property, comprising of approximately 23.193 acres, which is more particularly described in Exhibit "1" attached hereto and made a part hereof, and which is more particularly identified in Land Zoning Map No. L-559, which is on file in the Office of the County Clerk of the County of Maui; and

EXHIBIT "C"

WHEREAS, the Council recommends through its Land Use Committee, Committee Report No. 98-158, that said establishment of zoning be approved for passage on second reading subject to certain conditions pursuant to Section 19.510.050, Maui County Code; and

WHEREAS, Declarant has agreed to execute this instrument pursuant to the conditional zoning provisions of said Section 19.510.050, Maui County Code; and

NOW, THEREFORE, the Declarant hereby makes the following Declaration:

1. That this Declaration is made pursuant to the provisions of Section 19.510.050, Maui County Code, relating to conditional zoning;

2. That until written release by the County, the Property, and all parts thereof, is and shall be held subject to the covenants, conditions and restrictions contained herein and that all of such covenants, conditions and restrictions shall be effective as to and shall run with the land as to the Property from and after the recording of the Declaration with the Bureau of Conveyances or Land Court of the State of Hawaii, as the case may be, without the execution, delivery or recordation of any further deed, instrument, document, agreement, declaration, covenant or the like with respect thereto by the Declarant, the County of Maui, or any heir, devisee, executor, administrator, personal representative, successor, and assign, as the case may be, of any of them, that the acquisition of any right, title or interest in or with respect to the Property by any person or persons, entity or entities, whomsoever, shall be deemed to constitute the acceptance of all of the covenants, conditions and restrictions of this Declaration by such person or persons, entity or entities, and that upon any transfer of any right, title or interest in or with respect to the Property the same shall be subject to, and the transferee shall assume and be bound and obligated to observe and perform, all of the covenants, conditions and restrictions of this Declaration;

3. This Declaration and all of the covenants, conditions and restrictions contained herein shall continue to be effective as to run with the land in perpetuity, or until Declarant notifies the appropriate County Department that said covenants, conditions and restrictions are satisfied by Declarant at which time after verification by the appropriate County Department this Declaration or the appropriate covenant, condition and restriction shall be released in writing by the County;

4. The term "Declarant" and any pronoun in reference thereto, wherever used herein, shall be construed to mean the singular or the plural, the masculine or the feminine or the neuter, and vice versa, and shall include any corporation, and shall be held to mean and include the "Declarant", Declarant's successors, and assigns;

5. That the Declaration shall become fully effective on the effective date of the zoning ordinance approving the establishment of R-3 Residential District zoning for the Property and this Declaration shall be recorded in the Bureau of Conveyances of the State of Hawaii;

6. That the Declarant agrees to develop said Property in conformance with the conditions set forth in Exhibit "2", which is attached hereto and made a part hereof and which shall be made a part of the zoning ordinance; and

7. That the conditions imposed are reasonable and rationally relate to the objective of preserving the public health, safety and general welfare and such conditions fulfill the need for the public service demands created by the proposed use.

AND IT IS EXPRESSLY UNDERSTOOD AND AGREED that until released in writing by the County, the conditions imposed in this Declaration shall run with the land identified hereinabove and shall bind and constitute notice to all subsequent lessees, grantees, assignees, mortgagees, lienors and any other persons who claim an interest in the said land, and the County of Maui shall have the right to enforce this Declaration by appropriate action at law or suit in equity against all such persons, provided that the Declarant or its successor and assigns may at any time file a petition for the removal of the conditions and terminate this Unilateral Agreement, such petition to be processed in the same manner as petitions for change in zoning.

IN WITNESS WHEREOF, the undersigned has executed this Declaration the day and year first above written.

DECLARANT:

WAILEA RESORT COMPANY, LTD., a Hawaii corporation

By _____
HOWARD K. NAKAMURA
Its President

By _____
CLYDE MURASHIGE
Its Sr. Vice President

APPROVED AS TO FORM:

ANNE M. TAKABUKI
Attorney for Declarant

APPROVED AS TO FORM AND LEGALITY:

BRIAN T. MOTO
Deputy Corporation Counsel
County of Maui

STATE OF HAWAII)
) SS:
COUNTY OF MAUI)

On this 13th day of August, 1998 before me appeared HOWARD K. NAKAMURA AND CLYDE MURASHIGE, to me personally known, who, being by me duly sworn, did say that they are the President and Senior Vice President, respectively, of WAILEA RESORT COMPANY, LTD., a Hawaii corporation; that the seal affixed to the foregoing instrument is the corporate seal of such corporation and that such instrument was signed and sealed on behalf of such corporation by authority of its Board of Directors, and said HOWARD K. NAKAMURA AND CLYDE MURASHIGE acknowledged such instrument to be the free act and deed of such corporation.

Sandra Higa

SANDRA HIGA
Notary Public, State of Hawaii

LS

My commission expires: 10/14/01

DESCRIPTION

LOT 298
(MAP 34)
LAND COURT APPLICATION 1804
TMK: (2)2-1-08:115

All of that certain parcel of land, being a portion of Grant 548 to J. Y. Kanehoa situated at Paeahu, Honuaula, Makawao, Island and County of Maui, State of Hawaii.

Beginning at a point at the southeasterly corner of this lot, on the westerly side of Kapili Street (Lot 296 of Land Court Application 1804, as shown on Map 34) said point being also the northeasterly corner of Lot 459 of Land Court Application 1804 (as shown on Map 49), the coordinates of said point of beginning referred to Government Survey Triangulation Station "PUU IO" being 10,022.51 feet North and 17,812.21 feet West and running by azimuths measured clockwise from True South:

1. 136° 00' 275.25 feet along Lot 459 of Land Court Application 1804 (as shown on Map 49) to a point;

2. 103° 00' 678.01 feet along same to a point;

3. 148° 00' 264.99 feet along Lots 357,454 and 356 of Land Court Application 1804 (as shown on Map 49) to a point;

4. 129° 00' 301.00 feet along Lots 356, 355 and 455 of Land Court Application 1804 (as shown on Map 49) to a point;

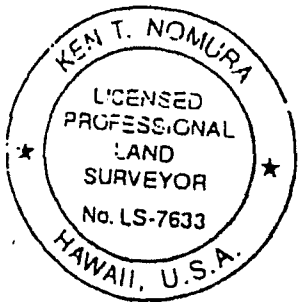
5. Thence along the easterly side of Wailea Alanui (Lot 89 of Land Court Application 1804, as shown on Map 24) on a curve to the left with a radius of 507.47 feet, the chord azimuth and distance being:
163° 12' 420.62 feet to a point;

Exhibit "1"

6.	214° 00'	270.64	feet along Lot 297 of Land Court Application 1804 (as shown on Map 34) to a point;
7.	249° 00'	189.95	feet along same to a point;
8.	284° 00'	150.00	feet along same to a point;
9.	307° 00'	225.00	feet along same to a point;
10.	285° 00'	155.00	feet along same to a point;
11.	262° 00'	205.46	feet along same to a point;
12.	Thence along the westerly side of Kapili Street (Lot 296 of Land Court Application 1804, as shown on Map 34) on a curve to the right with a radius of 230.00 feet, the chord azimuth and distance being: 350° 31' 06" 114.25 feet to a point;		
13.	4° 54'	32.65	feet along same to a point;
14.	Thence along same on a curve to the left with a radius of 602.96 feet, the chord azimuth and distance being: 350° 03' 30" 308.89 feet to a point;		
15.	335° 13'	607.59	feet along same to a point;
16.	Thence along same on a curve to the right with a radius of 379.26 feet, the chord azimuth and distance being: 356° 33' 275.94 feet to the point of beginning and containing an Area of 23.193 Acres.		

Prepared by A&B Properties, Inc. May 17, 1996
Kahului, Maui, Hawaii

This work was prepared by me or under my supervision.



Registered Professional Land Surveyor No. LS-7633
Land Court Certificate No. 251

1. The density shall be restricted to 2.5 single-family dwelling units per acre.

2. The applicant, its successors and assigns, shall satisfy the parks assessment, pursuant to Section 18.16.320, Maui County Code, for the subject property and the other properties that were granted R-3 Residential District zoning and A-1 Apartment District zoning upon the date of enactment of this ordinance (TMK Nos. 2-1-08: portion of 118, portion of 120 and portion of 128), by donating no less than 3.0 acres of land near the intersection of Piilani Highway and Kilohana Drive in an exact location to be determined by the Maui County Department of Parks and Recreation through discussions with the applicant, its successors and assigns. In addition, the applicant, its successors and assigns shall donate to the County the approximately 2.0-acre site at the northwest corner of Piilani Highway and Kilohana Road, referenced as Matrix 22B (Fire Station) in the Kihei-Makena Community Plan (1998), for use as a fire station and/or fire and public services facility.

3. As required by the State Historic Preservation Division, the applicant, its successors and assigns, shall conduct an archaeological inventory survey, including any subsurface testing where appropriate, prior to any ground-altering activity, excavation or landscaping. If significant historic sites are located during such survey(s), then a mitigation plan shall be prepared for the review and approval of the State Historic Preservation Division.

4. The applicant, its successors and assigns, shall provide opportunities for pedestrian and/or bicycle access ways within the roadways fronting the subject property. If the property includes a design focal point, such as a central or main entryway or "pull off", schematic designs for said focal point(s) shall be submitted to the Maui County Department of Planning for consideration by the Maui Planning Commission in conjunction with the Special Management Area application for the subject property.

5. The applicant, its successors and assigns, shall contribute its pro-rata share of regional roadway improvements as determined by the State Department of Transportation and the Maui County Department of Public Works and Waste Management. The applicant, its successors and assigns, shall work with the Wailea Community Association to mitigate traffic problems within the resort resulting from the development of the subject property.

EXHIBIT "2"

WE HEREBY CERTIFY that the foregoing BILL NO. 69 (1998)

1. Passed FINAL READING at the meeting of the Council of the County of Maui, State of Hawaii, held on the 22nd day of September, 1998, by the following votes:

Patrick S. KAWANO Chair	James "Kimo" APANA Vice-Chair	Alan ARAKAWA	J. Kalani ENGLISH	Sol P. KAHO'OHALAHALA	Alice L. LEE	Dennis Y. NAKAMURA	Wayne K. NISHIKI	Charmaine TAVARES
Aye	Aye	Aye	Aye	Aye	Excused	Aye	Aye	Aye

2. Was transmitted to the Mayor of the County of Maui, State of Hawaii, on the 22nd day of September, 1998.

DATED AT WAILUKU, MAUI, HAWAII, this 22nd day of September, 1998.

PATRICK S. KAWANO, CHAIR
Council of the County of Maui

DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

THE FOREGOING BILL IS HEREBY APPROVED THIS 23 DAY OF September, 1998.

LINDA LINGLE, MAYOR
County of Maui

I HEREBY CERTIFY that upon approval of the foregoing BILL by the Mayor of the County of Maui, the said BILL was designated as ORDINANCE NO. 2694 of the County of Maui, State of Hawaii.

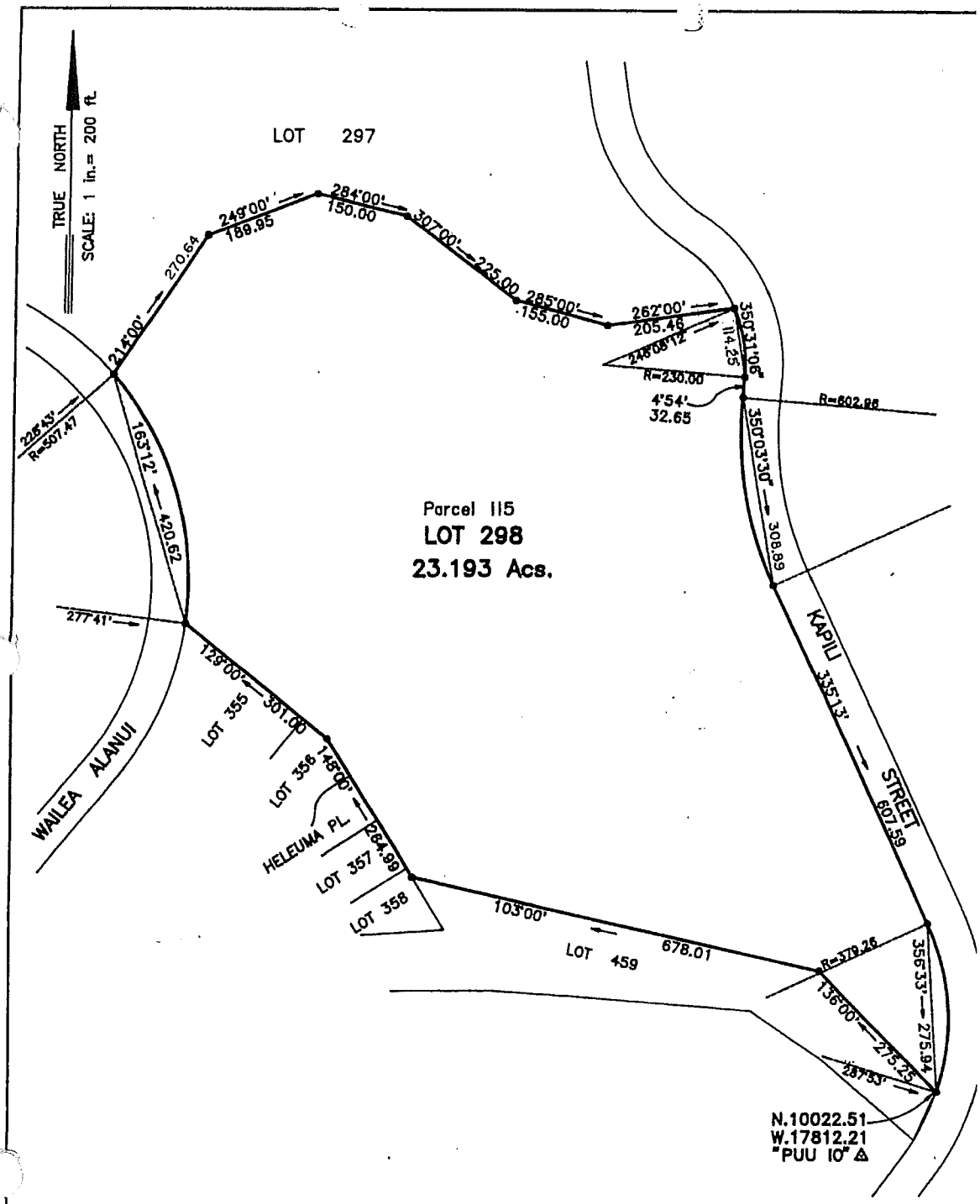
DARYL T. YAMAMOTO, COUNTY CLERK
County of Maui

Passed First Reading on September 4, 1998.
Effective date of Ordinance September 23, 1998.

I HEREBY CERTIFY that the foregoing is a true and correct copy of Ordinance No. 2694, the original of which is on file in the Office of the County Clerk, County of Maui, State of Hawaii.

Dated at Wailuku, Hawaii, on

County Clerk, County of Maui



TMK: 2nd 2-1-08: 115 (Site No. 1) AREA= 23.193 Acs.

LAND ZONING MAP NO. 559

CHANGE IN ZONING – HONUAULA, MAUI

FROM: PUBLIC/QUASI-PUBLIC

TO: R-3 RESIDENTIAL

APPROVED: COUNTY CLERK	PUBLIC HEARING: 11-10-97 ADOPTED–COUNCIL: 9-22-98 ADOPTED–MAYOR: 9-23-98 ORDINANCE: 2694
APPROVED: PLANNING DIRECTOR	DATE: DEC 2/97 SCALE: 1"=200'

OFFICE OF THE COUNTY CLERK

200 SOUTH HIGH STREET, WAILUKU, MAUI, HAWAII

L559

APPENDIX

PRELIMINARY PROJECT PLANS AND VIEW ANALYSIS

B

WAILEA **SF-S**

ENTITLEMENTS DRAWING PACKAGE | MAY 12, 2020

PROJECT DESCRIPTION

The planned development Wailea Resort SF-S is located on a single, undeveloped parcel within Wailea on Maui. Wailea Resort SF-S Partners LP is the developer of the fifty-seven single-family homes in a condominium property regime.

The lot measures 23.1 acres with +/- 120-ft of grade sloping downward from southeast to northwest corners. The site is boarded on its mauka edge by Kapili Street and on its makai edge by Wailea Alanui Drive. The southern portion of the site is bordered by a drainageway and the development. On the northern edge, the property is bordered by undeveloped land owned by the County of Maui.

The project is envisioned as a boutique, low density, up-market residential enclave with homes that provide all the desirable qualities of a single-family neighborhood, with the convenient lock-and-leave lifestyle provided through a condominium regime form of ownership.

Home sites will be just over 10,000sf and will be orientated towards either Molokini views or Lanai views. All homes will be single story and with 150 ft deep lots, the consistent grade on the site will allow the homes to look over top of the home in front, providing for excellent views.

Homes will have a consistent design for building efficiency and to provide a cohesive design aesthetic. Utilizing a pre-programmed expandable footprint, homes will range in size from approximately 2,600sf to 3,300sf. This allows for a flexible product size that can be personalized to a customer's individual needs.

A residential amenity center will be in a prominent location offering panoramic sweeping views from Molokini to the West Maui Mountains. The amenity center consists of a pool, terraces, covered outdoor lounge, office and spa/changing rooms; and 11 on-grade parking stalls.

A network of landscaped private lanes and pedestrian pathways connecting each structure to the main access points of the Project, allowing residents of the project easy pedestrian and bike access to both Wailea Alanui and Kapili Street.

SF-S PROJECT TEAM

OWNER
Wailea Resort SF-S Partners, LP

ARCHITECT
G70

CIVIL ENGINEER
Warren S. Unemori Engineering, Inc.

LANDSCAPE ARCHITECT
PBR Hawaii & Associates, Inc.

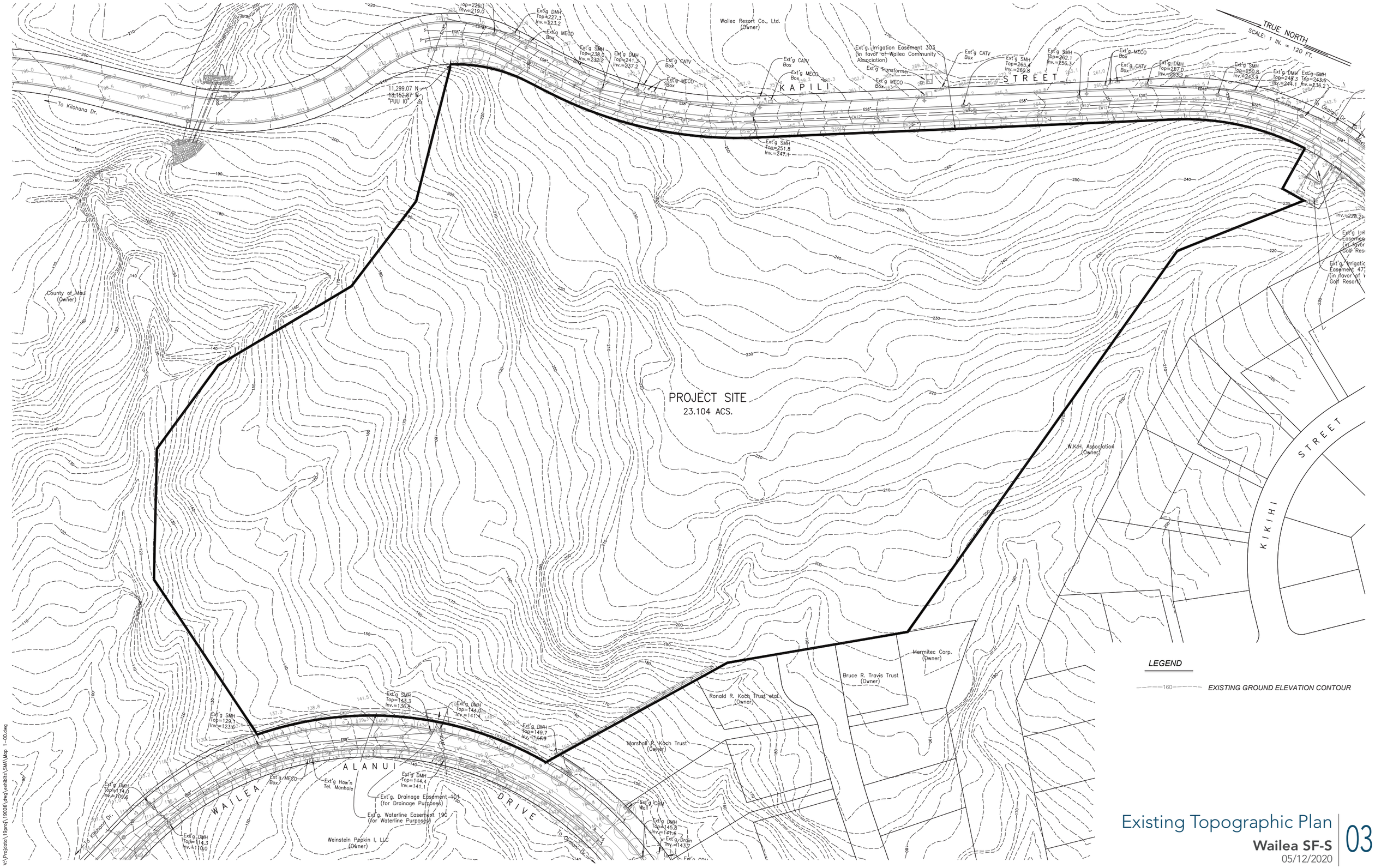
SHEET LIST

01 Summary Sheet
02 Context Plan
03 Existing Topographic Plan
04 Site Grading Plan
05 Site Lot Plan
06 Site Landscape Plan
07 Site Irrigation Plan
08 Protected Open Space Diagram
09 Typical Lot Landscape Plan
10 Typical Residence Floor Plan
11 Typical Residence Roof Plan
12 Typical Residence Exterior Elevations
13 Typical Residence Sections
14 Amenity Center Building and Landscape Plan
15 Amenity Center Floor Plan
16 Amenity Center Roof Plan
17 Amenity Center Exterior Elevations
18 Amenity Center Exterior Elevations
19 Amenity Center Building Section
20 Main Entry Landscape Plan
21 Main Entry Elevations
22 Kapili Street Fencing and Emergency Egress Gates
23 Wailea Ala Nui Fencing and Emergency Access Gates
24 Signage Monument
25 Plant Palette
26 View Study 1
27 View Study 2
28 View Study 3
29 View Study 4
30 View Study 5
31 View Study 6

Scale: 1"=300'
0' 75' 150' 300' 600'

Context Plan
Wailea SF-S
05/12/2020

02



Existing Topographic Plan

Wailea SF-S

05/12/2020

03

V:\Projdata\19proj\190206\dwg\exhibits\SMA\Map 1-00.dwg

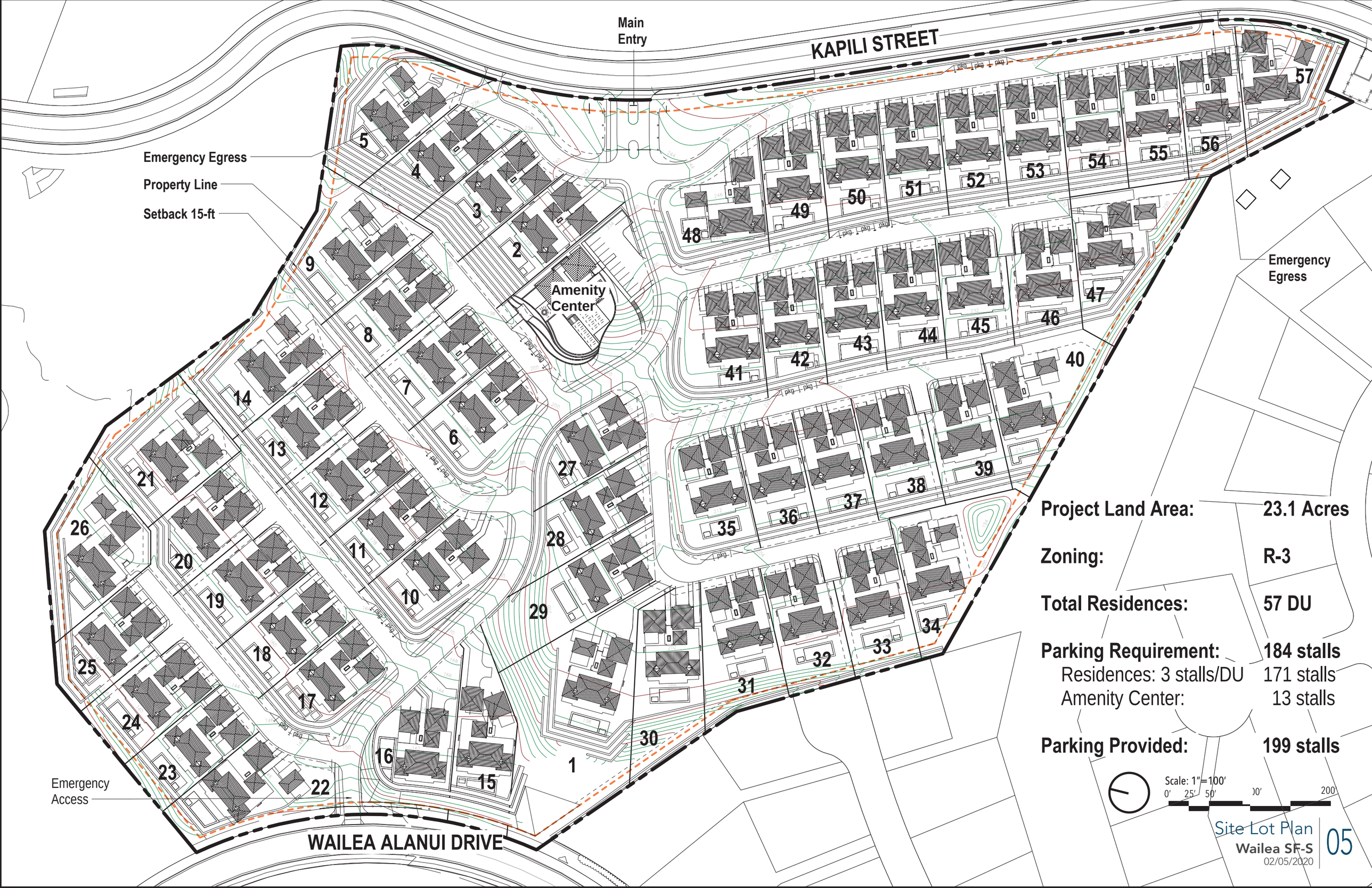
Site Grading Plan

Wailea SF-S

05/12/2020

04

V:\Projdata\19proj\19026\dwg\exhibits\SMA\Map 2-00.dwg


Main Entry
KAPILI STREET
Emergency Egress
Property Line
Setback 15-ft
Amenity Center
Emergency Egress
Emergency Access
WAILEA ALANUI DRIVE
Project Land Area: 23.1 Acres
Zoning: R-3
Total Residences: 57 DU
Parking Requirement: 184 stalls
Residences: 3 stalls/DU 171 stalls
Amenity Center: 13 stalls
Parking Provided: 199 stalls
Scale: 1"=100'
0' 25' 50' 200'
Site Lot Plan
Wailea SF-S
02/05/2020
05

Note: The Biological Resources Survey report prepared by Robert W. Hobdy for Wailea Resort SF-S Partners, LP and dated May 2019 does not identify any significant historical or exceptional trees on the property.

Site Landscape Plan
Wailea SF-S
05/12/2020

06

Irrigation Notes:

The irrigation system for the project will be connected to the Maui County Department of Water Supply, and provisions will be made to connect to future County R-1 water service.

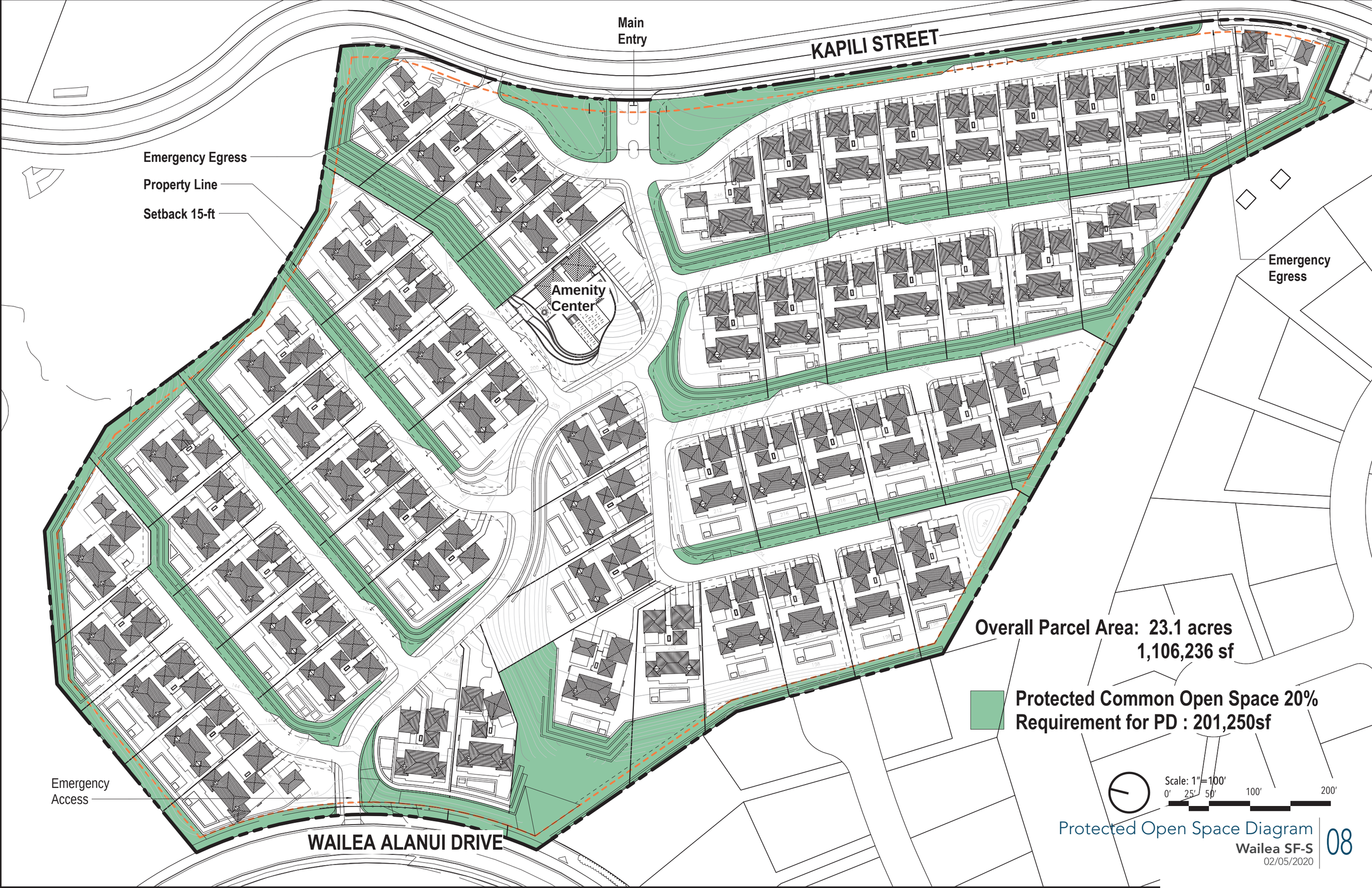
Future R-1 water service will irrigate the common areas of the project including roadway landscape and open space in accordance with the DOH rules.

The irrigation system will be designed using landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii and incorporate equipment including, but not limited to irrigation submeters, drip irrigation, rotary & high-efficiency nozzles, weather & flow sensors, and smart controllers.

N

50' 25' 0' 50' 100'

SCALE: 1" = 100'

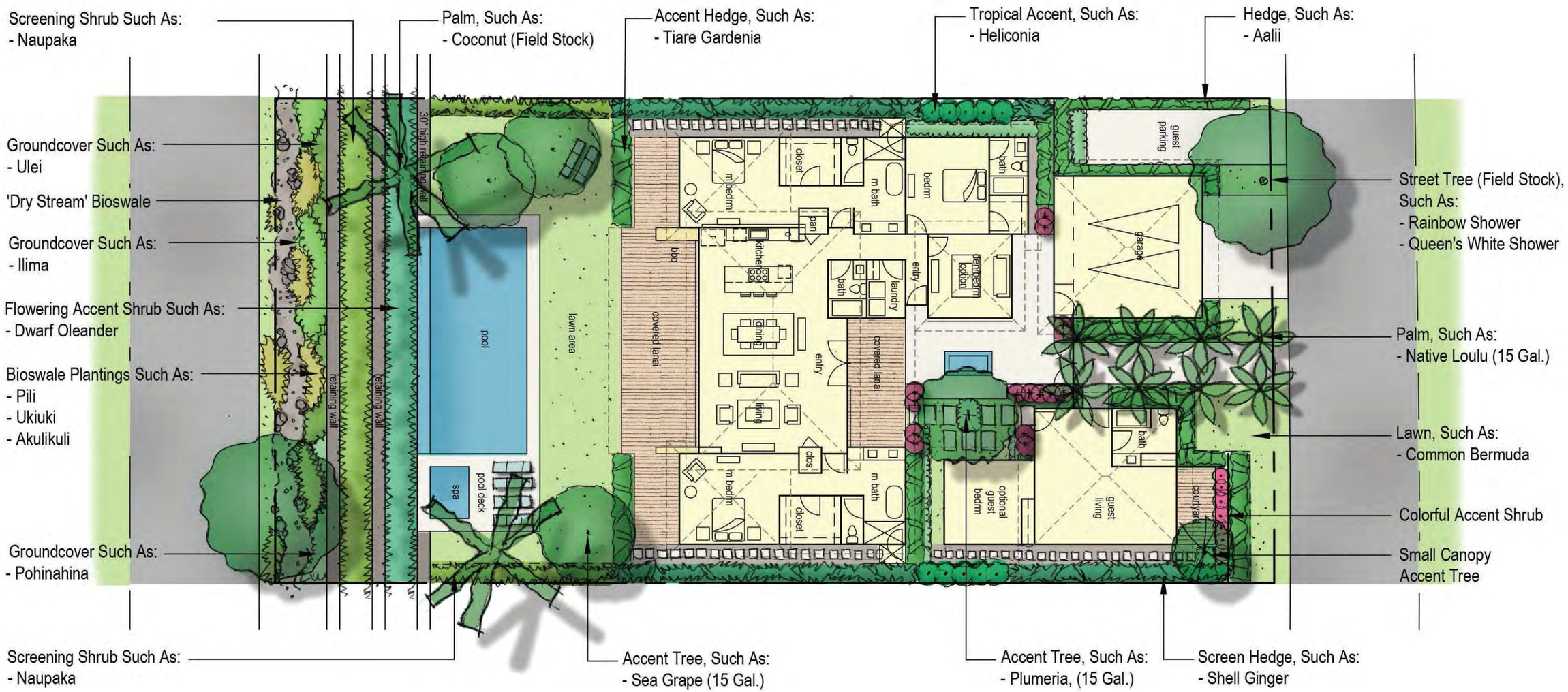


Protected Open Space Diagram

Wailea SF-S

02/05/2020

08



WCA Design Rules - Single Family Lot Tree & Palm Requirements

Major Palms, 10' min. trunk:
1 Field stock tree per 3000 sq. ft. of total lot area
or
Shade Canopy Trees:
1 Field stock tree per 3000 sq. ft. of total lot area, 12 ft. min. overall, 5" caliper
and
Palms/Small Flowering Trees:
1 ea. 15 gal. size per 1000 sq. ft. of total lot area, 6-7 ft. overall height

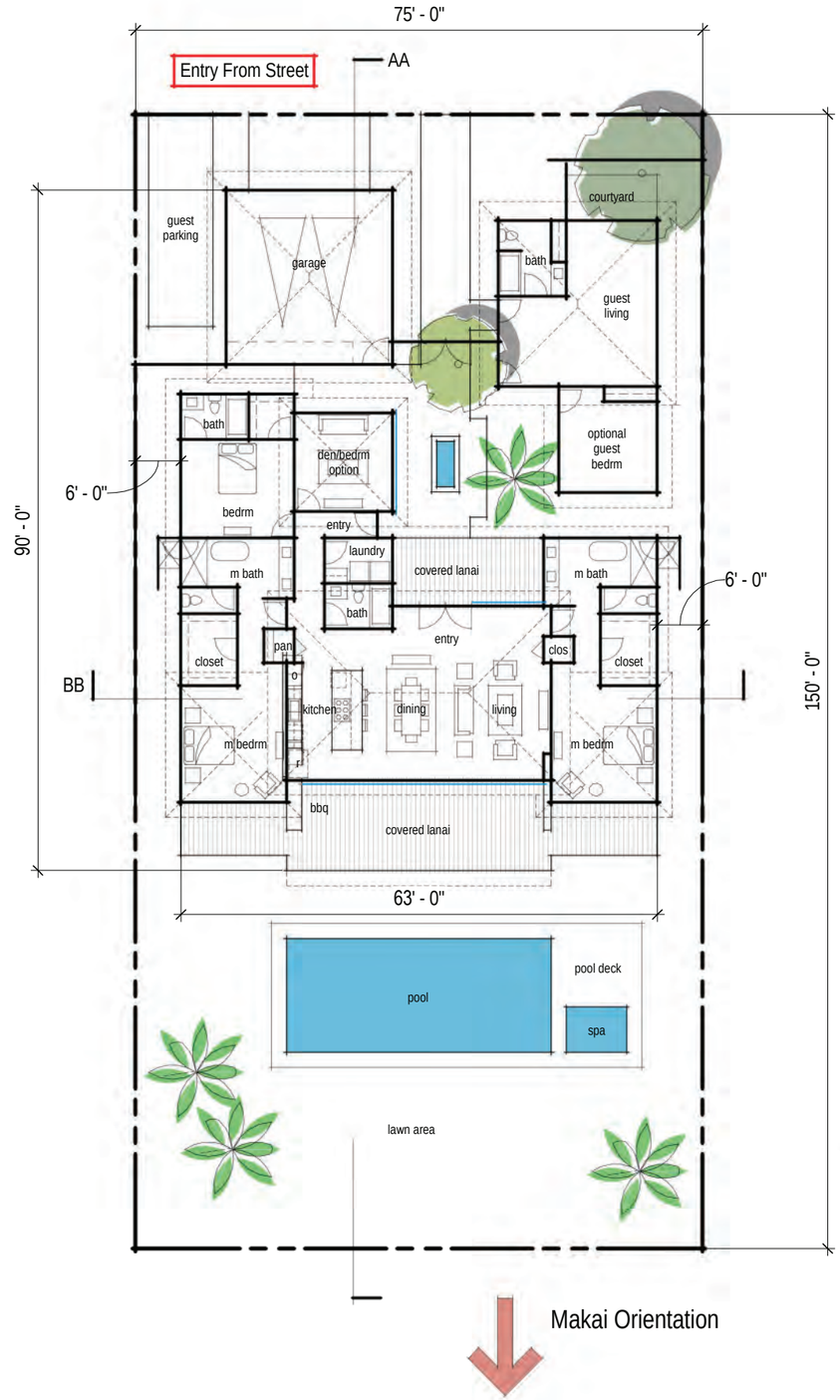
Example Typical Single Family Lot Tree & Palm Count

Total Lot Area: 11,587 SF

Major Palms, 10' min. trunk		Provided: 2
or	Required: 4 ea	
Shade Canopy Trees		Provided: 2
and		
Palms/Small Flowering Trees	Required: 12 ea	Provided: 12

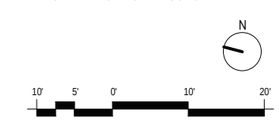
8' 4' 0' 8' 16'
SCALE: 1" = 16'

Typical Lot Landscape Plan
Wailea SF-S
05/12/2020



Approximate Areas	
Living area	2,600sf
Guest bedroom living area	700sf
Total **living** area	3,300sf
Garage	550sf
Lanai	900sf
Total area	4,750sf

All figures are approximate and should be used only for conceptual planning purposes.

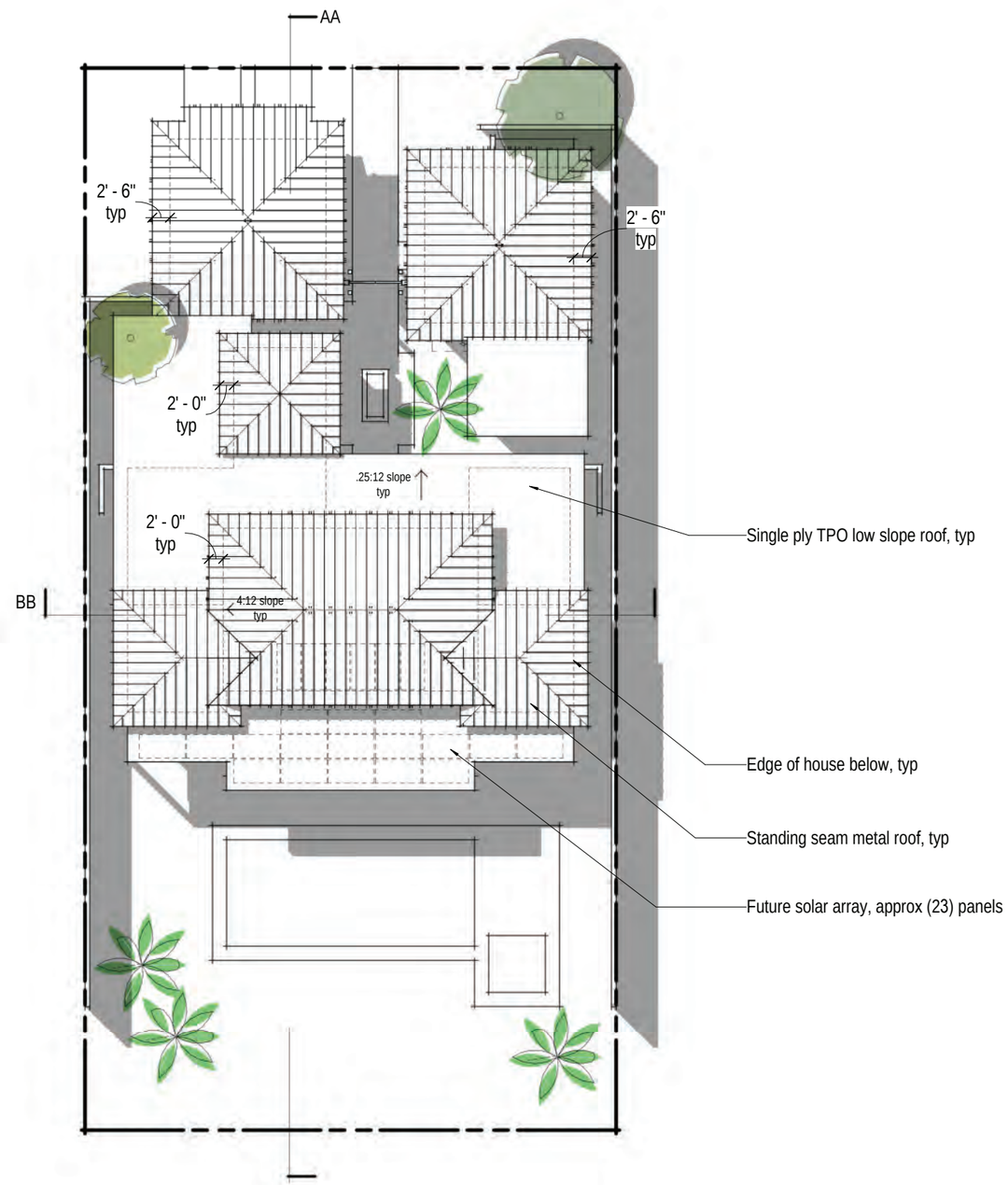


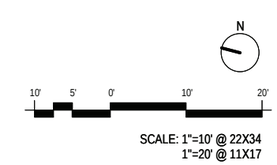
SCALE: 1"=10' @ 22X34
1"=20' @ 11X17

Typical Residence Floor Plan

Wailea SF-S

05/12/2020

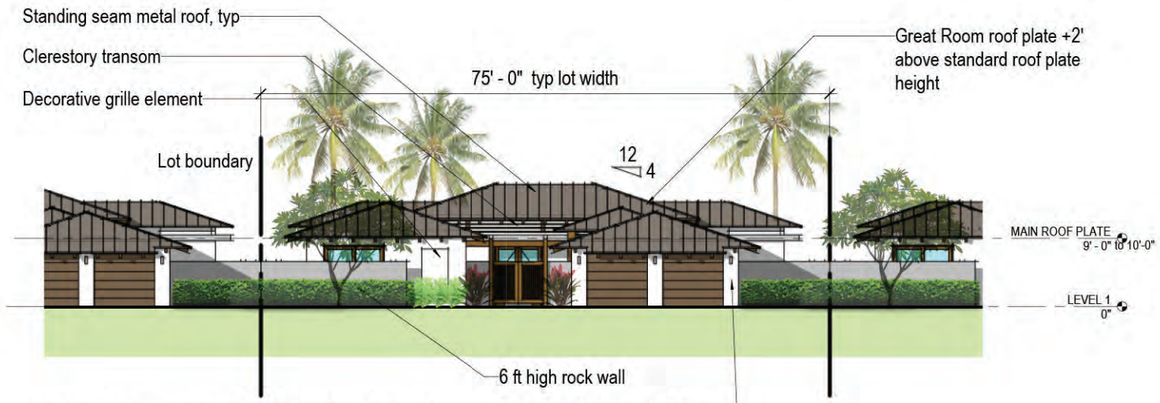




Typical Residence Roof Plan

Wailea SF-S

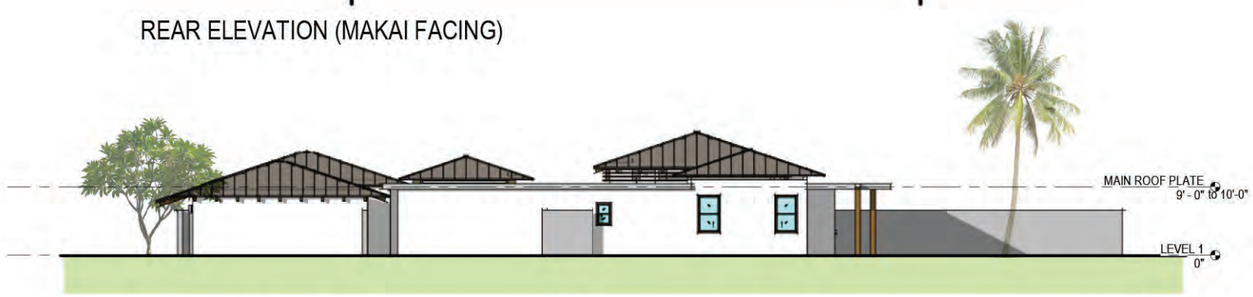
05/12/2020



FRONT ELEVATION (MAUKA FACING)

LEFT ELEVATION

REAR ELEVATION (MAKAI FACING)



RIGHT ELEVATION

Stucco or EIFS, light color

Rock walls

Pool and deck

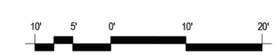
Standing seam metal roof

Front door

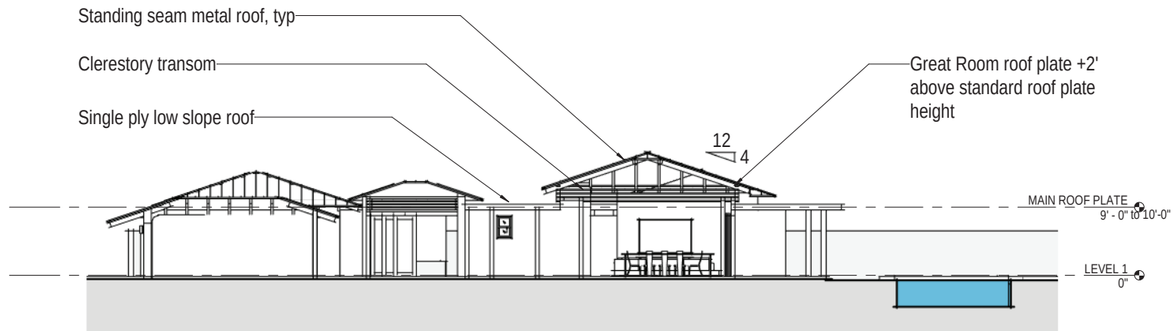
Lanai ceiling

Sliding doors

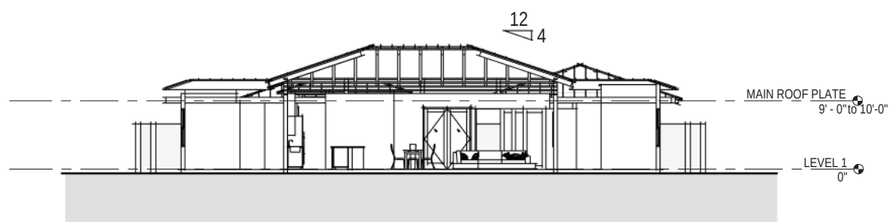
Material Considerations



SCALE: 1"=10' @ 22X34
1"=20' @ 11X17



SECTION AA



SECTION BB

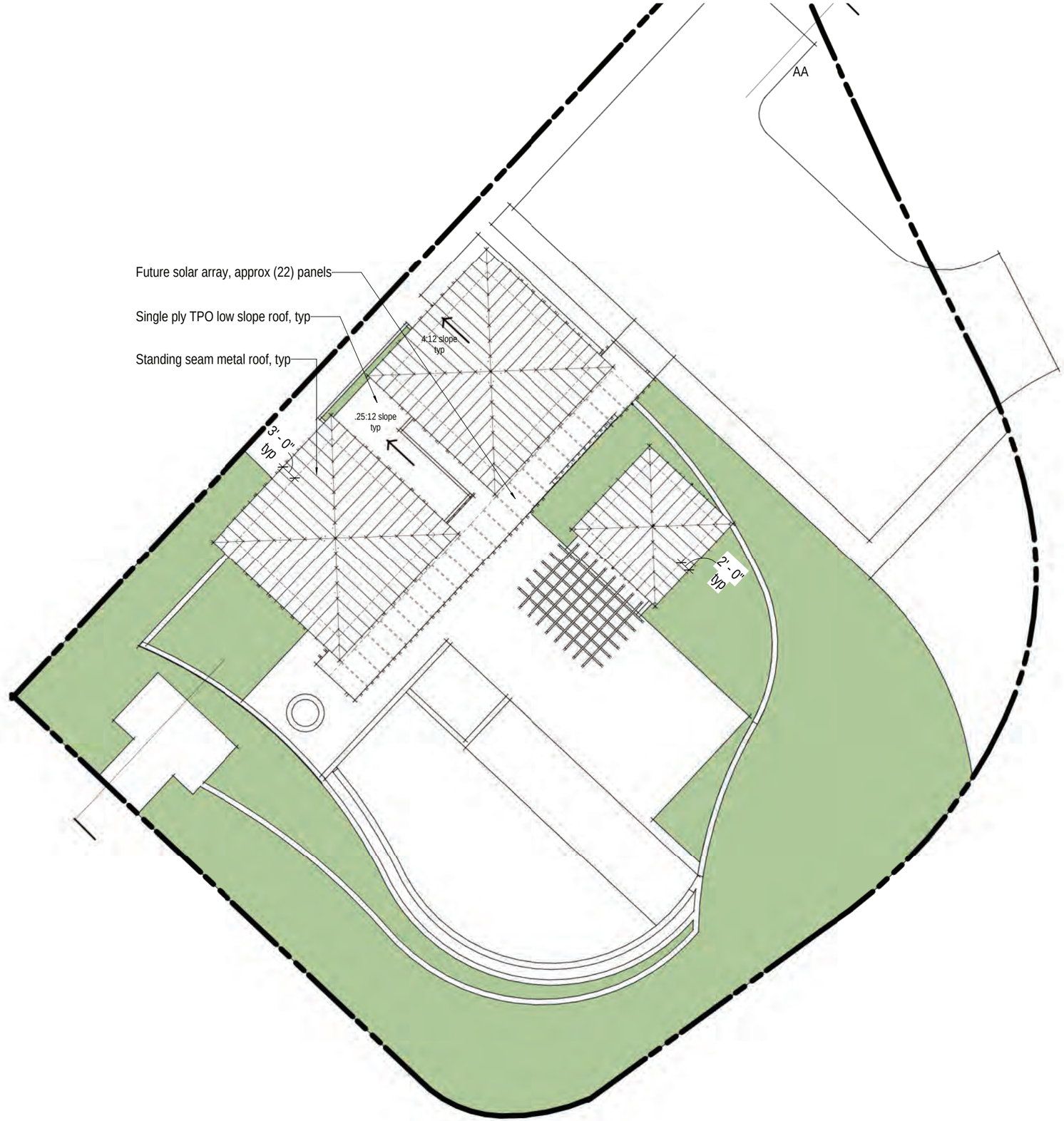
SCALE: 1"=10' @ 22X34
1"=20' @ 11X17

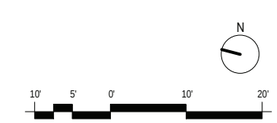
Shade Tolerant
Interior Plantings
Palms, Such As:
-Loulu
Screen Planting, Such As:
-Beef Steak Plant
Screen Planting, Such As:
-Naupaka
Small Tree, Such As:
-Beach Heliotrope
Flowering Accent Hedge,
Such As:
-Bougainvillea
Screen Hedge, Such As:
-Aalii
Lawn
Accent Shrubs, Such As:
- Purple Spider Lily
- Bird of Paradise
- Agave
- Philodendron
Specimen Tree Such As:
- Variegated Hala
Palms Such As:
- Coconut
Street / Parking Lot Tree
Such As:
- Rainbow Shower
Groundcover Such As:
- Lauae Fern
- Akia
-Pohinahina
- Variegated Dianella
Accent Tree Such As:
- Sea Grape
- Beac Heliotrope
Flowering Accent Tree
Such As:
- Plumeria
activity lawn
pool equip bldg
terraced planters
fire pit
fitness
lockers
lockers
parcel storage
mens
womens
office
pool
shallow lounge area
pool deck
bbq area
11 parking spaces
ADA
Loading
198
200
210
220
230
234
240
SCALE: 1" = 20'

Amenity Center Floor Plan

Wailea SF-S

05/12/2020





SCALE: 1"=10' @ 22X34
1"=20' @ 11X17

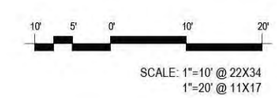
Amenity Center Roof Plan

Wailea SF-S

05/12/2020

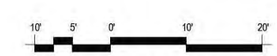
FRONT ELEVATION

LEFT ELEVATION

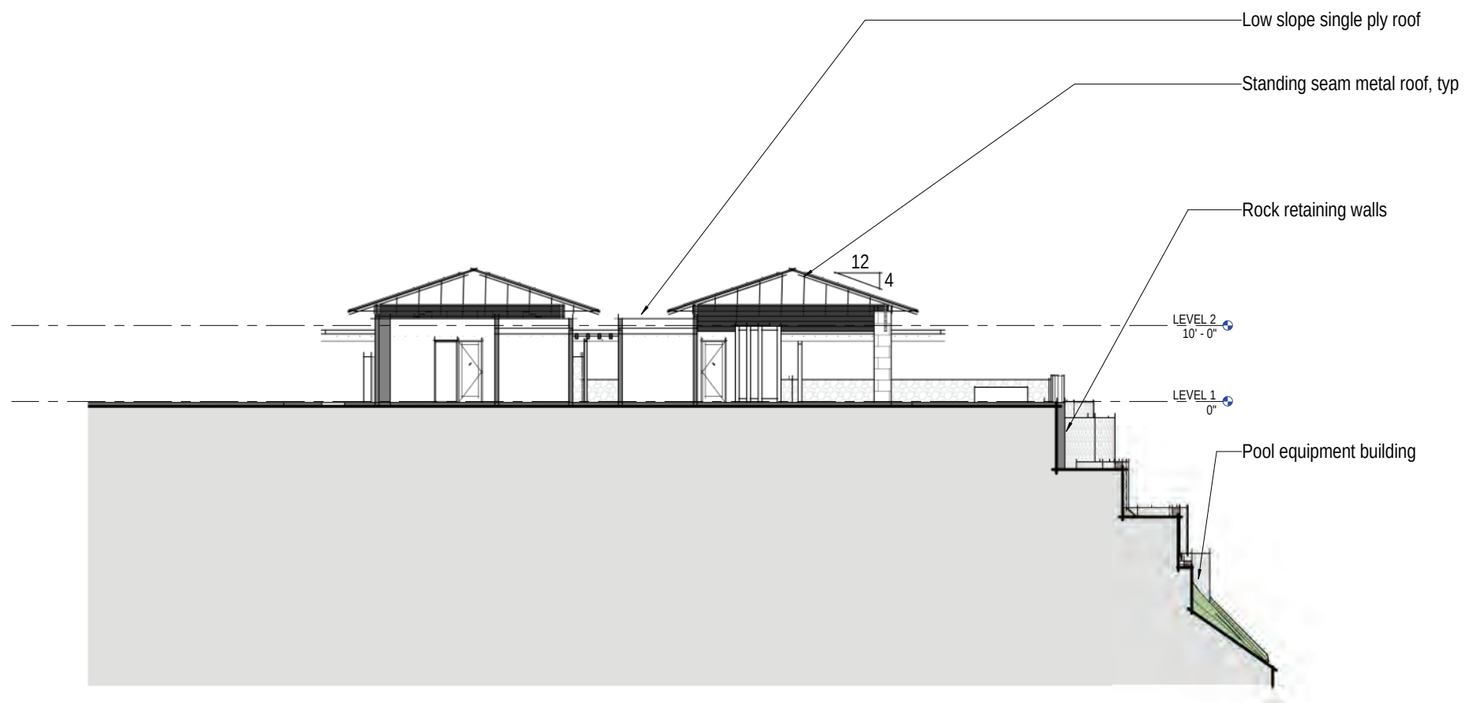


REAR ELEVATION

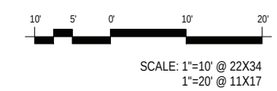
RIGHT ELEVATION

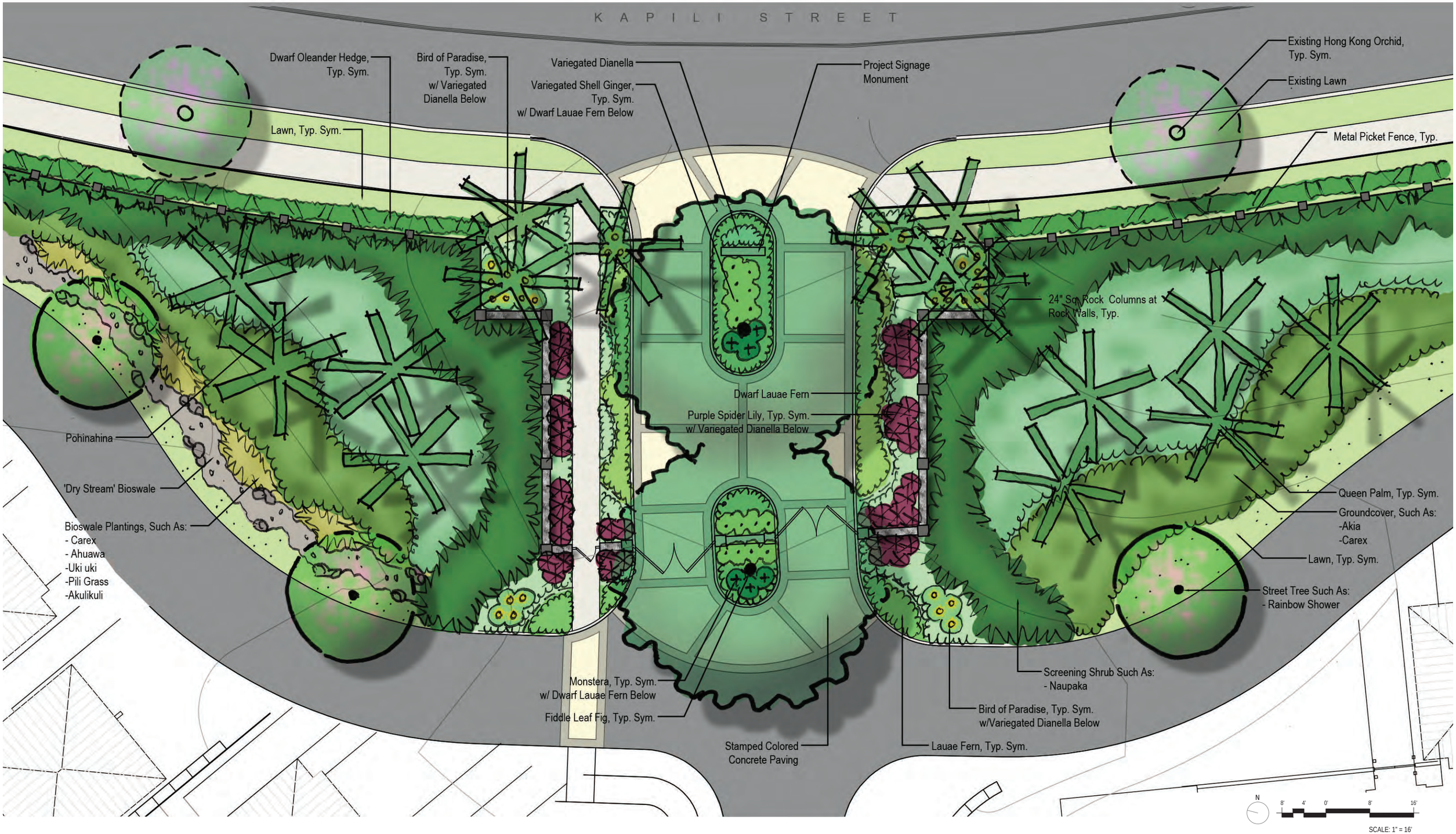


SCALE: 1"=10' @ 22X34
1"=20' @ 11X17


Low slope single ply roof
Standing seam metal roof, typ
Rock retaining walls
12
4
LEVEL 2
10' - 0"
LEVEL 1
0"
Pool equipment building

SECTION AA


10'
5'
0'
10'
20'
SCALE: 1"=10' @ 22X34
1"=20' @ 11X17

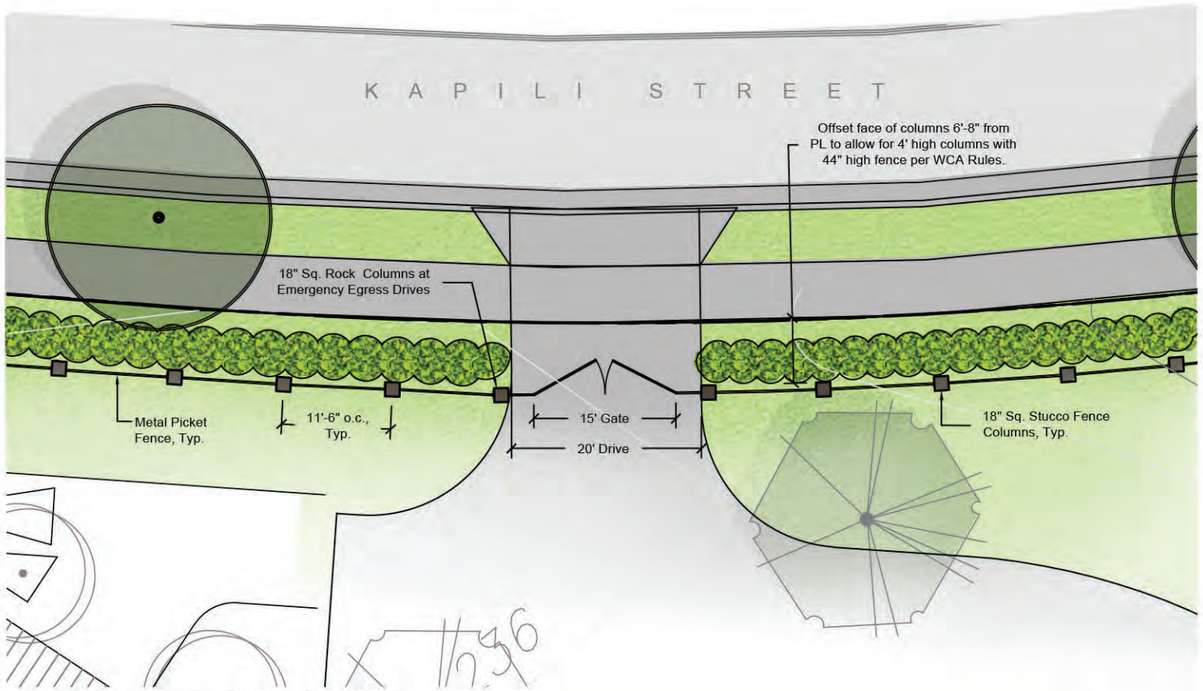


Main Entry Landscape Plan
Wailea SF-S
05/12/2020

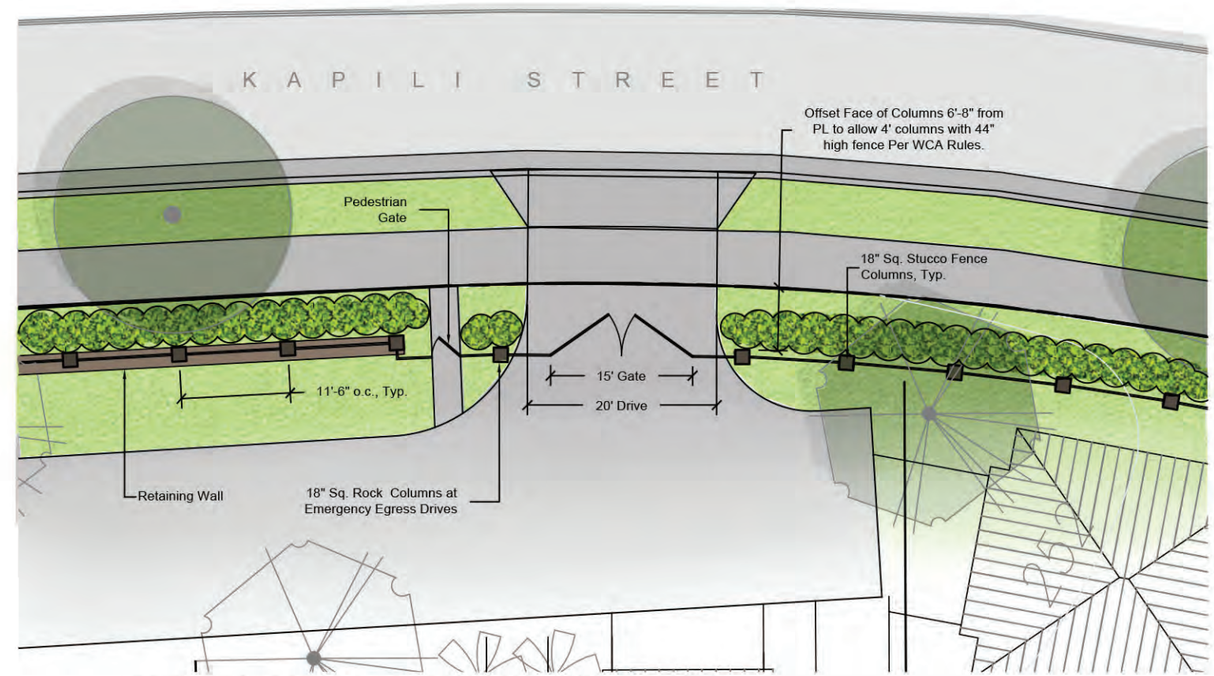
Main Entry Elevation at Signage Monument
Scale: 1/8"=1'-0"

Main Entry Elevation at Vehicular Gates
Scale: 3/16"=1'-0"

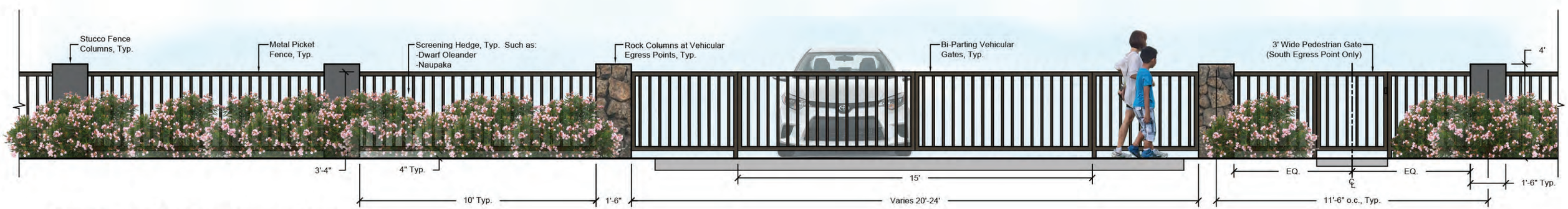
Note: All dimensions approximate, subject to final plan approval



Emergency Egress @ Lots 4 & 5
Scale: 1/16"=1'-0"

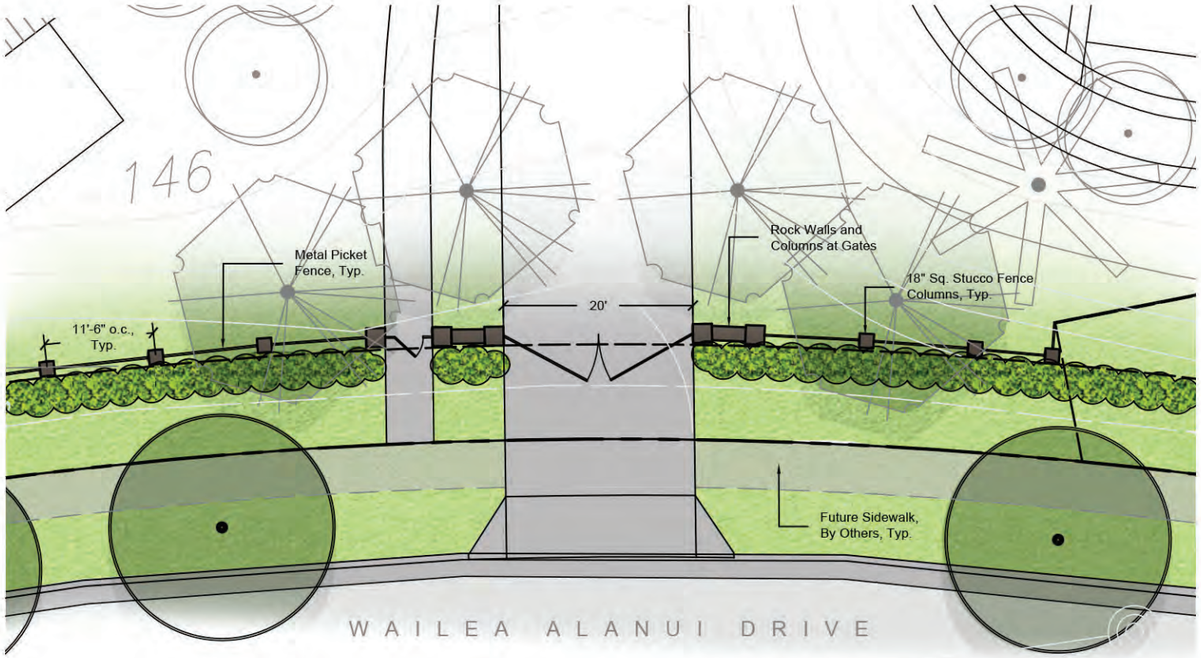


Emergency Egress @ Lots 56 & 57 & Kapili St. Retaining Wall
Scale: 1/16"=1'-0"

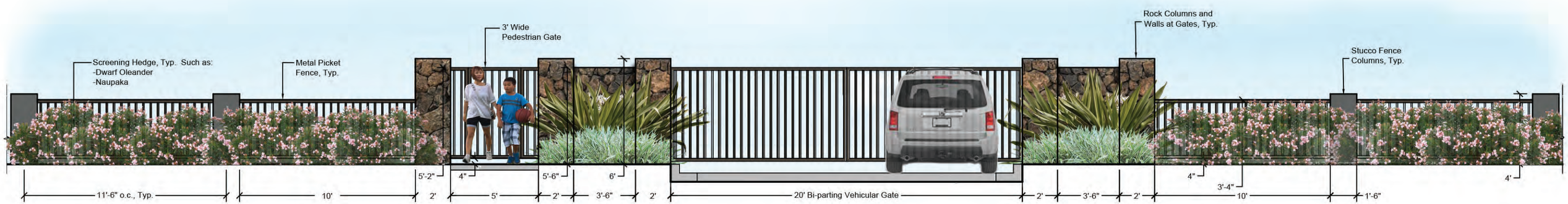


Typical Elevation: Kapili Street Emergency Egress
Scale: 1/4"=1'-0"

Note: All dimensions approximate, subject to final plan approval

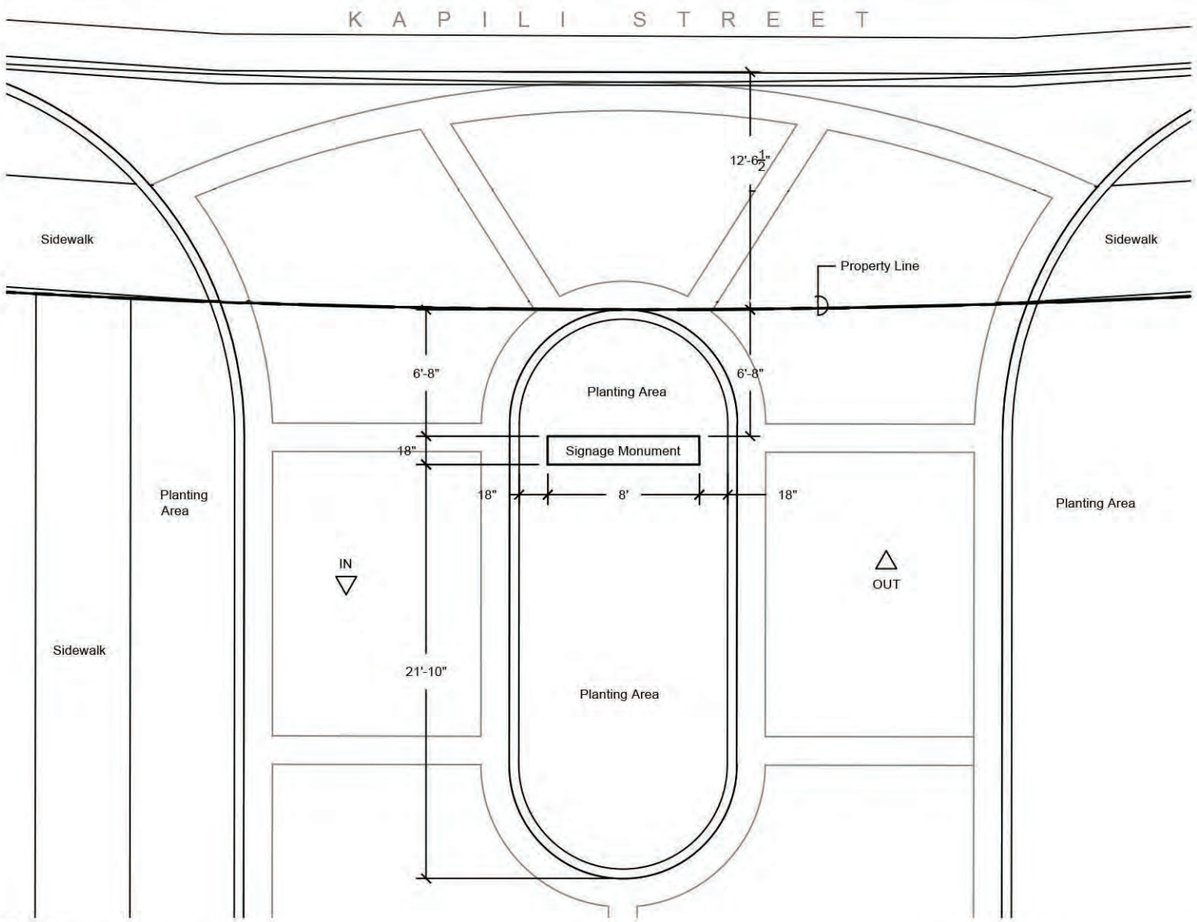


Emergency Access @ Wailea Alanui Drive
Scale: 1/16"=1'-0"



Elevation @ Wailea Alanui Drive Emergency Access
Scale: 3/16"=1'-0"

Note: All dimensions approximate, subject to final plan approval

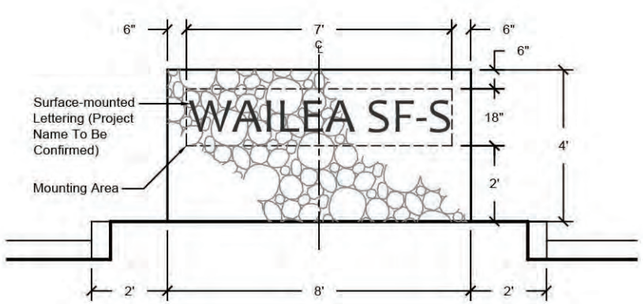


Plan
Scale: 1/8"=1'-0"

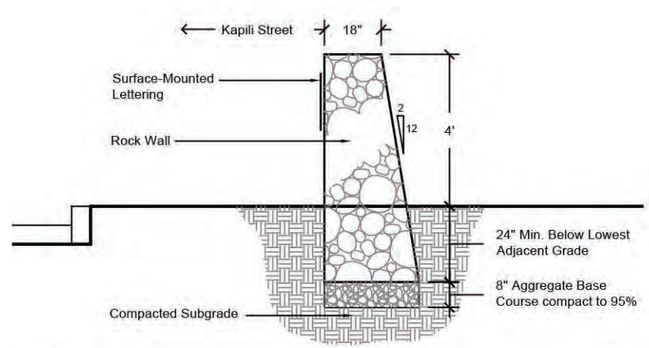
Concept Rendering
Scale: 1/2"=1'-0"

Material Sample Image: Rock
Scale: Not to Scale

Material Sample Image: Corian "White Jasmine"
Scale: 1"=1"



Elevation
Scale: 1/4"=1'-0"



Section
Scale: 1/4"=1'-0"

Note: All dimensions approximate, subject to final plan approval

STREETSCAPE

Queens White Shower (Cassia x nealiae)
Field Stock, 12' Height
Street Tree

Rainbow Shower (Cassia x nealiae)
Field Stock, 12' Height
Street Tree

Fiddle Leaf Fig (Ficus lyrata)
Field Stock
Specimen Tree

Queen Palm (Syagrus romanzoffi-ana) Field Stock
Specimen Palm

Dwarf Oleander (Nerium oleander)
3 Gal
Accent Hedge

Carex (Carex wahuensis)
6" Pot
Bioswale

Pili Grass (Heteropogon contortus)
6" Pot
Bioswale

Ukiuki (Dianella sandwicensis)
6" Pot
Bioswale

Ahuawa (Cyperus javanicus)
6" Pot
Bioswale

Akulikuli (Sesuvium portulacastrum)
6" Pot
Bioswale

COASTAL DRYLAND

Sea Grape (Coccoloba uvifera)
15 Gal, 6'-7' Height
Shade Tree

Thornless Kiawe (Prosopis pallida)
Field Stock, 12' Height
Shade Tree

Coconut Palm (Cocos nucifera)
Field Stock, 10' Min Trunk Height
Major Palm

Loulu (Pritchardia Spp.)
15 Gal, 6'-7' Height
Accent Palm

Bird of Paradise (Strelitzia reginae) 3 Gal
Accent Shrub

Naupaka (Scaevola taccada)
3 Gal
Screening Shrub

Akia (Wikistroemia uva-ursi)
6" Pot
Groundcover

Pohinahina (Vitex rotundifolia)
6" Pot
Groundcover

Ulei (Osteomeles anthyllidifolia)
6" Pot
Groundcover

Varieagated Dianella (Dianella tasmanica variegata) 6" Pot
Groundcover

COURTYARD LUSH

Singapore Plumeria (Plumeria obtusa)
15 Gal, 6'-7' Height
Flowering Tree

Yellow Plumeria (Plumeria rubra)
15 Gal, 6'-7' Height
Flowering Tree

Rhapis Palm (Rhapis excelsa)
3 Gal
Screening Shrub

Variegated Shell Ginger (Alpinia zerumbet) 3 Gal
Screening / Accent Shrub

Aalii (Dodonaea viscosa)
3 Gal
Hedge

Tiare Gardenia (Gardenia taitensis)
3 Gal
Hedge

Lobster Claw Heliconia (Heliconia rostrata)
3 Gal
Tropical Accent

Monstera (Monstera deliciosa)
3 Gal
Tropical Accent

Red Ginger (Alpinia purpurata)
3 Gal
Tropical Accent

Lauae Fern (Microsorum grossum)
6" Pot
Groundcover

Xanadu Philodendron
6" Pot
Groundcover

Purple Spider Lily (Crinum asiaticum) 3 Gal
Accent Shrub

FIRE BUFFER

Site type	Common name (Hawaiian)	Scientific name
Seasonal woodland	ʻAʻaliʻi	*Dodonaea viscosa*
	ʻEmoloa	*Eragrostis variabilis*
	Heupueo	*Agrostis avenacea*
	ʻIliahi	*Santalum paniculatum*
	Kupaoa	*Dubautia ciliolata*
	Koʻokoʻolau	*Bidens hawaiiensis*
	Kolea	*Myrsine lanaiensis*
	Mamane	*Sophora chrysophylla*
	Naio	*Myoporum sandwicense*
	Neleau	*Rhus sandwicensis*
	Naupaka kīlauea	*Scaevola kilaueae*
	ʻOhelo	*Vaccinium reticulatum*
	Pawale	*Rumex skottsbergii*
	Pua kala	*Argemone glauca*
	ʻUlei	*Osteomeles anthyllidifolia*
Coastal	ʻAwikiwiki	*Canavalia hawaiiensis*
	Pili	*Heteropogon contortus*
	Konakona	*Panicum nephelophilum*
	Kaioio	*Panicum pellitum*
	ʻIlima	*Sida fallax*
	ʻOhai	*Sesbania tomentosa*

Citation: Tunison, J.T., C.M. D'Antonio, and R.K. Loh. 2001. Fire and invasive plants in Hawaiʻi Volcanoes National Park. Pages 122–131 *in* K.E.M. Galley and T.P. Wilson (eds.). Proceedings of the Invasive Species Workshop: the Role of Fire in the Control and Spread of Invasive Species. Fire Conference 2000: the First National Congress on Fire Ecology, Prevention, and Management. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, FL.

EXISTING

PROPOSED

View Study 1
Wailea SF-S
05/12/2020

EXISTING

PROPOSED

View Study 2
Wailea SF-S
05/12/2020

EXISTING

PROPOSED

View Study 3
Wailea SF-S
05/12/2020

EXISTING

PROPOSED

View Study 4
Wailea SF-S
05/12/2020

EXISTING

PROPOSED

View Study 5
Wailea SF-S
05/12/2020

EXISTING

PROPOSED

View Study 6
Wailea SF-S
05/12/2020

PRELIMINARY ENGINEERING AND DRAINAGE REPORT

APPENDIX

C

Established 1969

Preliminary Engineering Report

WAILEA SF-S DEVELOPMENT

Wailea, Maui, Hawaii
TMK: (2) 2-1-008:145

Prepared For: Ledcor Development LP
590 Lipoa Parkway, Suite 259
Kihei, Maui, Hawaii 96753

WARREN S. UNEMORI ENGINEERING, INC.
Civil and Structural Engineers – Land Surveyors
Wells Street Professional Center – Suite 403
2145 Wells Street
Wailuku, Maui, Hawaii 96793

May 14, 2020

TABLE OF CONTENTS

Page

1. INTRODUCTION

1.1 Purpose 1-1

1.2 Project Description 1-1

2. ROADWAY IMPROVEMENTS

2.1 Existing Conditions 2-1

2.2 Proposed Improvements 2-1

2.2.1 Vehicular Access 2-1

2.2.2 Bike and Pedestrian Access 2-2

Figure 2-1 Access Plan

Figure 2-2 Spine Road Sections

Figure 2-3 Side Street Sections

3. STORM DRAINAGE

3.1 Existing Conditions 3-1

3.1.1 Topography and Soils 3-1

3.1.2 Flood and Tsunami Zone 3-2

3.1.3 Existing Drainage Conditions 3-2

Table 3-1 Pre-Development Drainage Summary

3.2 Drainage Plan 3-4

3.2.1 Projected Increase in Runoff Due to Development 3-4

3.2.2 Proposed Improvements 3-4

3.2.3 Post-Development Condition 3-5

Table 3-2 Post-Development Drainage Summary

Figure 3-1 Soil Survey Map

Figure 3-2 Existing Drainage Condition

Figure 3-3 Drainage Plan

4. WATER

4.1 Demand 4-1

4.1.1 Domestic Consumption 4-1

4.1.2 Fire Protection 4-1

4.2 Existing Infrastructure and Needed Improvements 4-2

4.2.1 Water Source 4-2

4.2.2 Storage Reservoirs 4-2

4.2.3 Distribution System 4-3

4.3 Provisions for Future R-1 Reclaimed Water Use 4-4

Figure 4-1 Water System Plan

5. WASTEWATER

5.1 Projected Demand 5-1

5.2 Existing Infrastructure and Needed Improvements 5-1

Figure 5-1 Sanitary Sewer Plan

6. POWER AND TELECOMMUNICATIONS

6.1 Existing Conditions 6-1

6.2 Project Requirements 6-1

6.2.1 Maui Electric Company 6-2

6.2.2 Hawaiian Telcom 6-3

6.2.3 Spectrum 6-3

6.3 Site Lighting Plan 6-4

6.4 Cost of Improvements 6-5

Figure 6-1 Electrical Site Plan

Figure 6-2 Lighting Details

APPENDIX A - Drainage Calculations

A-1 DLNR Flood Hazard Assessment Report for TMK 2-1-008: 145

A-2 Pre-Development Runoff Calculations

Table A-2 Pre-Development Drainage Summary

A-3 Post-Development Runoff Calculations

Table A-3 Post-Development Drainage Summary

A-4 Detention / Retention Basin Sizing Calculations

Table A-4 Minimum Storage Capacities for Detention / Retention Facilities

A-5 Stormwater Quality Calculations

Table A-5 Minimum 48 hr. Retention Capacity Needed to Meet Maui County Stormwater Quality Requirements

APPENDIX B - Potable Water Calculations

B-1 Projected Daily Water Demand

B-2 Domestic Water Storage Capacity Calculation

B-3 Preliminary Water Meter Sizing Calculation

APPENDIX C - Wastewater Demand Calculation

APPENDIX D - Electrical System References

D-1 MECo Reference Drawings

D-2 Preliminary Cost Estimate

V:\Projdata\19proj\19026\Reports\Prelim Engineering Report\Table of Contents_00.wpd

Preliminary Engineering Report

for

Wailea SF-S Development

1. INTRODUCTION

1.1 Purpose

This report discusses the existing condition of the Wailea SF-S project site and the infrastructure improvements needed to support the proposed development plan.

1.2 Project Description

Wailea SF-S will consist of a single 23.104 acre land parcel located within South Maui's Wailea Resort on which developer Ledcor proposes to create a condominium development consisting of 57 single-family homes. The project parcel is located south of Kilohana Drive and north of the Wailea Kialoa subdivision between Wailea Alanui Drive and Kapili Street.

2. ROADWAY IMPROVEMENTS

2.1 Existing Conditions

The Wailea SF-S site is accessible from either County-owned Wailea Alanui Drive or privately-owned[1] Kapili Street. Both streets possess the same physical cross-section, consisting of a 36-foot wide pavement[2]; two 12-foot wide curbed shoulders; and a single, six-foot wide sidewalk located on the makai shoulder. Both are two-lane roads; however, Wailea Alanui Drive has striped, curbside bike lanes while Kapili Street does not.

2.2 Proposed Improvements

2.2.1 Vehicular Access

The Wailea SF-S development proposes to utilize the four access points identified on Figure 2-1 for access. These include one primary, full-movement driveway on Kapili Street; two limited access (emergency exit-only) driveways on Kapili Street; and one limited access (emergency-only) driveway on Wailea Alanui Drive.

Internal access to each homesite will be provided by 20-foot wide paved driveways branching from a central spine road, as depicted on Figure 2-1. Figures 2-2 and 2-3 illustrate the typical roadway sections that will be used.

---

[1]Kapili Street, TMK 2-1-008: 147, is owned by A&B Wailea LLC.

[2]36 feet measured curb-to-curb

2.2.2 Bike and Pedestrian Access

A 5-foot wide paved sidewalk will be installed along the north side of the internal spine road to link Wailea Alanui Drive, Kapili Street and the Wailea SF-S Amenity Center building. A new pedestrian crosswalk will also be installed across Wailea Alanui Drive to create a safe linkage to both the sidewalk on the far side of the street and striped bike lanes. The internal spine road will also double as a bike route for residents who wish to cycle between Wailea Alanui Drive and Kapili Street.

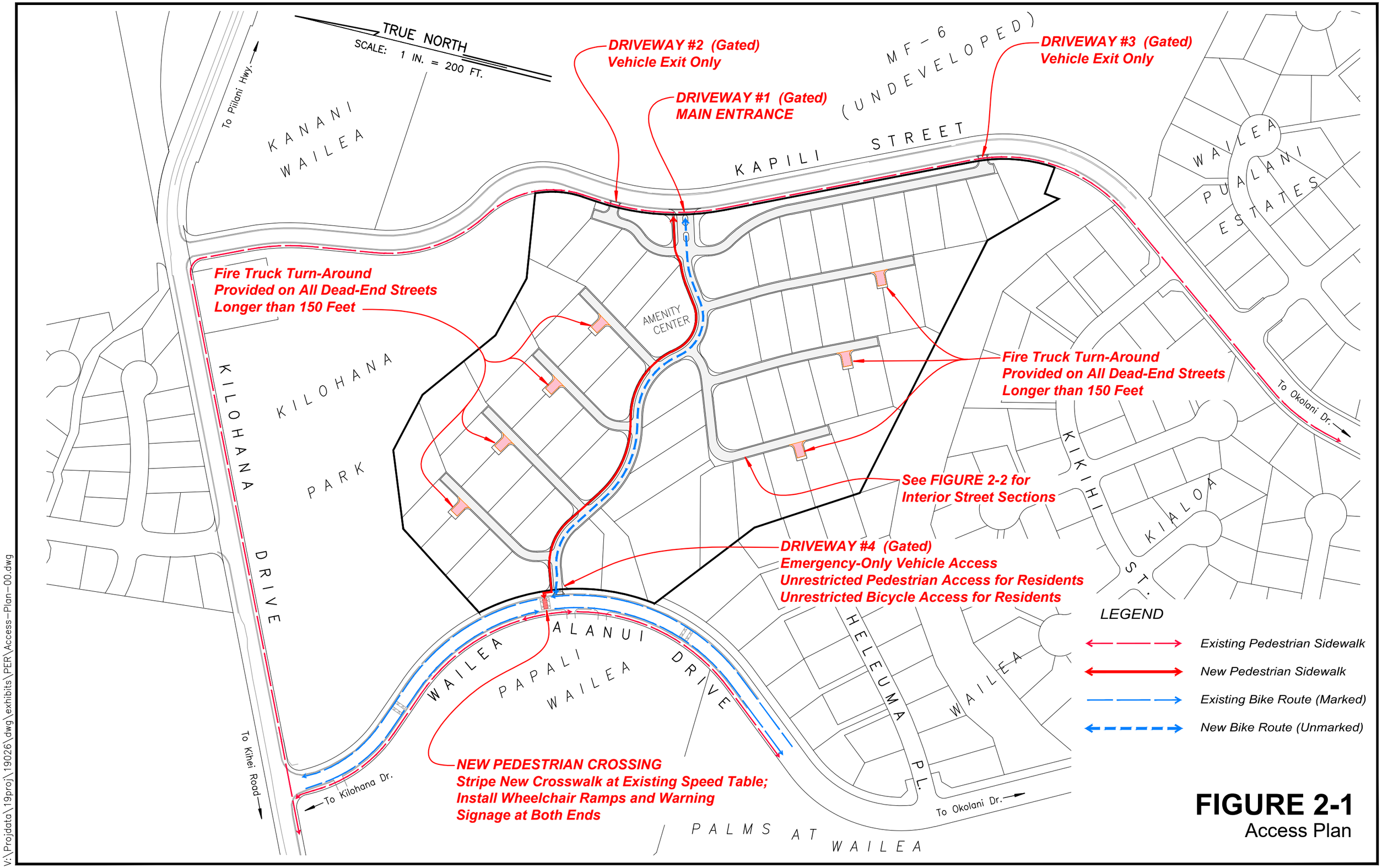
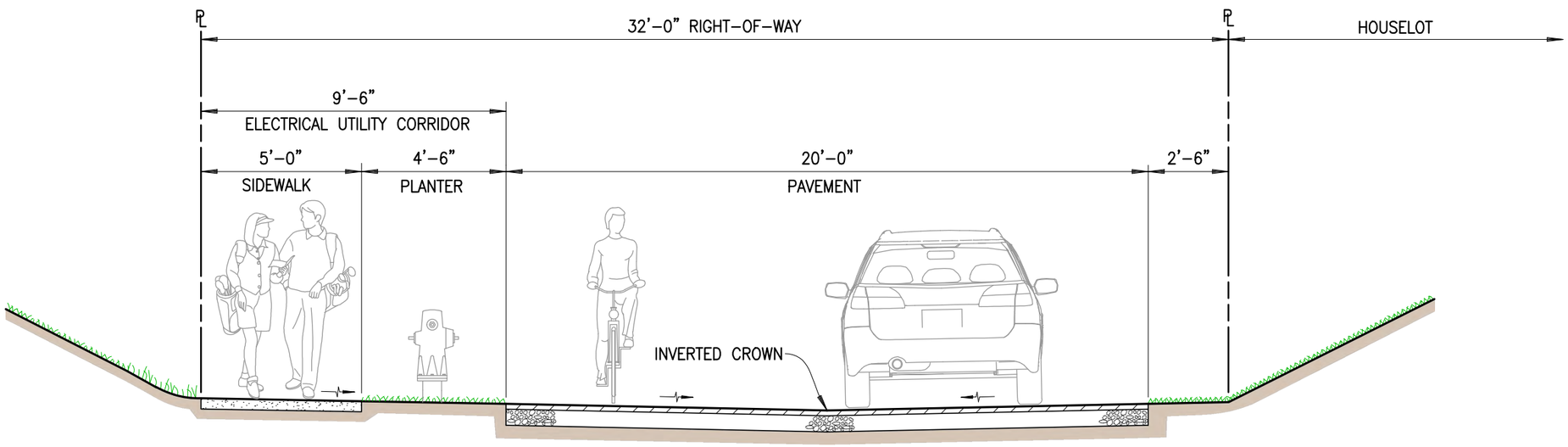


FIGURE 2-1
Access Plan

V:\Projdata\19proj\19026\dwg\exhibits\PER\Access-Plan-00.dwg

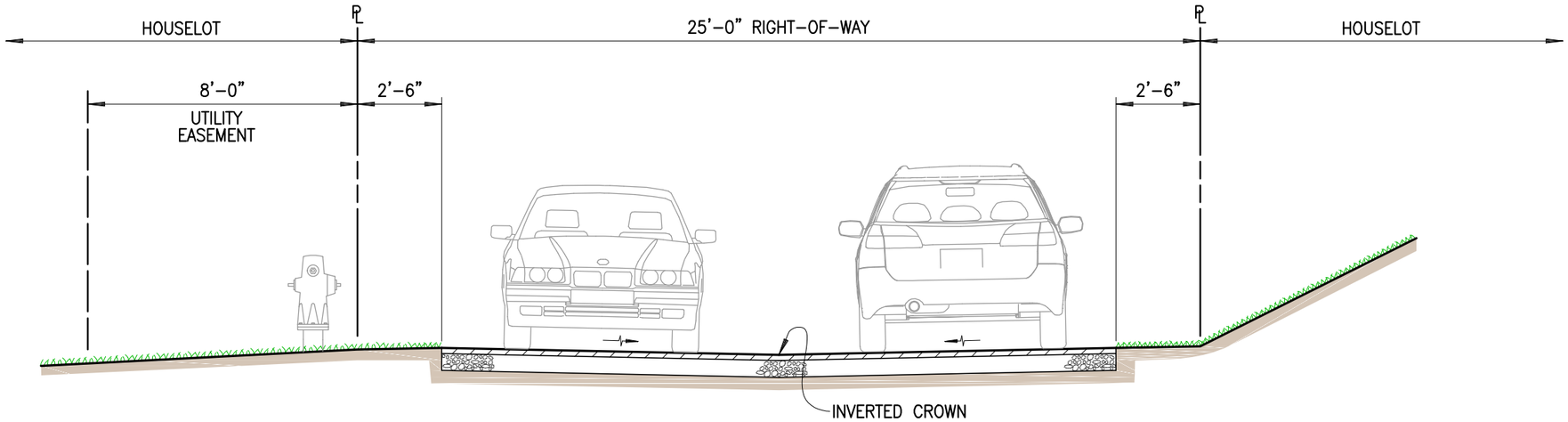


32 FT. RIGHT-OF-WAY SPINE ROAD

SCALE: 1 INCH = 4 FEET

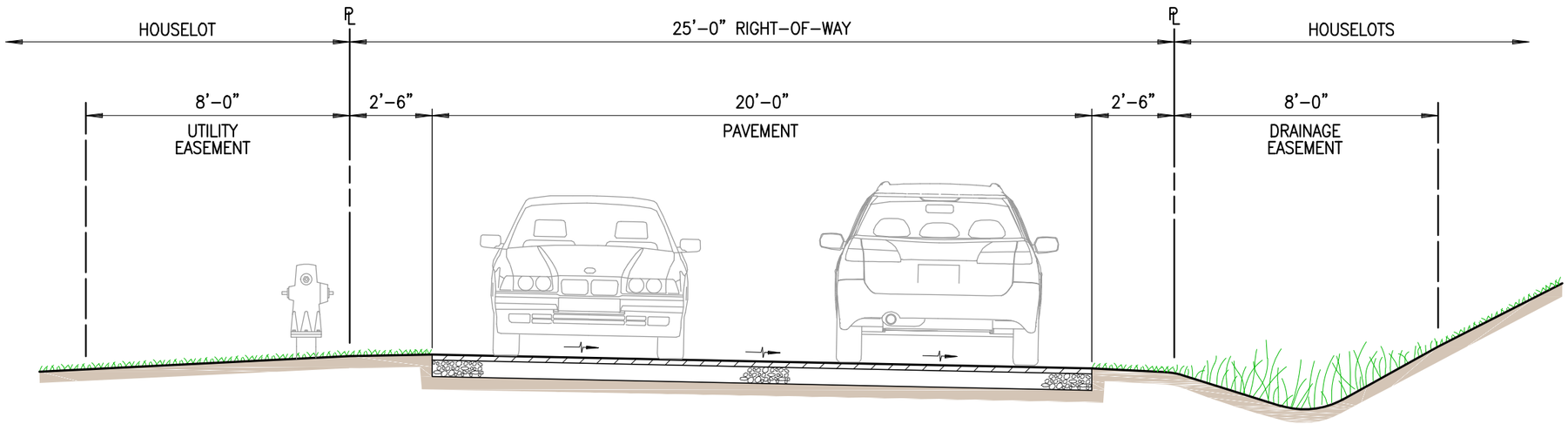
FIGURE 2-2
Internal Roadway Sections:
Spine Road

V:\Projdata\19proj\19026\dwg\exhibits\PER\typ-sect-00.dwg



25 FT. RIGHT-OF-WAY SIDE STREET

SCALE: 1 INCH = 4 FEET



ALTERNATIVE 25 FT. RIGHT-OF-WAY "GREEN STREET"

SCALE: 1 INCH = 4 FEET

FIGURE 2-3
Internal Roadway Sections:
Side Streets

V:\Projdata\19proj\19026\dwg\exhibits\PER\typ-sect-00.dwg

3. STORM DRAINAGE

3.1 Existing Conditions

3.1.1 Topography and Soils

The project site is currently undeveloped and not being used for any particular purpose.

The existing terrain within the project parcel slopes downward in an east-to-west direction at an average grade of approximately 10 percent. Elevations across the site range from 266 feet at its eastern edge along Kapili Street to 126 feet at its northwestern boundary along Kilohana Park. Two existing drainageways lie immediately to the north and south of the project site.

The USDA Natural Resources Conservation Service identifies two predominant soil types on the project site: (See Figure 3-1)

- Keawakapu extremely stony silty clay loam, 3 to 25 percent slopes (KNXD), having moderate permeability, slow to medium runoff, with a slight to moderate erosion hazard; and
- Makena loam, stony complex, 3 to 15 percent slopes (MXC), having moderately rapid permeability, slow to medium runoff, with a slight to moderate erosion hazard.[3]

[3] United States Department of Agriculture, Soil Conservation Service, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, August 1972, pp. 68 and 91, Maps 108-109.

3.1.2 Flood and Tsunami Zone

The Federal Emergency Management Agency's Flood Insurance Rate Map for Maui County locates the project site within Zone X, outside both the 500-year floodplain and tsunami zone.[4] A current DLNR Flood Hazard Assessment Report for the parcel can be found in Appendix A-1.

3.1.3 Existing Drainage Conditions

The existing 23.1 acre project site generates approximately 24.5 cfs of onsite surface runoff during a 10-year 1-hour storm which flows off of the project site in three directions. (See Figure 3-2)

1) Drainage Area 1 generates approximately 11.3 cfs of onsite surface runoff which sheet flows to an existing drainage gully located on the County-owned Kilohana Park site to the north of the project. The runoff then flows into an underground storm drain along Kilohana Drive; through an open drainageway crossing the Wailea Kai subdivision; through a culvert crossing at South Kihei Road; then into the ocean at Keawekapu Beach roughly 3,000 feet from the Wailea SF-S project site.
2) Drainage Area 2 generates approximately 4.5 cfs of onsite surface runoff which enters an 18" culvert crossing at Wailea Alanui. The runoff then

[4] U.S. Department of Homeland Security, Federal Emergency Management Agency, *Flood Insurance Rate Map, Maui County, Hawaii,* Community-Panel Number 150003 0391E, September 25, 2009.

passes into an open drainageway between the Palms at Wailea and Papali Wailea condominiums; past the Wailea Kai subdivision; through a culvert crossing at South Kihei Road; then into the ocean at Keawekapu Beach roughly 2,800 feet from the Wailea SF-S project site.

3) Drainage Area 3 generates approximately 8.7 cfs of onsite surface runoff which flows into the grassed drainage channel passing through the adjacent Wailea Kialoa Subdivision. The runoff then crosses under Wailea Alanui; through the Palms at Wailea; through the Wailea Kai subdivision; across South Kihei Road; and into the ocean at Keawekapu Beach roughly 3,000 feet from the Wailea SF-S project site.

Table 3-1 summarizes the existing flows.

TABLE 3-1

Pre-Development Drainage Summary

Drainage Area	Receiving Facility	Approx. Area Draining to Receiving Facility	Pre-Development Peak Runoff (10 yr / 1 hr)
1	Drainageway through Kilohana Park	10.8 Ac.	11.3 cfs
2	18" dia. Roadway Culvert at Wailea Alanui	4.2 Ac.	4.5 cfs
3	Drainageway through Wailea Kialoa Subd.	8.1 Ac.	8.7 cfs
Total		23.1 Ac.	24.5 cfs

3.2 Drainage Plan

3.2.1 Projected Increase in Runoff Due to Development

Once developed, the project site is expected to generate an onsite 10-year peak storm flow of 52.9 cfs -- an 28.4 cfs increase over its existing, undeveloped condition.[5]

3.2.2 Proposed Improvements

The project site will be graded so as to maintain the natural form of the hillside and the drainage pattern that now exists. Three different approaches to mitigating the post-development runoff will be implemented. (See Figure 3-3)

Drainage Area 1

Drainage Area 1 will employ "Green Streets" to capture and dispose of runoff where it is generated. Runoff from rooftops and pavements will be directed into green "bioretention strips" located along on one side of the street in which runoff will be held and allowed to percolate into the ground. Subsurface storage chambers will be used to augment the capacity of the bioretention strips and underground drainage piping will be installed as a safety precaution to handle overflows and prevent flooding during large storm events.

[5] See Post-Development runoff calculation in Appendix A-3.

Drainage Area 2

Drainage Area 2 will employ a conventional storm drainage system consisting of inlets and underground pipes to collect the runoff shed by rooftops and pavements and convey it to an underground stormwater detention structure located just upstream of the existing 18-inch culvert crossing at Wailea Alanui Drive that will serve as its discharge point.

Drainage Area 3

Drainage Area 3 will employ a combination of "Green Street" bioretention strips, subsurface storage chambers and a conventional open stormwater basin to provide the storage capacity necessary to mitigate post-development runoff. As with Drainage Area 1, underground drainage piping will be installed as a safety precaution to handle overflows and prevent flooding during large storm events.

3.2.3 Post-Development Condition

Peak Flow Mitigation

The onsite stormwater retention/detention facilities described above will mitigate the increase in peak flow attributable to development of the Wailea SF-S site, with the result that post-development flows discharged into each of the three

receiving storm drainage facilities downstream of Drainage Areas 1, 2 and 3 will either decrease or remain unchanged from the current, pre-development condition. Table 3-2 summarizes the post-development flows before and after mitigation.

TABLE 3-2

Post-Development Drainage Summary

Drainage Area	Receiving Facility	Approx. Area Draining to Receiving Facility	Pre-Development Peak Runoff (10 yr / 1 hr)	Post-Development Peak Runoff *BEFORE* Mitigation	Post-Development Peak Runoff *AFTER* Mitigation	Net Change in Peak Flow *AFTER* Mitigation
1	Drainage through Kilohana Park	10.6 Ac.	11.3 cfs	24.4 cfs	≤11.3 cfs	≤0.0 cfs
2	18" dia. Roadway Culvert at Wailea Alanui	4.1 Ac.	4.5 cfs	9.2 cfs	≤4.5 cfs	≤0.0 cfs
3	Drainageway through Wailea Kialoa Subd.	8.4 Ac.	8.7 cfs	19.3 cfs	≤8.7 cfs	≤0.0 cfs
Total		23.1 Ac.	24.5 cfs	52.9 cfs	≤24.5 cfs	≤0.0 cfs

Water Pollution Control

Stormwater will receive the following pollution control treatment before leaving the project site.

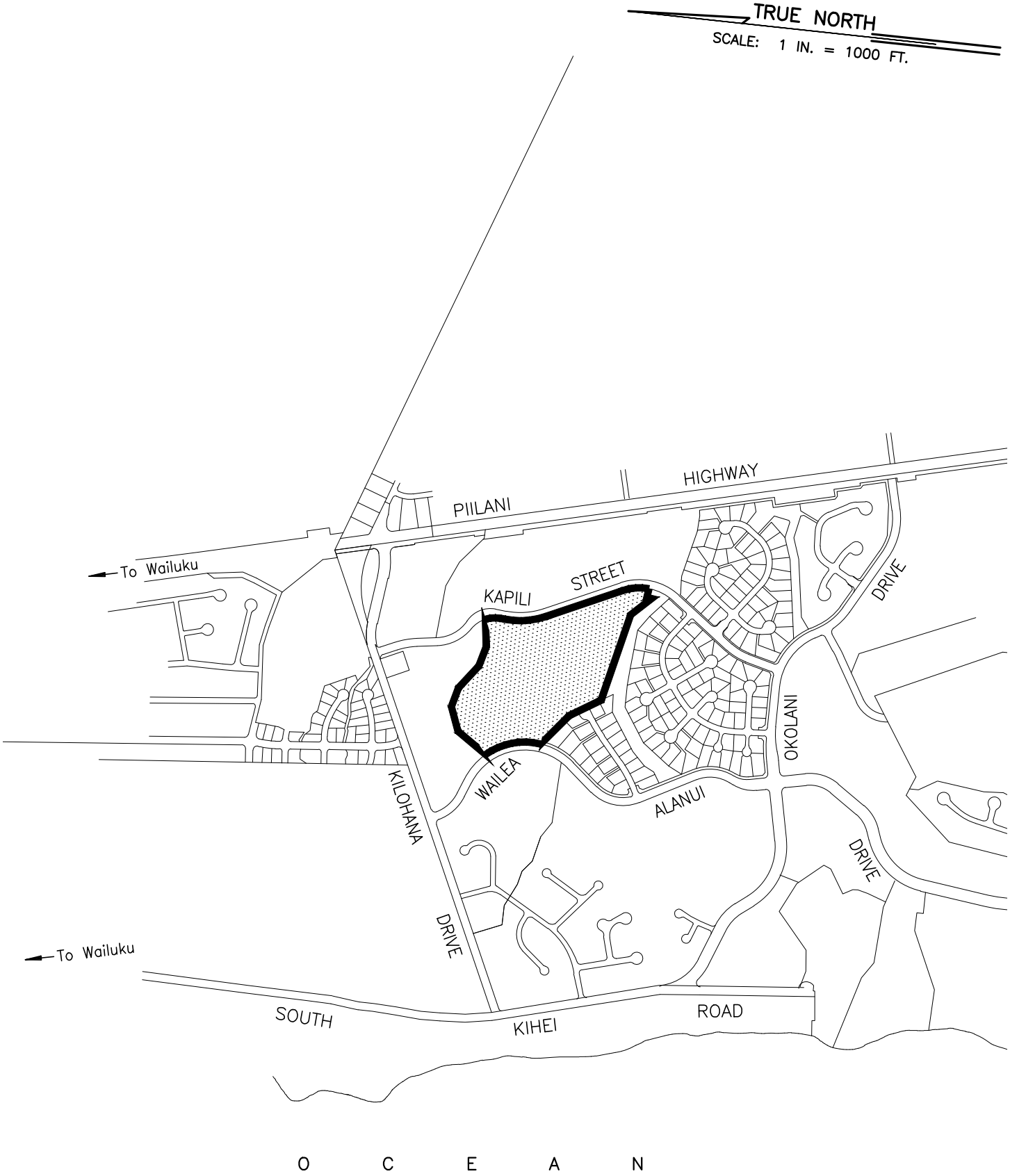
- Runoff within Drainage Area 1 and a portion of Drainage Area 3 will receive "flow through" treatment[6] by utilizing the roadside bioretention strips as vegetated filters.
- Runoff from Drainage Area 2 and a portion of Drainage Area 3 will receive "detention-based" treatment[7] whereby a requisite amount of stormwater will be held in stormwater basins for at least 48 hours before being discharged.[8]

---

[6] "Flow through" treatment defined in Maui County Dept. of Public Works, Title MC-15, Subtitle 01, Chapter 111, "Rules for the Design of Stormwater Treatment Best Management Practices", Section 15-111-5 (b).

[7]"Detention-based" treatment defined in Maui County Dept. of Public Works, Title MC-15, Subtitle 01, Chapter 111, "Rules for the Design of Stormwater Treatment Best Management Practices", Section 15-111-5 (a).

[8]See Table A-5 in Appendix A-5 for minimum required 48-hour detention volumes.



Source:
U.S. Department of Agriculture, Soil Conservation Service, "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii", 1972, Map Sheets 108–109.

FIGURE 3-1
Soil Survey Map

V:\Projdata\19proj\19026\dwg\exhibits\PER\Soil-Map-00.dwg

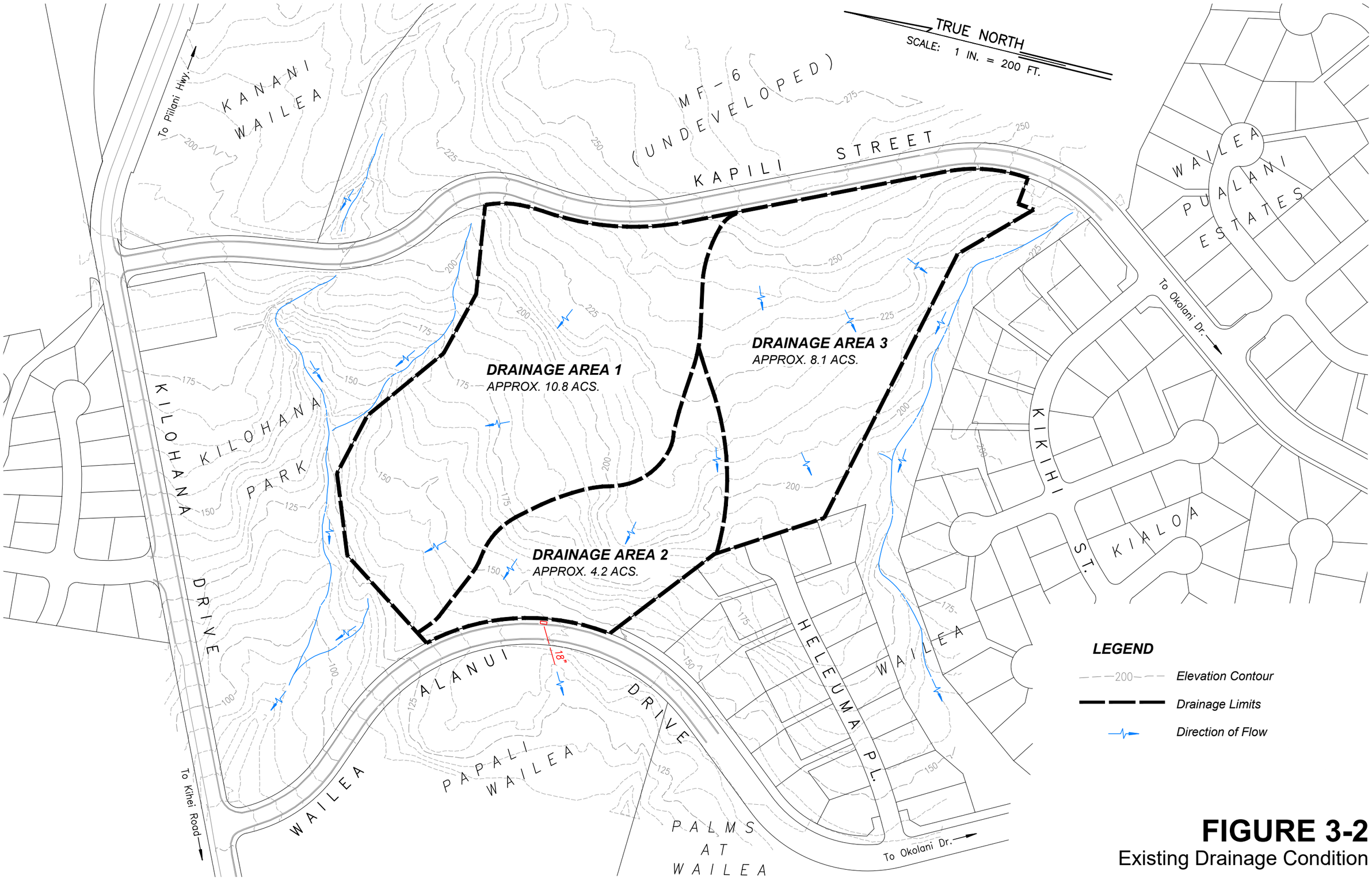


FIGURE 3-2
Existing Drainage Condition

V:\Projdata\19proj\19026\dwg\exhibits\PER\Pre-Drainage Area-00.dwg

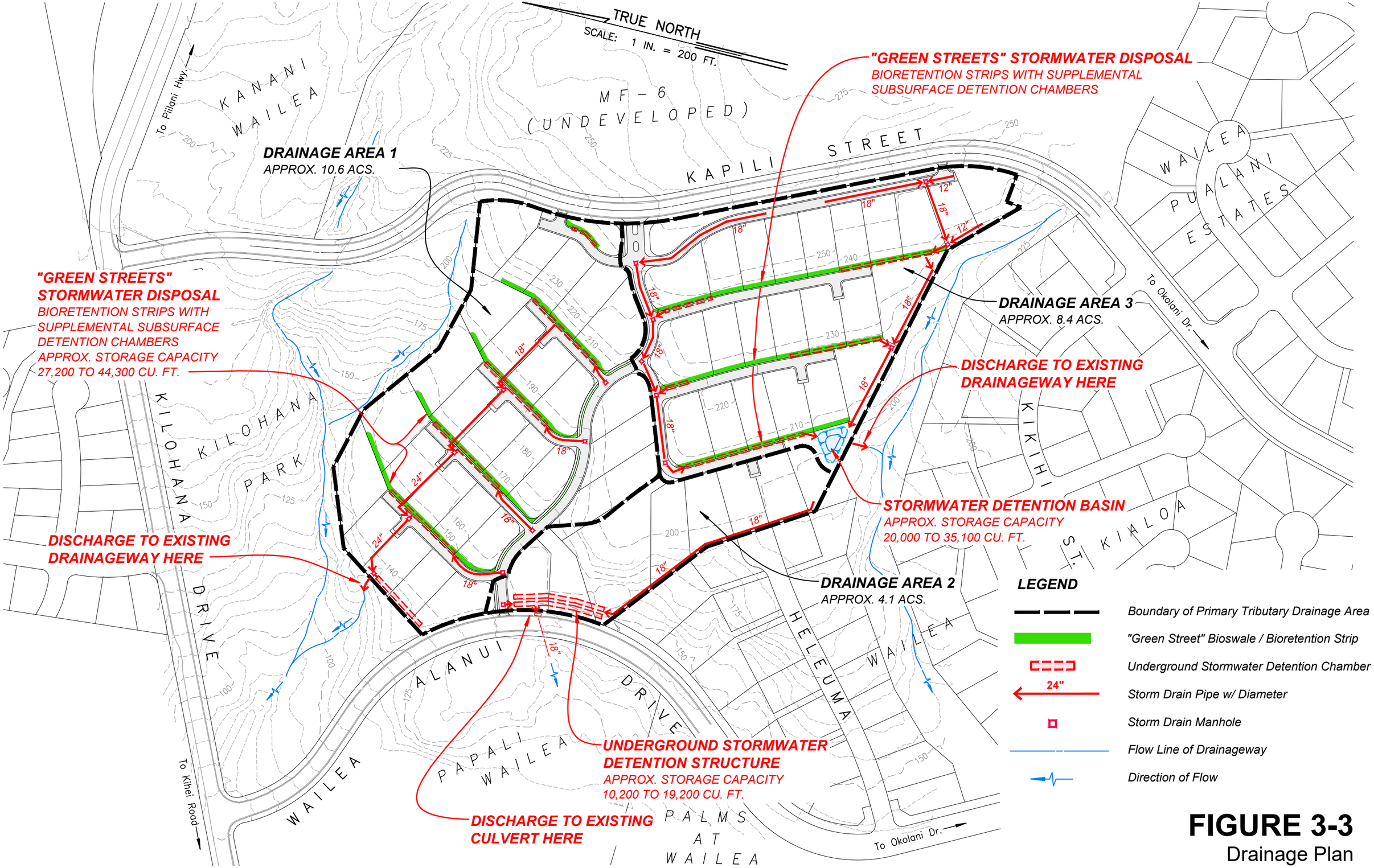


FIGURE 3-3
Drainage Plan

V:\Projdata\19proj\19026\dwg\exhibits\PER\Drainage-Plan-00.dwg

4. WATER

Potable water for drinking and fire protection will be supplied to the Wailea SF-S development by the Maui County Department of Water Supply (DWS) from its Central Maui water system.

4.1 Demand

4.1.1 Domestic Consumption

The proposed condominium complex is expected to consume an average 36,000 gallons per day (gpd) of potable water.[9]

4.1.2 Fire Protection

A fire flow of 1,000 gallons per minute (gpm) sustainable for 2 hours is required to protect the single-family homes within the development.[10] The Amenity Center public building *may* require a higher fire flow depending upon its fire-resistance and whether it is sprinklered.

---

[9] See Appendix B-1 for potable water demand calculation.

[10]Required fire flow specified for single-family homes by Maui County Code Section 14.05.090.D (Fire Protection) and Maui County Department of Water Supply *Water System Standards*, 2002, Table 100-19, p.111-4.

4.2 Existing Infrastructure and Needed Improvements

4.2.1 Water Source

The water sources from which the Dept. of Water Supply will use to supply the project site include groundwater wells located in Wailuku, Waiehu and Waihee which draw water from the Iao Aquifer. Surface water flows from the irrigation ditch system operated by Wailuku Water Company are also utililized. No source improvements are proposed by the Wailea SF-S project.

4.2.2 Storage Reservoir

The project site will be supplied from both the Dept. of Water Supply's existing 3.0 million gallon (MG) capacity Wailea Mid-Level storage tank located along Kalai Waa Street at an elevation of 353 feet and A&B Wailea's 1.0 MG capacity Upper-Level storage tank located within Wailea 670 at elevation 541 feet.[11] A 17-mile long transmission line brings water from DWS' well sources in Waiehu and Waihee to fill these tanks. The 1.0 MG Upper- and 3.0 MG Mid-Level tanks together provide the necessary water pressure[12],

[11]A&B Wailea LLC is currently working to dedicate the 1.0 MG Upper-Level storage tank and its associated pipelines to the Maui County Department of Water Supply.

[12]Static water pressure will range between 58 psi and 100 psi as indicated on Figure 4-1.

domestic storage capacity[13] and fire protection storage capacity[14] needed to meet Maui County Dept. of Water Supply's water service standards when developing the Wailea SF-S site; therefore, no additional storage improvements are proposed with the project.

4.2.3 Distribution System

Existing networks of 12-, 16-, and 18-inch diameter distribution mains within the Wailea Resort bring water from the 3.0 MG Mid-Level and 1.0 MG Upper-Level storage tanks to the Wailea SF-S project site. Three sets of service mains -- two for domestic (drinking) water and one for fire protection -- will be extended into the site from the existing 12-inch Mid-Level and 12-inch Upper-Level distribution mains located on Kapili Street to provide domestic water service and fire suppression as shown in Figure 4-1. A branching network of domestic and fire protection waterlines located along the internal streets will provide water service to each home and supply the fire hydrants located at regular intervals throughout the development.

---

[13]A calculation of the domestic water storage capacity needed by Wailea SF-S can be found in Appendix B-2

[14]The 1.0 MG Upper-Level Tank, which supplies the Wailea SF-S fire protection system, exceeds the minimum 120,000 gallon minimum capacity required for fire protection. (1,000 gpm fire flow x 2 hours = 120,000 gallons)

Two Dept. of Water Supply-issued 3-inch water meters[15] -- one for the Upper-Level service zone; the other for the Mid-Level service zone -- will be installed on the drinking water mains near Kapili Street to measure water usage by the development. Water use by each of the individual homes, Amenity Center building and common-area irrigation will be tracked by privately-read sub-meters installed downstream of the main County meter.

4.3 Provisions for Future R-1 (Reclaimed Water) Use

County R-1 reclaimed water is not yet available at the Wailea SF-S project site. However, in preparation for the day when R-1 water does become available, the following provisions will be made during the initial construction of Wailea SF-S to encourage its future use by all homeowners.

1. The common area irrigation system for the development will be designed and constructed to allow an easy conversion to an R-1 source by:
    a) Utilizing a single point of connection to the external water supply; and by
    b) Utilizing materials, equipment and installation meeting current State Dept. of Health guidelines for reclaimed water use.

[15]See Appendix B-3 for Preliminary Water Meter Sizing Calculation.

2. Adequate space will be set aside within the internal roads to allow reclaimed water piping to be economically installed and run to the Amenity Center and front yards of each individual home within the development.

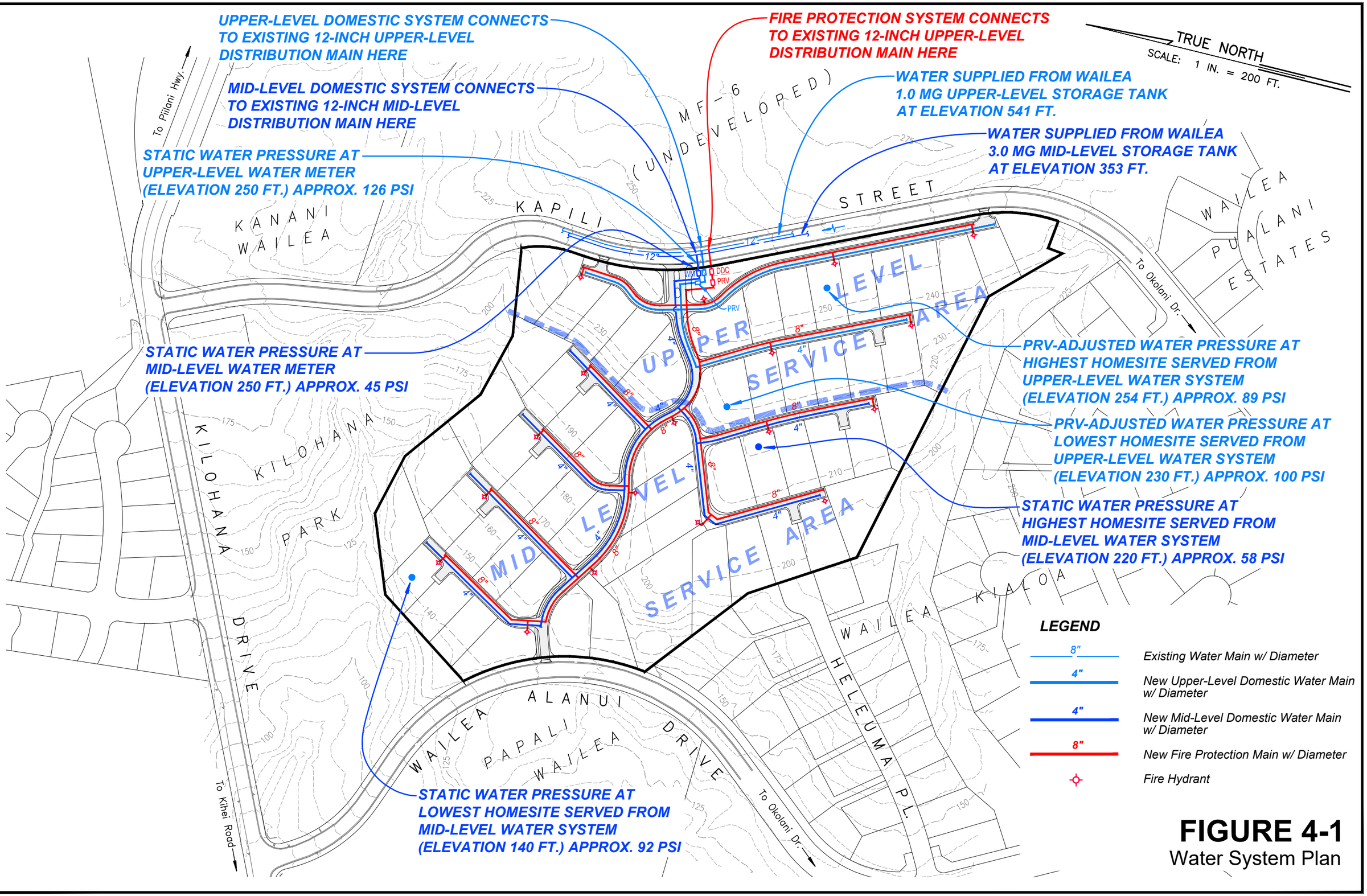


FIGURE 4-1
Water System Plan

V:\Projdata\19proj\19026\dwg\exhibits\PER\Water System-00.dwg

5. WASTEWATER

5.1 Projected Demand

Wailea SF-S is expected to contribute a wastewater flow of approximately 20,000 gallons per day (gpd) into the County-managed Kihei sewerage system.[16]

5.2 Existing Infrastructure and Needed Improvements

Maui County Department of Environmental Management's Wastewater Reclamation Division (WWRD) operates the public sewerage system which collects wastewater from the Wailea Resort and conveys it to the County's Kihei Wastewater Treatment Facility for processing and disposal.

The Wailea SF-S project will install a conventional gravity sewer collection system which will collect wastewater generated by the buildings and discharge it into the existing 8-inch diameter County sewer main located on Wailea Alanui Drive as indicated in Figure 5-1. The County sewerage system will, in turn, convey the wastewater down Kilohana Drive to South Kihei Road; then along South Kihei Road to Pumping Station No. 8; then from Pump Station No. 8 to Pump Station No. 7; then from Pump Station No. 7 to Pump Station No. 6; then from Pump Station No. 6 to the Kihei Wastewater Reclamation Facility above Piilani Highway.

[16] See Appendix C for wastewater demand calculation.

WWRD reports that about 4,800 feet of large diameter gravity sewerline located under South Kihei Road between Sewer Pump Stations No. 7 and No. 8[17] is nearing its current safe operating capacity and will require a capacity upgrade if flows increase significantly in the future -- due to new development in the Wailea Resort, for example. WWRD is currently working to plan and program the needed capacity upgrade.

WWRD's Kihei Wastewater Reclamation Facility is currently processing about 4 million gallons of wastewater per day (MGD) out of its 8 MGD design capacity, so treatment capacity appears ample to accommodate Wailea SF-S' projected sewer demand.

[17]The sewer pipeline segment of concern is located between the Kihei Boat Landing and Kamaole Beach Park I.

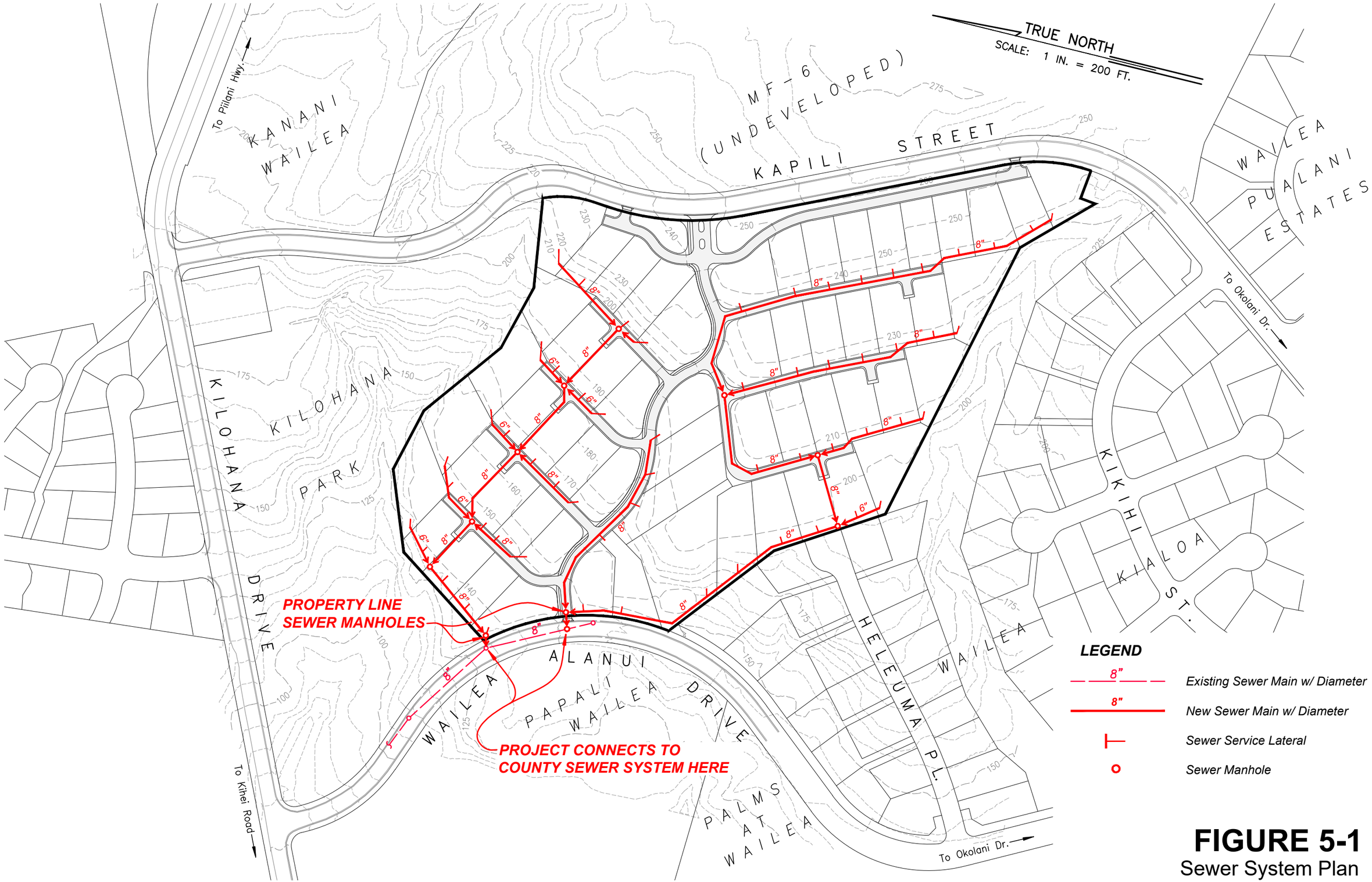


FIGURE 5-1
Sewer System Plan

V:\Projdata\19proj\19026\dwg\exhibits\PER\Sewer System-00.dwg

6. POWER AND TELECOMMUNICATIONS

6.1 Existing Conditions

Existing utility company infrastructure is installed along both Kapili Street and Wailea Alanui Drive on the side of the street opposite the Wailea SF-S project. The underground infrastructure along Kapili Street includes Maui Electric Company (MECO) primary (3-4", 2-2") and secondary (1-2") conduits; a single Hawaiian Telcom (2-4") conduit; and a single Spectrum (1-4") conduit. The infrastructure along the Wailea Alanui Drive frontage is more limited, but does include a 15kV primary electrical power circuit.

6.2 Project Requirements

Underground distribution system improvements for Wailea SF-S will involve the installation of infrastructure for public utility service providers Maui Electric Company, Hawaiian Telcom and Spectrum. Figure 6-1 is a preliminary Electrical Site Plan depicting these distribution system improvements.[18] Developer Ledcor will generally be responsible for installing the necessary distribution and street lighting infrastructure. Once these initial improvements are complete, the utility companies will pull cables and install their service equipment to complete the needed improvements.

[18] Maui Electric Company service drawings 1-1-372, 1-5-507, 1-5-539, 1-5-901 and 1-5-944 used to prepare Figure 6-1 can be found in Appendix D-1.

6.2.1 Maui Electric Company

MECO will require an extension of its distribution system into the project site from Kapili Street to provide service to Wailea SF-S, with a possible connection through to Wailea Alanui Drive. Onsite electrical improvements will consist of a single-phase underground distribution system for which the developer Ledcor will install underground conduit, handholes, and equipment pads; MECO will install electrical conductors and pad-mounted transformers on-site and street lights off-site along county roads. The underground distribution facilities will be installed as part of the project's site work; however, separate service requests for each individual house/cottage will need to be submitted to MECO during construction.

Table 6-1 is an estimate of the load Wailea SF-S will demand from MECO's system.

TABLE 6-1

Estimated Project Demand Load

Unit Type	Number	MECO Estimate		NEC Estimate kW
		kW/Lot	Total kW	
Single Family	57	10	570	6,555
Amenity Center	1	20	20	100
Total	58		590	6,655

6.2.2 Hawaiian Telcom

Hawaiian Telcom provides telephone and DSL services in the area. Its existing telephone plant is not sufficient to serve the Wailea SF-S project; therefore, a fiber distribution hub (FDH) and fiber optic equipment will be installed to provide the needed telecommunication services. The FDH equipment will function as a hub for the distribution of all Hawaiian Telcom telecommunication services within the Wailea SF-S development.

Hawaiian Telcom's route of entry into Wailea SF-S will either be from Kapili Street or Wailea Alanui Drive, with the final configuration of the telephone system dependent upon the location of the FDH within the project. Telephone cables will be installed at Hawaiian Telcom's expense, and customers will be responsible for service connection and monthly rental fees.

An easement will be required for the FDH equipment, whose location will be specified by Hawaiian Telcom's planning department at the time detailed construction plans are prepared.

6.2.3 Spectrum

Spectrum, Maui's designated cable television provider[19], will need to install an underground service extension to the Wailea SF-S site from either the makai side of the Wailea Alanui Drive or the mauka side of Kapili Street where it has existing underground facilities. Developer Ledcor will be responsible for

[19] Spectrum also offers telephone and internet connection services.

providing all onsite infrastructure, including a 4" conduit for main runs along the streets and street crossings; 2” service stub-outs; boxes; and at least one power supply pad within the project site. The power supply equipment and all cabling will be installed by Spectrum. Individual homeowners will be required to submit a service request with Spectrum for the desired type of service and rental equipment for which an installation and monthly service fees will be charged.

Easements will be required to cover any underground facilities located in private property and ensure access for maintenance vehicles.

6.3 Site Lighting Plan

Existing street lighting along Kapili Street will be supplemented by additional fixtures at the main development entrance (Driveway #1) and possibly the auxiliary driveways (Driveways #2 and #3) on Kapili Street to enable safe vehicle and pedestrian movement at these locations. Safety lighting will also be provided along the internal sidewalk linking Kapili Street and Wailea Alanui Drive, as well as the new pedestrian crossing at Wailea Alanui Drive.

All exterior lighting will be full cut-off fixtures compliant with Maui County Dept. of Public Works' street lighting standards[20] and Maui County's Street Lighting

[20] Maui County Department of Public Works, "Street Lighting Standards", Title MC-15, Chapter 901, Effective March 23, 2000.

Ordinance.[21] Lighting fixtures for the private roads, which includes Kapili Street and Wailea SF-S' internal driveways, will be the responsibility of the developer. Lighting fixtures for County-owned Wailea Alanui Drive will be installed by MECO. Figure 6-2 depict the lighting fixtures proposed for use along private and public roadways.

6.4 Cost of Improvements

The cost to construct the described electrical site improvements is estimated to be $1,951,486 excluding utility company charges. An itemized breakdown of this cost figure can be found in Appendix D-2.

V:\Projdata\19proj\19026\Reports\Prelim Engineering Report\Wailea SF-S_Preliminary Eng Report_rev09.wpd

[21] Maui County Code, Chapter 20.35 - Outdoor Lighting.

SYMBOL LEGEND

- EXISTING 150W HPS MECO ST. LIGHT, 20' POLE (FULL CUT-OFF)
- NEW OR RELOCATED 150W HPS MECO ST. LIGHT, 20' POLE (FULL CUT-OFF)
- NEW OR RELOCATED LED PRIVATE ST. LIGHT, 12' POLE (FULL CUT-OFF)
- EXISTING DUCT LINE
- NEW DUCT LINE
- STUB-OUT CONDUIT, CAP, AND CONDUIT MARKER
- EXISTING HANDHOLE
- NEW HANDHOLE GROUP
- EXISTING MANHOLE
- S — NEW SWITCHGEAR (MECO)
- FRONT — NEW TRANSFORMER PAD (MECO) SINGLE-PHASE UNLESS OTHERWISE NOTED
- C — NEW POWER SUPPLY PAD (CATV)
- F — NEW FDH PAD (HTCO)
- EP — ELECTRICAL PRIMARY DUCTS, QTY. AND SIZE AS INDICATED
- ES — ELECTRICAL SECONDARY DUCTS, QTY. AND SIZE AS INDICATED
- T — TELEPHONE DUCTS, QTY. AND SIZE AS INDICATED
- TV — CATV DUCTS, QTY. AND SIZE AS INDICATED
- M-2 — ELECTRICAL 2'x4' HANDHOLE, MECO DWG. 30-2005.
- M-4 — ELECTRICAL 4'x6' HANDHOLE, MECO DWGS. 101024/101028/101029.
- M-5 — ELECTRICAL 5'x7' HANDHOLE, MECO DWGS. 102302/101028/101029.
- M-6 — ELECTRICAL 6'X11' HANDHOLE, HECO DWGS. 100919/100913/100914.
- T-2 — TELEPHONE PULLBOX, TYPE 435TB (2'x4'), HTCO DWG. 34056.
- T-3 — TELEPHONE PULLBOX, (3'x5') HTCO DWG. 34110A.
- T-4 — TELEPHONE PULLBOX, (4'x6') HTCO DWG. 34029.
- T-436T — TELEPHONE METER TYPE PULLBOX, (12"x20").
- C-2 — CATV PULLBOX, SIMILAR TO HTCO TYPE 435TB, HTCO DWG. 34036.
- C-3 — CATV PULLBOX, SIMILAR TO HTCO TYPE 3660TB (3'x5')
- C-434T — CATV METER TYPE PULLBOX (18"x36")
- C-436T — CATV METER TYPE PULLBOX (12"x20")

N

ELECTRICAL SITE PLAN

SCALE: 1" = 60'-0"

FIGURE 6-1

Electrical Site Plan

THIS DRAWING IS AN "INSTRUMENT OF SERVICE" BY ECM INC. THIS WORK IS A PART OF AN INTEGRATED PROCESS OF TECHNICAL DESIGN. USE OUTSIDE THIS PROCESS IS INAPPROPRIATE AND TRANSFER OF ITS OBSERVATIONS, CONCLUSIONS, OR METHODOLOGY TO ANY OTHER WORK MAY HAVE SERIOUS CONSEQUENCES.

2019-93 2 1 0 24x36

2019-93-E1

ECM INC
Electrical Engineering Consultants

MAUI OFFICE
130 North Market Street
Wailuku, Maui, HI. 96793
Phone: (808)242-9070
Fax: (808)244-9530
E-mail: ecm@ecm-maui.com

MARK P. RICKARD
LICENSED PROFESSIONAL ENGINEER
No. 8991-E
HAWAII, U.S.A.

APRIL 30, 2020
EXPIRATION DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. (SUPERVISION OF CONSTRUCTION AS DEFINED UNDER SECTION 16-82-2 OF CHAPTER 82: RULES OF THE BOARD OF PROFESSIONAL ENGINEERS, ARCHITECTS AND LAND SURVEYORS, STATE OF HAWAII.)

Note: Contractor shall check and verify all dimensions at job before proceeding with work.

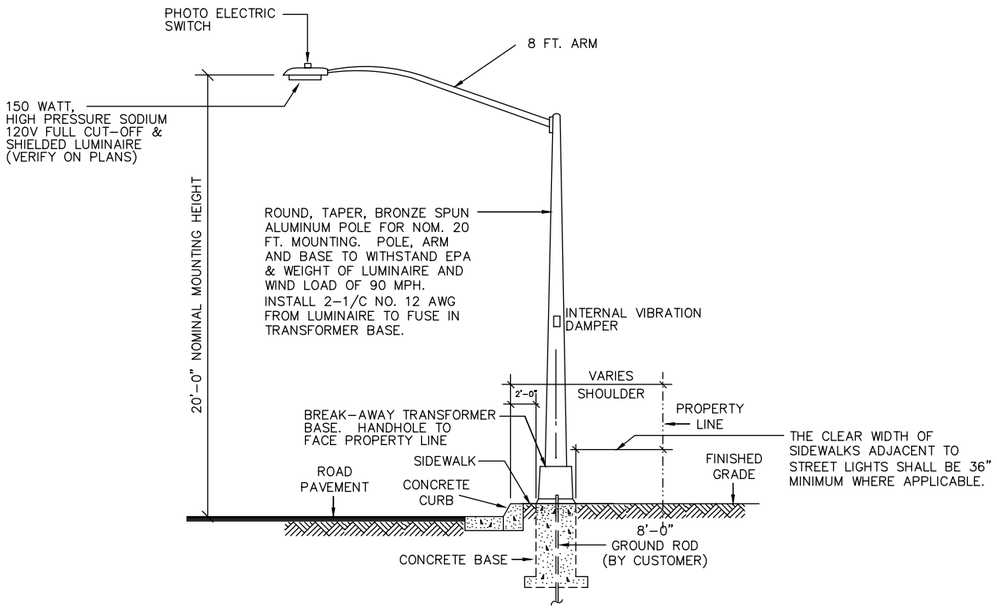
REVISIONS

NO	DATE	DESCRIPTION	INI

JOB NO. 2019-93
DATE: 11/19
DRAWN BY: RMB
DESIGNED BY: MPR
CHECKED BY: MPR

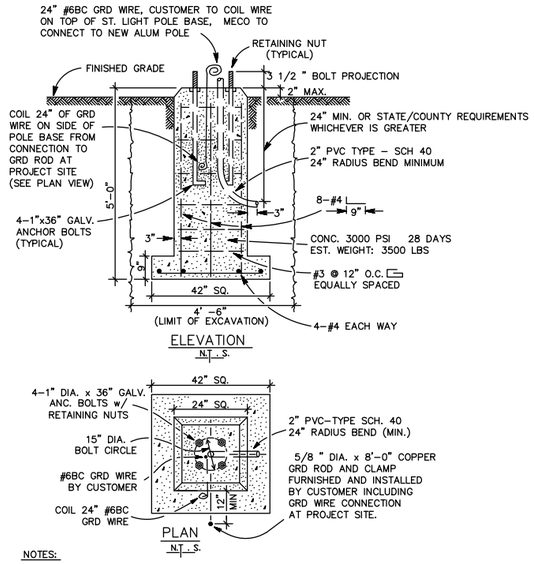
ELECTRICAL PLANS FOR:
WAILEA SF-S
WAILEA, MAUI, HAWAII
TMK: (X) X-X-XXXXXX

SHEET NO.
E-1
1 OF - SHEETS



STREET LIGHT STANDARD DETAIL W/IN COUNTY R.O.W.

NOT TO SCALE



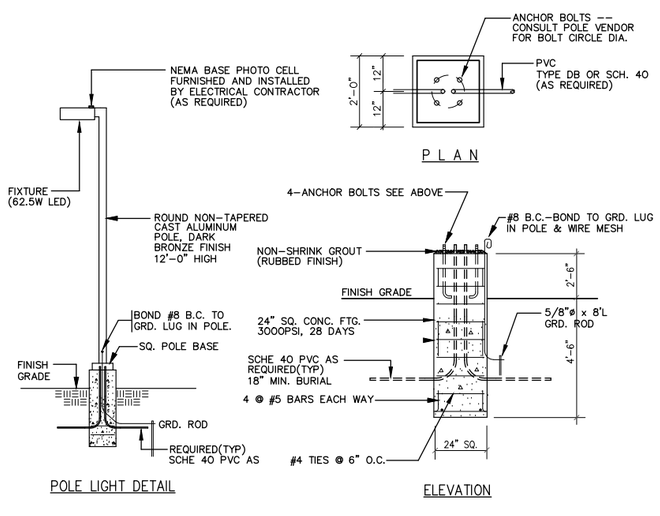
NOTES:

1. THIS ITEM PREFABRICATED BY WALKER INDUSTRIES AT AMERON MAUI, PH: 877-5068
2. MECO SHALL PROVIDE 1" DIA. x 36" ANCHOR BOLTS (4 EACH) AS FURNISHED BY MANUFACTURER. PICK-UP BY CUSTOMER AT MECO'S KAHULUI WAREHOUSE.
3. INSPECTION BY MECO INSPECTOR REQUIRED PRIOR TO FABRICATION OF FOOTING, CONTACT MECO INSPECTOR (PH: 871-8461)

PRECAST CONCRETE FOOTING
STREET LIGHT POLE BASE TRANSFORMER TYPE
(COUNTY ROADWAY OR STATE HIGHWAY)

STREET LIGHTING NOTES:

1. FOUR 1"øX36" GALVANIZED ANCHOR BOLTS SHALL BE FURNISHED BY MAUI ELECTRIC COMPANY AND INSTALLED BY THE CONTRACTOR. THE CONTRACTOR SHALL PICK UP THE ANCHOR BOLTS FROM MAUI ELECTRIC COMPANY'S KAHULUI WAREHOUSE.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL A 5/8"X8'-0" COPPER CLAD GROUND ROD AT EACH STREET LIGHT LOCATION. THE GROUND ROD SHALL BE LOCATED A MINIMUM OF TWELVE (12) INCHES FROM THE STREET LIGHT CONCRETE FOUNDATION.
3. THE CONTRACTOR SHALL FURNISH AND INSTALL THE STREET LIGHT CONCRETE FOUNDATION. STREET LIGHT CONCRETE FOUNDATIOINS ARE PRECASTED BY WALKER INDUSTRIES, PHONE NO. 877-3430 AND WEIGH APPROXIAMETLY 4,000 POUNDS EACH. IF THE STREET LIGHT CONCRETE FOUNDATIOINS ARE PRECASTED, INSPECTION BY MAUI ELECTRIC COMPANY'S INSPECTOR IS REQUIRED PRIOR TO PRECASTING THE CONCRETE FOUNDATION. MAUI ELECTRIC COMPANY'S INSPECTOR MAY BE CONTACTED BY CALLING 871-8461, EXT. 213.
4. MAUI ELECTRIC COMPANY WILL FURNISH AND INSTALL THE STREET LIGHT POLES, CONDUCTORS, FIXTURES, DEVICES AND LUMINAIRE. MAUI ELECTRIC COMPANY WILL CONNECT THE STREET LIGHTS TO THE 120 VOLT SOURCE.
5. ALL GROUNDING, BONDING AND STREET LIGHT INSTALLATION SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, THE NATIONAL ELECTRICAL SFETY CODE, MAUI COUNTY ELECTRICAL ORDINANCE AND ALL APPLICABLE RULES, REGULATIONS, CODES, ORDINANCES AND MANDATES.



PRIVATE DRIVEWAY LIGHT DETAIL

NOT TO SCALE

FIXTURE SCHEDULE				
TYPE	SYMBOL	DESCRIPTION	MANUFACTURER	LAMP
A		LED AREA LIGHT, DARK BRONZE, DIE-CAST ALUMINUM HOUSING, POLYESTER POWDER COAT FINISH, TYPE 3 DISTRIBUTION, SEE PLAN FOR MULTIPLE FIXTURE CONFIGURATION, 12' MOUNTING HEIGHT ON 4" ROUND ALUMINUM ANODIZED POLE WITH TENON ARM AND VERTICAL SLIPFITTER, 120V.	KIM LIGHTING ALT3P-35-60L-4K-120V PRA-12-61BB-DBA OR APPROVED EQUAL	62.5W LED
B	●	LANDSCAPE/PATHWAY LIGHTS	VERIFY WITH LANDSCAPE PLANS	LED

FIGURE 6-2
Lighting Details

ECM INC
Electrical Engineering Consultants
MAUI OFFICE
130 North Market Street
Wailuku, Maui, HI. 96793
Phone: (808)242-9070
Fax: (808)244-9530
E-mail: ecm@ecm-maui.com

MARK P. RICKARD
LICENSED PROFESSIONAL ENGINEER
No. 8991-E
HAWAII, U.S.A.

APRIL 30, 2020
EXPIRATION DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. (SUPERVISION OF CONSTRUCTION AS DEFINED UNDER SECTION 16-82-2 OF CHAPTER 82: RULES OF THE BOARD OF PROFESSIONAL ENGINEERS, ARCHITECTS AND LAND SURVEYORS; STATE OF HAWAII.)

Note: Contractor shall check and verify all dimensions at job before proceeding with work.

REVISIONS

NO	DATE	DESCRIPTION	INI

JOB NO. 2019-93
DATE: 11/19
DRAWN BY: RMB
DESIGNED BY: MPR
CHECKED BY: MPR

ELECTRICAL PLANS FOR:
WAILEA SF-S
WAILEA, MAUI, HAWAII
TMK: (X) X-X-XX:XXX

SHEET NO.
E-2
2 OF - SHEETS

THIS DRAWING IS AN "INSTRUMENT OF SERVICE" BY ECM INC. THIS WORK IS A PART OF AN INTEGRATED PROCESS OF TECHNICAL DESIGN. USE OUTSIDE THIS PROCESS IS INAPPROPRIATE AND TRANSFER OF ITS OBSERVATIONS, CONCLUSIONS, OR METHODOLOGY TO ANY OTHER WORK MAY HAVE SERIOUS CONSEQUENCES.

2019-93-E2

APPENDIX A

Drainage Calculations

APPENDIX A-1

DLNR Flood Hazard Assessment Report for TMK 2-1-008: 145

BASEMAP: FIRM BASEMAP

Flood Hazard Assessment Report

www.hawaiinfip.org

Wailea SF-S Project Site

Property Information

COUNTY:	MAUI
TMK NO:	(2) 2-1-008:145
WATERSHED:	WAILEA
PARCEL ADDRESS:	KAPILI STREET KIHEI, HI 96753

Notes:

Flood Hazard Information

FIRM INDEX DATE:	NOVEMBER 04, 2015
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1500030676F
PANEL EFFECTIVE DATE:	SEPTEMBER 19, 2012

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: NO
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 400 800 ft

Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR, its officers, and employees from any liability which may arise from its use of its data or information.

If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determinations to be used for compliance with local floodplain management regulations.

FLOOD HAZARD ASSESSMENT TOOL LAYER LEGEND
(*Note: legend does not correspond with NFHL*)

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD - The 1% annual chance flood (100-year), also know as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. SFHAs include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

	Zone A: No BFE determined.
	Zone AE: BFE determined.
	Zone AH: Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
	Zone AO: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
	Zone V: Coastal flood zone with velocity hazard (wave action); no BFE determined.
	Zone VE: Coastal flood zone with velocity hazard (wave action); BFE determined.
	Zone AEF: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA - An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

	Zone XS (X shaded): Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
	Zone X: Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

	Zone D: Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase apply, but coverage is available in participating communities.

APPENDIX A-2

Pre-Development Runoff Calculations

TABLE A-2

Pre-Development Drainage Summary

Drainage Area	Receiving Facility	Approx. Area Draining to Receiving Facility	Pre-Development Peak Runoff (10 yr / 1 hr)
1	Drainageway through Kilohana Park	10.8 Ac.	11.3 cfs
2	18" dia. Roadway Culvert at Wailea Alanui	4.2 Ac.	4.5 cfs
3	Drainageway through Wailea Kialoa Subd.	8.1 Ac.	8.7 cfs
Total		23.1 Ac.	24.5 cfs

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/24/2019

Area

Description: Pre-development surface runoff toward existing drainageway through Kilohana Park.

Total Area (A): 10.80 acres

Runoff Coefficient

Unimproved Area Runoff Coefficient: 0.30

Time of Concentration

Runoff Length:	1060	ft.
Start Elevation:	246	ft. M.S.L.
End Elevation:	124	ft. M.S.L.
Average Slope:	11.5	%
Time of Concentration (T_c):	18	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	10-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.0	in.
Intensity (I):	3.50	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 11.3 \quad ft.^3/sec.$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/24/2019

Area

Description: Pre-development surface runoff toward roadway culvert at Wailea Alanui Drive.

Total Area (A): 4.20 acres

Runoff Coefficient

Unimproved Area Runoff Coefficient: 0.30

Time of Concentration

Runoff Length:	752	ft.
Start Elevation:	232	ft. M.S.L.
End Elevation:	144	ft. M.S.L.
Average Slope:	11.7	%
Time of Concentration (T_c):	16	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	10-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.0	in.
Intensity (I):	3.60	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 4.5 \quad ft.^3/sec.$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/24/2019

Area

Description: Pre-development surface runoff toward existing drainageway through Wailea Kialoa Subdivision.

Total Area (A): 8.10 acres

Runoff Coefficient

Unimproved Area Runoff Coefficient: 0.30

Time of Concentration

Runoff Length:	680	ft.
Start Elevation:	264	ft. M.S.L.
End Elevation:	198	ft. M.S.L.
Average Slope:	9.7	%
Time of Concentration (T_c):	16	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	10-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.0	in.
Intensity (I):	3.60	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 8.7 \quad ft.^3/sec.$$

APPENDIX A-3

Post-Development Runoff Calculations

TABLE A-3

Post-Development Drainage Summary

Drainage Area	Receiving Facility	Approx. Area Draining to Receiving Facility	Pre-Development Peak Runoff (10 yr / 1 hr)	Post-Development Peak Runoff *BEFORE* Mitigation	Post-Development Peak Runoff *AFTER* Mitigation	Net Change in Peak Flow *AFTER* Mitigation
1	Drainageway through Kilohana Park	10.6 Ac.	11.3 cfs	24.4 cfs	≤ 11.3 cfs	≤ 0 cfs
2	18" dia. Roadway Culvert at Wailea Alanui	4.1 Ac.	4.5 cfs	9.2 cfs	≤ 4.5 cfs	≤ 0 cfs
3	Drainageway through Wailea Kialoa Subd.	8.4 Ac.	8.7 cfs	19.3 cfs	≤ 8.7 cfs	≤ 0 cfs
Total		23.1 Ac.	24.5 cfs	52.9 cfs	≤ 24.5 cfs	≤ 0 cfs

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Area

Description: Post-development surface runoff toward existing drainageway through Kilohana Park.

Total Area (A): 10.60 acres

Runoff Coefficient

Single-Family Runoff Coefficient: 0.50

Time of Concentration

Runoff Length:	1200	ft.
Start Elevation:	249	ft. M.S.L.
End Elevation:	135	ft. M.S.L.
Average Slope:	9.5	%
Time of Concentration (T_c):	7.5	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	10-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.0	in.
Intensity (I):	4.60	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 24.4 \quad ft.^3/sec.$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Area

Description: Post-development surface runoff toward roadway culvert at Wailea Alanui.

Total Area (A): 4.10 acres

Runoff Coefficient

Single-Family Runoff Coefficient: 0.50

Time of Concentration

Runoff Length:	1440	ft.
Start Elevation:	240	ft. M.S.L.
End Elevation:	142	ft. M.S.L.
Average Slope:	6.8	%
Time of Concentration (T_c):	8.5	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	10-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.0	in.
Intensity (I):	4.50	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 9.2 \quad ft.^3/sec.$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Area

Description: Post-development surface runoff toward existing drainageway through Wailea Kialoa Subdivision.

Total Area (A): 8.40 acres

Runoff Coefficient

Single-Family Runoff Coefficient: 0.50

Time of Concentration

Runoff Length:	900	ft.
Start Elevation:	246	ft. M.S.L.
End Elevation:	195	ft. M.S.L.
Average Slope:	5.7	%
Time of Concentration (T_c):	7.5	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	10-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.0	in.
Intensity (I):	4.60	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 19.3 \quad ft.^3/sec.$$

APPENDIX A-4

Detention / Retention Basin Sizing Calculations

TABLE A-4

Minimum Storage Capacities for Detention / Retention Facilities

Drainage Area	Receiving Facility	Approx. Area Draining to Receiving Facility	Pre-Development Peak Runoff (10 yr / 1 hr)	Approximate Minimum Detention Storage Volume Required to Ensure Post-Development Peak Flow Does Not Exceed Pre-Development Peak Flow	Approximate Minimum Storage Volume Required to Retain All Runoff from 50 yr. / 1 hr. Design Storm
1	Drainageway through Kilohana Park	10.6 Ac.	11.3 cfs	27,200 cu.ft.	44,300 cu.ft.
2	18" dia. Roadway Culvert at Wailea Alanui	4.1 Ac.	4.5 cfs	10,200 cu.ft.	19,200 cu.ft.
3	Drainageway through Wailea Kialoa Subd.	8.4 Ac.	8.7 cfs	20,400 cu.ft.	35,100 cu.ft.

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Storage Volume Calculation

Description: Storage capacities required for stormwater detention or retention for Drainage Area 1.

Universal Rational Hydrograph Method:

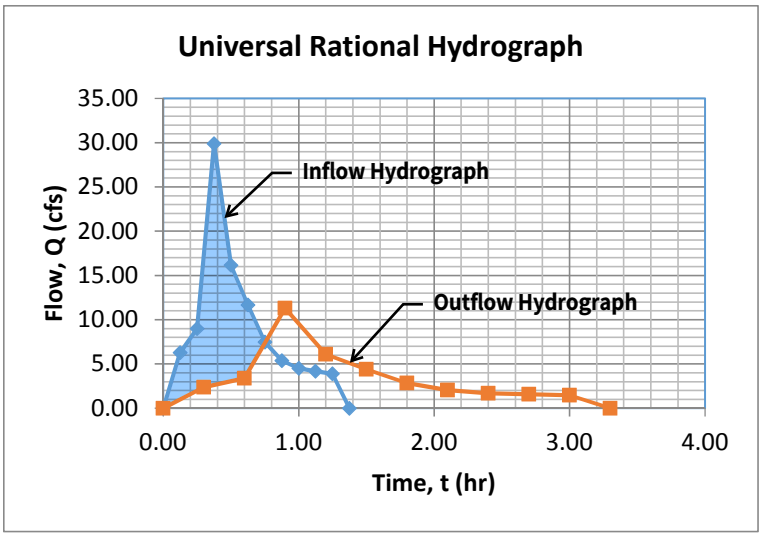
Pre-development Peak Flow, Q_{peak10} (cfs) :	11.3	cfs
Time of Concentration, T_c (min) :	18	min
Post-development Peak Flow, Q_{peak50} (cfs) :	29.9	cfs
Time of Concentration, T_c (min) :	7.5	min

Post-Development Inflow Hydrograph Ordinates

t/tc	Q/Qp	t (hr)	Q (cfs)
0	0.00	0.00	0.00
1	0.21	0.13	6.28
2	0.30	0.25	8.97
3	1.00	0.38	29.90
4	0.54	0.50	16.15
5	0.39	0.63	11.66
6	0.25	0.75	7.48
7	0.18	0.88	5.38
8	0.15	1.00	4.49
9	0.14	1.13	4.19
10	0.13	1.25	3.89
11	0.00	1.38	0.00

Post-Development Outflow Hydrograph Ordinates

t/tc	Q/Qp	t (hr)	Q (cfs)
0	0.00	0.00	0.00
1	0.21	0.30	2.37
2	0.30	0.60	3.39
3	1.00	0.90	11.30
4	0.54	1.20	6.10
5	0.39	1.50	4.41
6	0.25	1.80	2.83
7	0.18	2.10	2.03
8	0.15	2.40	1.70
9	0.14	2.70	1.58
10	0.13	3.00	1.47
11	0.00	3.30	0.00



Detention Volume
(Blue area above outflow hydrograph)

Area	=	7.548	cfs*hr
Vol.	=	27,173	cu.ft.
	=	27,200	cu.ft.

Retention Volume
(Striped area below inflow hydrograph)

Area	=	12.299	cfs*hr
Vol.	=	44,276	cu.ft.
	=	44,300	cu.ft.

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Storage Volume Calculation

Description: Storage capacities required for stormwater detention or retention for Drainage Area 2.

Universal Rational Hydrograph Method:

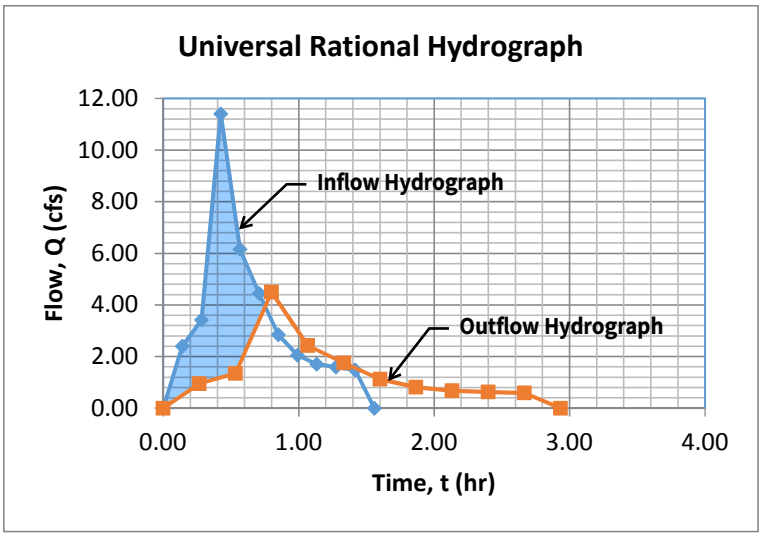
Pre-development Peak Flow, Q_{peak10} (cfs) :	4.5	cfs
Time of Concentration, T_c (min) :	16	min
Post-development Peak Flow, Q_{peak50} (cfs) :	11.4	cfs
Time of Concentration, T_c (min) :	8.5	min

Post-Development Inflow Hydrograph Ordinates

t/tc	Q/Qp	t (hr)	Q (cfs)
0	0.00	0.00	0.00
1	0.21	0.14	2.39
2	0.30	0.28	3.42
3	1.00	0.43	11.40
4	0.54	0.57	6.16
5	0.39	0.71	4.45
6	0.25	0.85	2.85
7	0.18	0.99	2.05
8	0.15	1.13	1.71
9	0.14	1.28	1.60
10	0.13	1.42	1.48
11	0.00	1.56	0.00

Post-Development Outflow Hydrograph Ordinates

t/tc	Q/Qp	t (hr)	Q (cfs)
0	0.00	0.00	0.00
1	0.21	0.27	0.95
2	0.30	0.53	1.35
3	1.00	0.80	4.50
4	0.54	1.07	2.43
5	0.39	1.33	1.76
6	0.25	1.60	1.13
7	0.18	1.87	0.81
8	0.15	2.13	0.68
9	0.14	2.40	0.63
10	0.13	2.67	0.59
11	0.00	2.93	0.00



Detention Volume
(Blue area above outflow hydrograph)

Area	=	2.822	cfs*hr
Vol.	=	10,159	cu.ft.
	=	10,200	cu.ft.

Retention Volume
(Striped area below inflow hydrograph)

Area	=	5.342	cfs*hr
Vol.	=	19,231	cu.ft.
	=	19,200	cu.ft.

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Storage Volume Calculation

Description: Storage capacities required for stormwater detention or retention for Drainage Area 3.

Universal Rational Hydrograph Method:

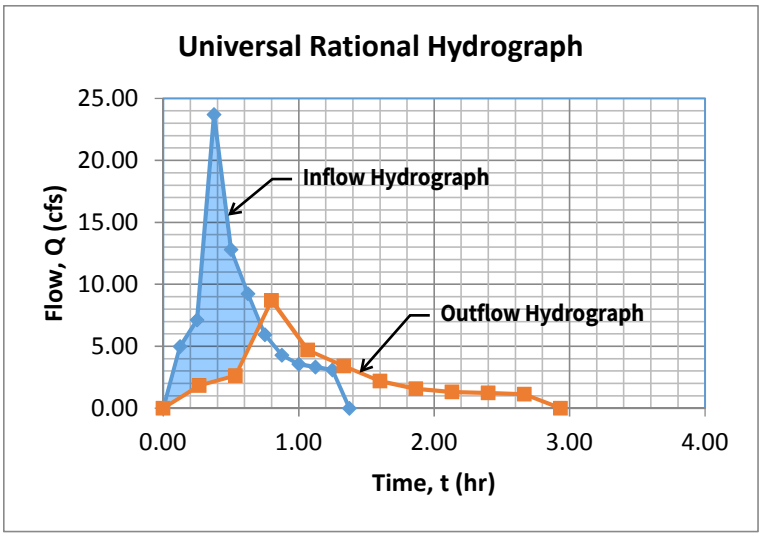
Pre-development Peak Flow, Q_{peak10} (cfs) :	8.7	cfs
Time of Concentration, T_c (min) :	16	min
Post-development Peak Flow, Q_{peak50} (cfs) :	23.7	cfs
Time of Concentration, T_c (min) :	7.5	min

Post-Development Inflow Hydrograph Ordinates

t/tc	Q/Qp	t (hr)	Q (cfs)
0	0.00	0.00	0.00
1	0.21	0.13	4.98
2	0.30	0.25	7.11
3	1.00	0.38	23.70
4	0.54	0.50	12.80
5	0.39	0.63	9.24
6	0.25	0.75	5.93
7	0.18	0.88	4.27
8	0.15	1.00	3.56
9	0.14	1.13	3.32
10	0.13	1.25	3.08
11	0.00	1.38	0.00

Post-Development Outflow Hydrograph Ordinates

t/tc	Q/Qp	t (hr)	Q (cfs)
0	0.00	0.00	0.00
1	0.21	0.27	1.83
2	0.30	0.53	2.61
3	1.00	0.80	8.70
4	0.54	1.07	4.70
5	0.39	1.33	3.39
6	0.25	1.60	2.18
7	0.18	1.87	1.57
8	0.15	2.13	1.31
9	0.14	2.40	1.22
10	0.13	2.67	1.13
11	0.00	2.93	0.00



Detention Volume
(Blue area above outflow hydrograph)

Area	=	5.666	cfs*hr
Vol.	=	20,398	cu.ft.
	=	20,400	cu.ft.

Retention Volume
(Striped area below inflow hydrograph)

Area	=	9.749	cfs*hr
Vol.	=	35,096	cu.ft.
	=	35,100	cu.ft.

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Area

Description: Post-development surface runoff toward existing drainageway through Kilohana Park.

Total Area (A): 10.60 acres

Runoff Coefficient

Single-Family Runoff Coefficient: 0.50

Time of Concentration

Runoff Length:	1200	ft.
Start Elevation:	249	ft. M.S.L.
End Elevation:	135	ft. M.S.L.
Average Slope:	9.5	%
Time of Concentration (T_c):	7.5	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	50-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.5	in.
Intensity (I):	5.65	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 29.9 \text{ ft.}^3\text{/sec.}$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Area

Description: Post-development surface runoff toward roadway culvert at Wailea Alanui.

Total Area (A): 4.10 acres

Runoff Coefficient

Single-Family Runoff Coefficient: 0.50

Time of Concentration

Runoff Length:	1440	ft.
Start Elevation:	240	ft. M.S.L.
End Elevation:	142	ft. M.S.L.
Average Slope:	6.8	%
Time of Concentration (T_c):	8.5	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	50-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.5	in.
Intensity (I):	5.54	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 11.4 \quad ft.^3/sec.$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Surface Runoff

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Area

Description: Post-development surface runoff toward existing drainageway through Wailea Kialoa Subdivision.

Total Area (A): 8.40 acres

Runoff Coefficient

Single-Family Runoff Coefficient: 0.50

Time of Concentration

Runoff Length:	900	ft.
Start Elevation:	246	ft. M.S.L.
End Elevation:	195	ft. M.S.L.
Average Slope:	5.7	%
Time of Concentration (T_c):	7.5	minutes

Intensity

Project Location:	Wailea, Maui, Hawaii	
Design Storm:	50-year recurrence interval, 1-hour duration	
Rainfall Depth:	2.5	in.
Intensity (I):	5.65	in./hr.

Flow Rate

$$Q = C \cdot I \cdot A$$
$$= 23.7 \quad ft.^3/sec.$$

APPENDIX A-5

Stormwater Quality Calculations

TABLE A-5

Minimum 48 hr. Retention Capacity Needed to Meet Maui County Stormwater Quality Requirements[1]

Drainage Area	Receiving Facility	Approx. Area Draining to Receiving Facility	Minimum 48 hr. Retention Capacity Needed to Meet Maui County Stormwater Quality Requirements
1	Drainageway through Kilohana Park	10.6 Ac.	19,239 cu.ft.
2	18" dia. Roadway Culvert at Wailea Alanui	4.1 Ac.	7,442 cu.ft.
3	Drainageway through Wailea Kialoa Subd.	8.4 Ac.	15,246 cu.ft.

[1] Ref. Maui County Dept. of Public Works, Title MC-15, Subtitle 01, Chapter 111, "Rules for the Design of Stormwater Treatment Best Management Practices", Section 15-111-5 (a).

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Storm Water Treatment

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Purpose: To determine the required basin volume to meet the County of Maui, Department of Public Works' "Rules for the Design of Storm Water Treatment Best Management Practices" for Drainage Area 1.

Calculations: The required design volume for detention based control is computed by the MCC §15-111-5.a.1.C formula:

$$WQDV = C \cdot 1'' \cdot A \cdot 3630$$

where, WQDV = water quality design volume in cubic feet
C = EPA volumetric runoff coefficient
A = gross area of the site in acres = 10.60 ac.
1" = design storm for detention based water quality system
3630 = conversion factor

The EPA volumetric runoff coefficient, C, calculated from the formula given in MCC §15-111-5.a.1.A is:

$$C = 0.05 + (0.009) \cdot (IMP)$$

where, IMP = percentage of impervious area
= (impervious area) / (gross area) · 100
= (5.3 ac.) / (10.6 ac.) · 100
= 50.0

Since IMP = 50.0, the value of C is:

$$C = 0.05 + (0.009) \cdot (50.0)$$
$$= 0.50$$

Compute the required design volume for a 1" storm with C = 0.50

$$WQDV = C \cdot 1'' \cdot A \cdot 3630$$
$$= 0.50 \cdot 1'' \cdot 10.6 \cdot 3630$$
$$= 19{,}239\ ft^3$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Storm Water Treatment

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Purpose: To determine the required basin volume to meet the County of Maui, Department of Public Works' "Rules for the Design of Storm Water Treatment Best Management Practices" for Drainage Area 2.

Calculations: The required design volume for detention based control is computed by the MCC §15-111-5.a.1.C formula:

$$WQDV = C \cdot 1'' \cdot A \cdot 3630$$

where, WQDV = water quality design volume in cubic feet
C = EPA volumetric runoff coefficient
A = gross area of the site in acres = 4.10 ac.
1" = design storm for detention based water quality system
3630 = conversion factor

The EPA volumetric runoff coefficient, C, calculated from the formula given in MCC §15-111-5.a.1.A is:

$$C = 0.05 + (0.009) \cdot (IMP)$$

where, IMP = percentage of impervious area
= (impervious area) / (gross area) · 100
= (2.05 ac.) / (4.1 ac.) · 100
= 50.0

Since IMP = 50.0, the value of C is:

$$C = 0.05 + (0.009) \cdot (50.0)$$
$$= 0.50$$

Compute the required design volume for a 1" storm with C = 0.50

$$WQDV = C \cdot 1'' \cdot A \cdot 3630$$
$$= 0.50 \cdot 1'' \cdot 4.1 \cdot 3630$$
$$= 7{,}442 \text{ ft}^3$$

Warren S. Unemori Engineering, Inc.
Civil & Structural Engineers · Land Surveyors
Wells Street Professional Center
2145 Wells Street, Suite 403
Wailuku, Maui, HI 96793

HYDROLOGIC CALCULATIONS - Storm Water Treatment

Project Name: Wailea SF-5 Development
Project No.: 19026
Engineer: Clarissa S. Ong
Date: 10/25/2019

Purpose: To determine the required basin volume to meet the County of Maui, Department of Public Works' "Rules for the Design of Storm Water Treatment Best Management Practices" for Drainage Area 3.

Calculations: The required design volume for detention based control is computed by the MCC §15-111-5.a.1.C formula:

$$WQDV = C \cdot 1'' \cdot A \cdot 3630$$

where, WQDV = water quality design volume in cubic feet
C = EPA volumetric runoff coefficient
A = gross area of the site in acres = 8.40 ac.
1" = design storm for detention based water quality system
3630 = conversion factor

The EPA volumetric runoff coefficient, C, calculated from the formula given in MCC §15-111-5.a.1.A is:

$$C = 0.05 + (0.009) \cdot (IMP)$$

where, IMP = percentage of impervious area
= (impervious area) / (gross area) · 100
= (4.2 ac.) / (8.4 ac.) · 100
= 50.0

Since IMP = 50.0, the value of C is:

$$C = 0.05 + (0.009) \cdot (50.0)$$
$$= 0.50$$

Compute the required design volume for a 1" storm with C = 0.50

$$WQDV = C \cdot 1'' \cdot A \cdot 3630$$
$$= 0.50 \cdot 1'' \cdot 8.4 \cdot 3630$$
$$= 15{,}246 \text{ ft}^3$$

APPENDIX B

Potable Water Calculations

APPENDIX B-1

Projected Daily Water Demand

WAILEA SF-S

Projected Daily Water Demand

Land Use	Base Unit		Consumption Rate[1]		Average Daily Demand			Maximum Daily Demand
Single-Family Homes	57 units	x	600 gals/unit	==>	34,200 gpd	*x 1.5*[2]	==>	51,300 gpd
Amenity Center Building	3,000 s.f.	x	140 gals/1,000 s.f.	==>	420 gpd	*x 1.5*	==>	630 gpd
Street Pavement	2.4 Ac.		0 gals/Ac.	==>	0 gpd	*x 1.5*	==>	0 gpd
Common Area Landscaping	1.0 Ac.	x	1,700 gals/Ac.	==>	1,700 gpd	*x 1.5*	==>	2,550 gpd
Total					36,320 gpd			54,480 gpd

Note:

[1] Consumption rate taken from Water System Standards, Department of Water Supply, County of Maui, State of Hawaii, 2002, Table 100-18, p.111-3.

[2] Max. daily demand factor taken from Water System Standards, Department of Water Supply, County of Maui, State of Hawaii, 2002, Table 100-20, p.111-5.

APPENDIX B-2

Domestic Water Storage Capacity Calculation

WAILEA SF-S

Domestic Water Storage Capacity Calculation

Land Use	Base Unit		Consumption Rate[1]		Average Daily Demand			Needed Domestic Water Storage Capacity
UPPER-LEVEL STORAGE TANK								
Single-Family Homes	21 units	x	600 gals/unit	==>	12,600 gpd	*x 1.5*[2]	==>	18,900 gal.
Amenity Center Building	3,000 s.f.	x	140 gals/1,000 s.f.	==>	420 gpd	*x 1.5*	==>	630 gal.
Common Area Landscaping	1.0 Ac.	x	1,700 gals/Ac.	==>	1,700 gpd	*x 1.5*	==>	2,550 gal.
Subtotal					14,720 gpd			22,080 gal.
MID-LEVEL STORAGE TANK								
Single-Family Homes	36 units	x	600 gals/unit	==>	21,600 gpd	*x 1.5*	==>	32,400 gal.
Subtotal					21,600 gpd			32,400 gal.
Total								54,480 gal.

Notes:

[1] Consumption rate taken from Water System Standards, Department of Water Supply, County of Maui, State of Hawaii, 2002, Table 100-18, p.111-3.

[2] Max. daily demand factor taken from Water System Standards, Department of Water Supply, County of Maui, State of Hawaii, 2002, Table 100-20, p.111-5.

APPENDIX B-3

Preliminary Water Meter Sizing Calculation

WAILEA SF-S
Preliminary Water Meter Sizing Calculation
for Upper-Level Service Zone
(Single meter for CPR Development)

January 15, 2020

Domestic Flow Demand

Single-family homes + Amenity Center

= (35 FU/home x 21 homes) + 50 FU/Amenity Center

= 785 FU

≈ 176 gpm

Irrigation Flow Demand

50 gpm peak flow

Needed Meter Capacity

Domestic Flow Demand + Irrigation Flow Demand ≈ 226 gpm

Needed Meter Size

2" Meter Capacity	<	Needed Capacity	<	3" Meter Capacity
160 gpm		226 gpm		320 gpm

∴ 3-inch meter needed for Upper-Level service zone

WAILEA SF-S
Preliminary Water Meter Sizing Calculation
for Mid-Level Service Zone
(Single meter for CPR Development)

January 15, 2020

Domestic Flow Demand

Single-family homes

= (35 FU/home x 36 homes)

= 1,260 FU

≈ 240 gpm

Irrigation Flow Demand

0 gpm peak flow

Needed Meter Capacity

Domestic Flow Demand + Irrigation Flow Demand ≈ 240 gpm

Needed Meter Size

2" Meter Capacity	<	Needed Capacity	<	3" Meter Capacity
160 gpm		240 gpm		320 gpm

∴ 3-inch meter needed for Mid-Level service zone

V:\Projdata\19proj\19026\Reports\Prelim Engineering Report\Calcs\dtu_Meter sizing_rev03.wpd

APPENDIX C

Wastewater Demand Calculations

WAILEA SF-S
Projected Daily Sewer Demand

	Base Unit		Contribution Rate[1]		Average Daily Sewer Demand
Single-Family Home	57 units	x	350 gals/unit/day	==>	19,950 gpd
Amenity Center Building	15 persons[2]	x	20 gals/capita/day	==>	300 gpd
Total					20,250 gpd

Notes:

[1] Contribution rates taken from County of Maui, Wastewater Reclamation Division, "Wastewater Flow Standards," February 2, 2000.

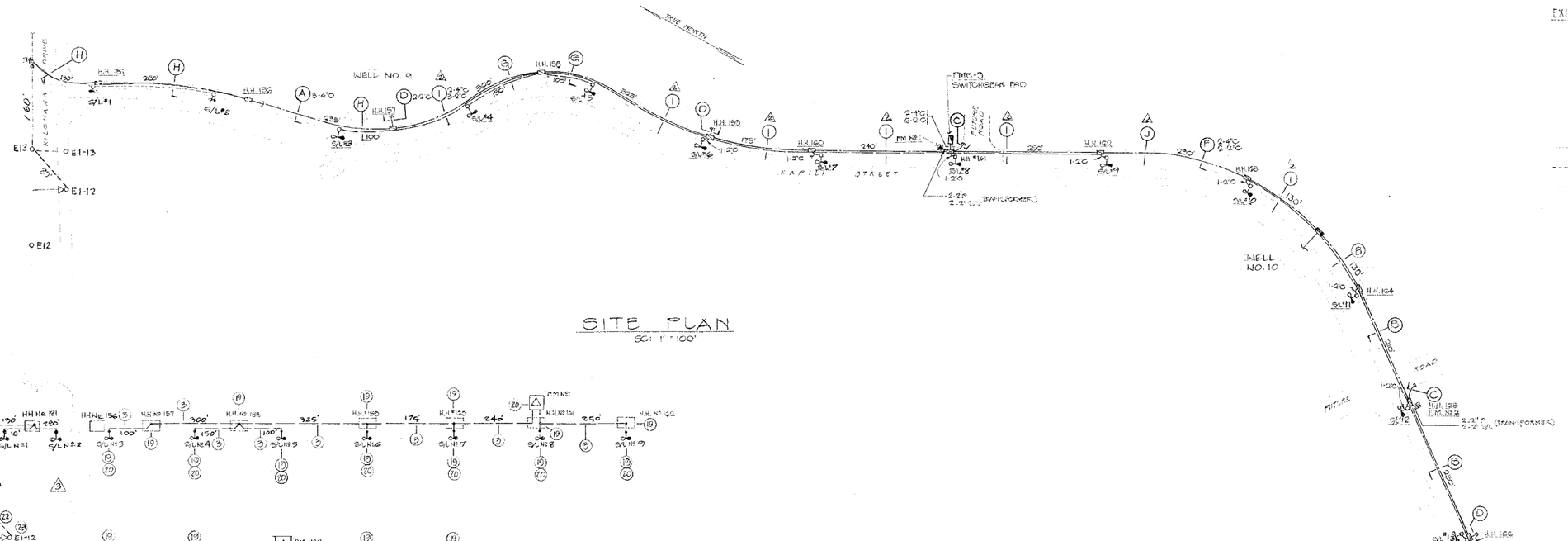
[2] Based on occupancy of 1 person / 200 sq. ft. x 3,000 sq.ft. building = 15 persons.

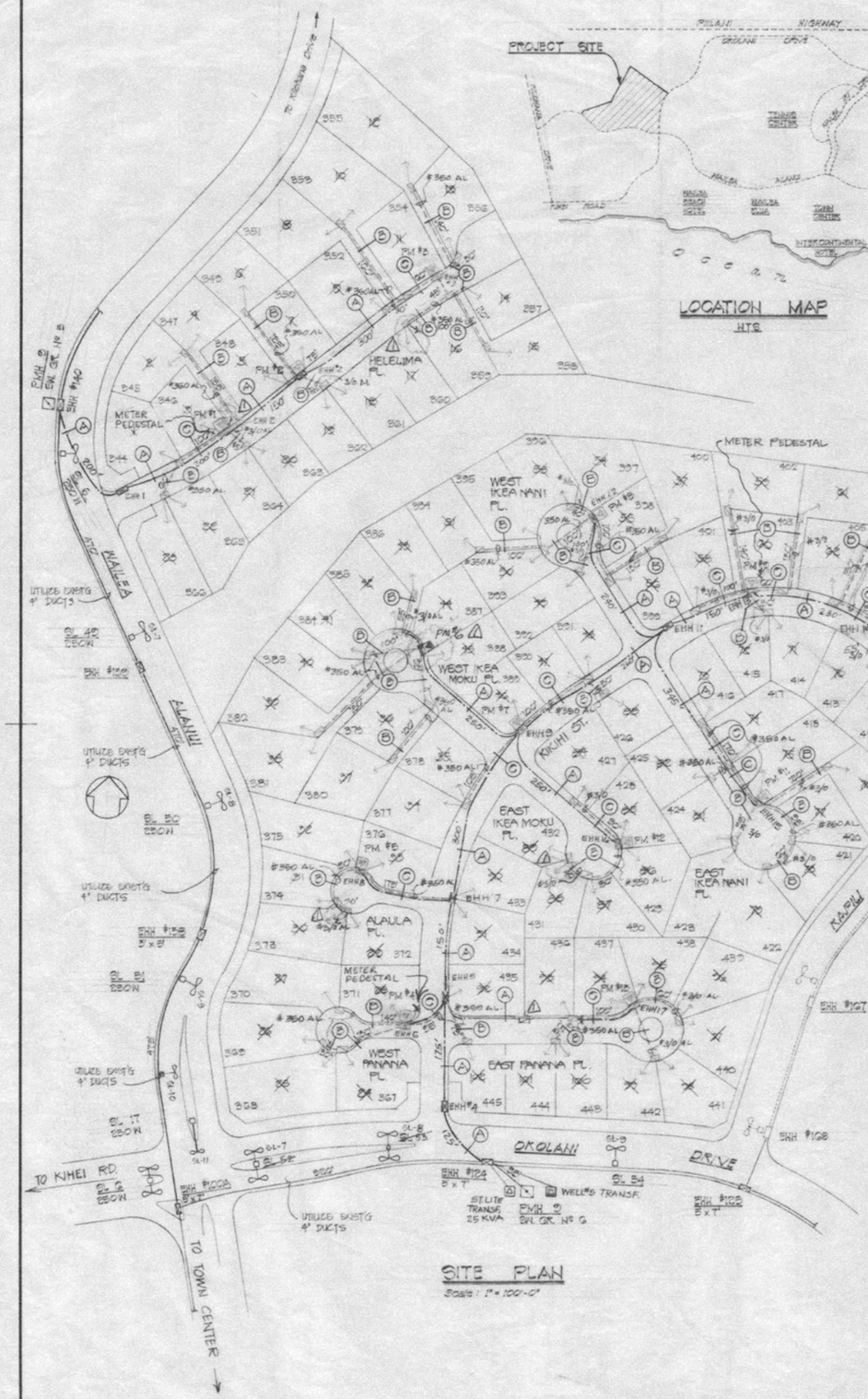
APPENDIX D

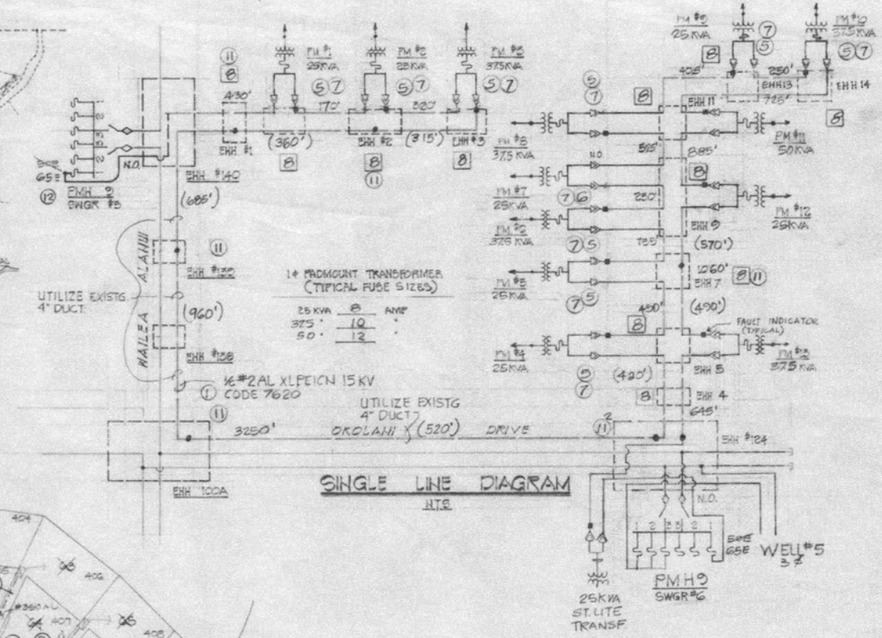
Electrical System References

APPENDIX D-1

MECo Reference Drawings


TRUE NORTH
WELL NO. 9
WELL NO. 10
KAPILULI STREET
PM-9 SWITCHGEAR PAD
(TRANSFORMER)
H.H. 161
H.H. 163
H.H. 164
H.H. 165
H.H. 167
H.H. 168
H.H. 169
H.H. 170
H.H. 171
H.H. 172
H.H. 173
H.H. 174
H.H. 175
H.H. 176
H.H. 177
H.H. 178
H.H. 179
H.H. 180
H.H. 181
H.H. 182
H.H. 183
H.H. 184
H.H. 185
H.H. 186
H.H. 187
H.H. 188
H.H. 189
H.H. 190
H.H. 191
H.H. 192
H.H. 193
H.H. 194
H.H. 195
H.H. 196
H.H. 197
H.H. 198
H.H. 199
H.H. 200
H.H. 201
H.H. 202
S/L #1
S/L #2
S/L #3
S/L #4
S/L #5
S/L #6
S/L #7
S/L #8
S/L #9
S/L #10
S/L #11
S/L #12
S/L #13
S/L #14
S/L #15
E13
E1-13
E1-12
E12
1-20
2-4'C
2-2'C
2-2'C (TRANSFORMER)
2-2'C (TRANSFORMER)
2-2'C (TRANSFORMER)
2-4'C
3-4'C
1-20
1-20
1-20





LINE	SMU	DESCRIPTION	QTY
1	21-1000-10	1/0 #2 AL XLPE 15 KV CABLE	10,500'
2	" " -15	#2 AL 600V TRIPLEX	60'
3	" " "	#6 AL " "	2,300'
4	" " "	#350 MCM AL 600V TRIPLEX	4,100'
5	23-1020-1	PADMOUNT TRANSFORMER	18
6	" - " -2	" " - OPEN FRONT	1
7	24-1001	SECONDARY TERMINATION - TRANER #350, #3/0, #2	67
8	SPECIAL	HANDHOLE GROUNDING	17
9	24-1006-1	SECONDARY SPLICE #350 TO #3/0	45
10	24-1000	" SPLICE #3/0 TO #2	20
11	26-1062-1	PREFAB SPLICE #2 TO #2	7
12	26-2004-2	PMH-9 SWITCHGEAR TERMINATION #2 AL	2
13			
14			
15			
16			

MECo NOTES :

1. INSTALL PRIMARY PER ONE LINE DIAGRAM
2. " 1φ 7.2/12.47 KV 240/120V PADMOUNT TRANSFORMER
3. " SECONDARY AS FOLLOWS :
   A. 2½ #3/0 AL XLPE 600V CABLES AND #6 AL NEUTRAL FOR ALL SERVICE TAILS
   B. 2½ #6 AL XLPE 600V CABLES AND #6 AL NEUTRAL FOR ALL ROAD CROSSINGS EXCEPT WHERE NOTED.
   C. 2½ #350 MCM AL XLPE 600V CABLES AND #3/0 AL NEUTRAL FOR ALL SECONDARY DISTRIBUTION EXCEPT WHERE NOTED.

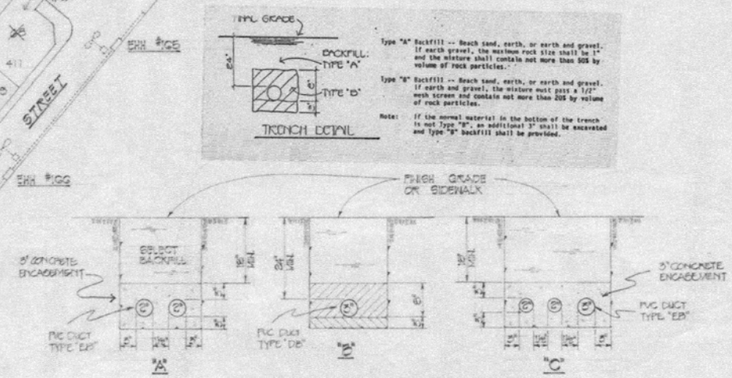
CUSTOMER NOTES :

1. DO ALL NECESSARY EXCAVATION AND BACKFILLING FOR DUCT LINES.
2. PREPARE ALL TRANSFORMER PAD SITES AS SHOWN.
3. CUSTOMER TO FURNISH AND INSTALL TRANSFORMER PADS.
4. FURNISH AND INSTALL ALL PVC CONDUITS IN ACCORDANCE WITH THE DUCT AND TRENCHING DETAILS.
5. AS DESIGN OF DISTRIBUTION SYSTEM WAS MADE FROM PRELIMINARY DRAWINGS, ANY ADDITIONAL HANDHOLES & RETAINING WALLS REQUIRED DUE TO GRADE OR CHANGES IN GRADE TO BE FURNISHED AND INSTALLED BY CUSTOMER.
6. REFER TO HAWAIIAN TELEPHONE CO. FOR THEIR DRAWINGS AND REQUIREMENTS.
7. FURNISH AND INSTALL #8 12 GAUGE PULL WIRE IN EACH DUCT.
8. THE ELECTRICAL UNDERGROUND SYSTEM INSTALLATION SHALL BE DONE IN ACCORDANCE WITH THE DRAWINGS, CONSTRUCTION STANDARDS, AND REQUIREMENTS AS SPECIFIED BY MECo.
9. COORDINATE ALL INSPECTIONS WITH MECo'S UNDERGROUND INSPECTOR MR. YASUO GO (871-2813) EXT. 315.
10. CUSTOMER TO FURNISH, INSTALL AND MAINTAIN ALL STREET LITES, STREET LITE STANDARDS AND CONDUCTORS WITHIN PRIVATE ROADWAY. CUSTOMER TO PROVIDE METERING FACILITIES AS REQUIRED FOR METERING/SERVICE FROM MECO METERS LOCATED ADJACENT TO LOTS 34 & 40.
11. STUB-OUTS FOR SERVICE TAILS TO BE ALL 3" PVC.

*A UTILITY CO. STANDBY MAN IS REQUIRED TO BE AT THE SITE AT THE TIME ANY NON-UTILITY CO. PERSONNEL WILL BE BREAKING INTO OR ENTERING ANY FACILITIES THAT CONTAIN ENERGIZED UTILITY CO. EQUIPMENT OR CABLES.

THREE WORKING DAYS ADVANCE NOTICE IS REQUIRED BY THE UTILITY CO. FOR ANY INSPECTION SERVICE OR STANDBY MAN.

CALL MECO -- PH. 871-7777



LEGEND :

- EXIST'G UNDERGROUND CONDUCTOR
- " HANDHOLE
- " STREET LITE (MECo) ON DEDICATED STREET
- " PMH-9 SWITCHGEAR
- " 1φ PADMOUNT TRANSFORMER
- " 3φ " "
- NEW UNDERGROUND PRIMARY CONDUCTOR
- " " SECONDARY CONDUCTOR
- " PADMOUNT 1φ TRANSFORMER
- " 2' x 4' PULLBOX
- " 5' x 5' HANDHOLE
- " STREET LITE BY CUSTOMER (PRIVATE)
- " SERVICE TAIL 3" DUCTS W/ #3/0 AL. 600V CABLE
- FUTURE STREET LITE (MECo) ON DEDICATED STREET
- " UNDERGROUND CONDUCTOR
- " HANDHOLE

REFERENCE DRAWINGS :

30-2008	2' x 4' PULLBOX
18841	5' x 5' HANDHOLE TYPE 5B
30-5001	PADMOUNT TRANSFORMER 1φ
1-5-226	WAILEA OFFSITE UNDERGROUND DISTRIBUTION SYSTEM - WAILEA ALANUI & OKOLANI ST.

SUBSTATION Nº 25B

WAILEA 2
CIRCUIT #1320

NO.	DATE	REVISIONS	BY	CHK'D	APP'D
3	7-14-88	RENUMBERED UNDERGROUND ST. LITES	DU		
2	1-15-88	REVISED LOT NUMBERS	ASM		
1	4-29-87	Changed transf. pads & svc. tail location add. 1'-2'x4' Pullbox	RF		

1 φ UNDERGROUND DISTRIBUTION SYSTEM FOR

KIALOA SUBDIVISION

AT WAILEA ALANUI AND OKOLANI DRIVE

102 LOTS (LOT ONLY)

DESIGNED: R. Fukushima/R. Abe | DRAWN: W.W. | DATE | SCALE: As Noted

CHECKED: NO. ELEC. | MECH. | STRUC.

APPROVAL: for C.A. Kawanol 4/9/87

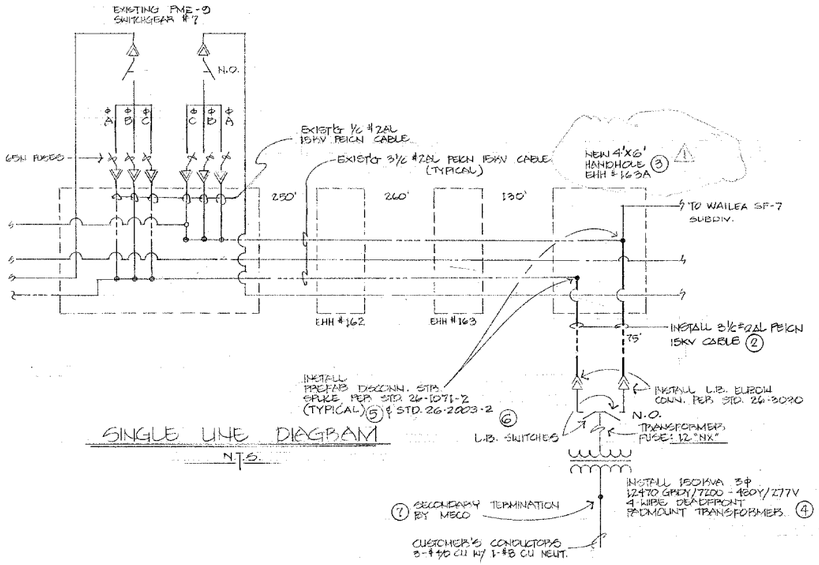
MAUI ELECTRIC CO., LTD.
P. O. BOX 398
KAHULUI, MAUI, HAWAII 96732

DRAWING NUMBER

1-5-339

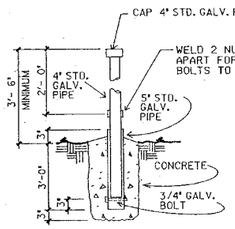
Sheet 1 of 1 Sheets

PRINTED ON DIEPO NO. 1000M CLEARPRINT



SINGLE LINE DIAGRAM

N.T.S.



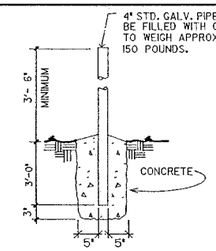
DETAIL "X-1"

NOTE:

BARRIER POSTS ARE TO BE PAINTED YELLOW ACCORDING TO ANSI SPEC Z53.1 TO COMPLY WITH OSHA STANDARDS FOR COLORING CODE.

THE PIPE THAT IS TO BE PLACED DIRECTLY IN FRONT OF THE DOORS SHALL NOT BE FILLED WITH CONCRETE. THE PIPE SHALL BE CAPPED AND THE WELDED NUTS USED TO SCREW IN BOLTS TO ACT AS HANDLES FOR LIFTING. THE BOLTS ARE TO BE REMOVED AFTER INSTALLATION.

UG-30-5000



DETAIL "X"

NOTE:

BARRIER POSTS ARE TO BE PAINTED YELLOW ACCORDING TO ANSI SPEC Z53.1 TO COMPLY WITH OSHA STANDARDS FOR COLORING CODE.

UG-30-5000

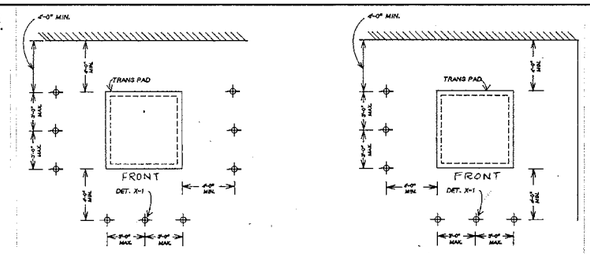
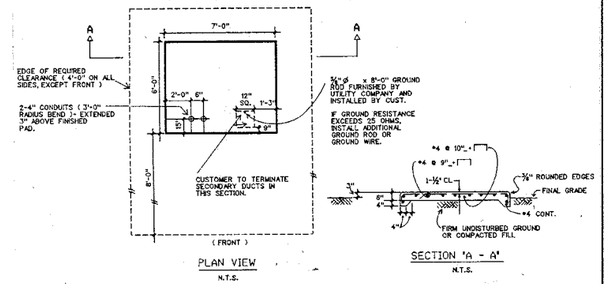


FIGURE 1

FIGURE 2

POST TYPE BARRIER (STANCHION)



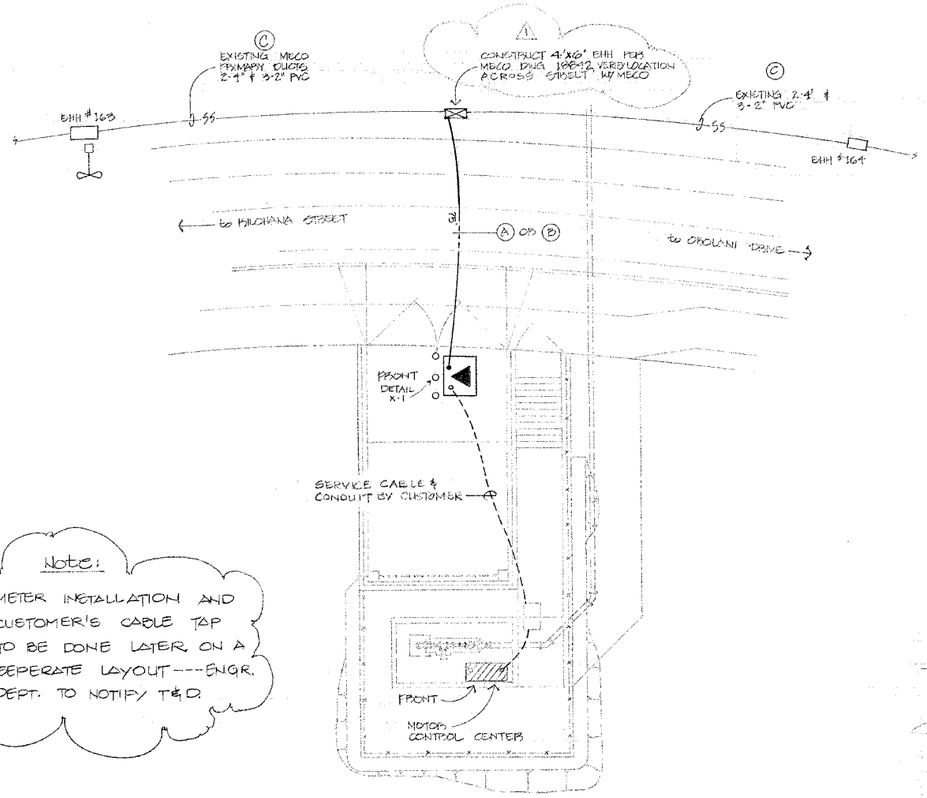
PLAN VIEW

N.T.S.

SECTION 'A - A'

N.T.S.

75 - 300 KVA TRANSFORMER PAD



ELECTRICAL SITE PLAN

SCALE: 1" = 10'

Note:

METER INSTALLATION AND CUSTOMER'S CABLE TAP TO BE DONE LATER ON A SEPERATE LAYOUT --- ENGR. DEPT. TO NOTIFY T&D

DUCT NOTES

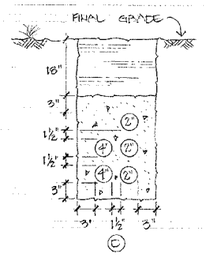
1. ALL CONDUITS TO BE PVC SCHEDULE 40.
2. ALL CONDUITS TO CONTAIN A POLYOLEFIN PULL LINE (JET LINE CAT. #232 OR EQUIVALENT).
3. AFTER THE CONDUITS ARE INSTALLED, THE CUSTOMER SHALL PASS A SMOOTH BULLET-SHAPED WOODEN TEST MANDREL THROUGH THE ENTIRE LENGTH OF EACH CONDUIT TO TEST FOR FREEDOM OF BURRS AND OBSTRUCTIONS.
4. BACKFILL LEGEND:

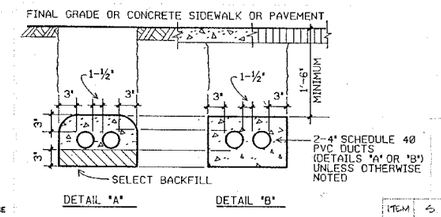
TYPE "A" BACKFILL: BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH GRAVEL, THE MAXIMUM ROCK SIZE SHALL BE 1" AND THE MIXTURE SHALL CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES.

TYPE "B" BACKFILL: BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH AND GRAVEL, THE MIXTURE MUST PASS A 1/2" MESH SCREEN AND CONTAIN NOT MORE THAN 20% BY VOLUME OF ROCK PARTICLES.

NOTE: IF THE NORMAL MATERIAL IN THE BOTTOM OF THE TRENCH IS NOT TYPE "B", AN ADDITIONAL 3" SHALL BE EXCAVATED AND TYPE "B" BACKFILL SHALL BE PROVIDED.

CONCRETE ENCASEMENT STRENGTH: 2500 PSI IN 28 DAYS MAXIMUM AGREGATE: 3/4"



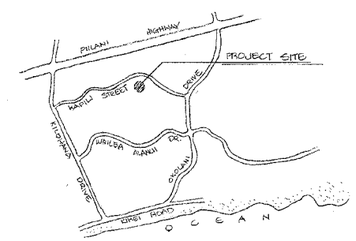


DETAIL "A" DETAIL "B"

DUCT ENCASEMENT DETAIL

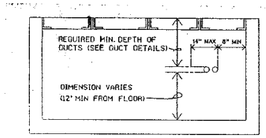
N.T.S.

ITEM	S M U	CODE	DESCRIPTION	QTY.
1		7680	1/C #2AL PRIGN 15kV CABLE	
2		7623	3-1/C #2AL PRIGN 15kV CABLE	630
3	21-1046-3		BACKING AND GROUND BUS DETAILS FOR 4'X6' HH	1
4	23-2012		3Φ PADMOUNT TRANSFORMER DEADFRONT #2A	1
5	26-1071-2		PREFAB DISCONN. STD. SPLICE 1/C #2AL PRIGN	3
6	26-2003-2		PREFAB DISCONN. "T" SPLICE 1/C #2AL PRIGN	3
7		11431	TERMINATOR CU # 4/0	3
8		3128	FAULT INDICATOR	6



LOCATION MAP

N.T.S.



NOTE: 18" MAX. DIMENSION FOR LOCATING DUCT(S) IN SPACE ALLOCATED.

HANDHOLE LONGITUDINAL SECTION FOR CONDUIT ENTRANCE

N.T.S.

ELECTRICAL LEGEND

- EXISTING HANDHOLES
- EXISTING UNDERGROUND
- EXISTING STREET LIGHT
- NEW 4'X6' HANDHOLE (6'-0" DEEP)
- METER LOOP
- PADMOUNT TRANSFORMERS
- UNDERGROUND SECONDARY
- NEW UNDERGROUND 3Φ PRIMARY FEEDERS

REFERENCE DRAWINGS

1-5-372	KAPILI ST. IMPROVEMENTS
1-5-476	OKOLANI DRIVE EXTENSION
1-5-494	WAILEA SF-7 SUBDIVISION
18842	4'X6' CONCRETE HANDHOLE 6'-0" DEEP
16688	MISCELLANEOUS HANDHOLE DETAIL

A UTILITY CO. STANDBY MAN IS REQUIRED TO BE AT THE SITE AT THE TIME ANY NON-UTILITY CO. PERSONNEL WILL BE BREAKING INTO OR ENTERING ANY FACILITIES THAT CONTAIN ENERGIZED UTILITY CO. EQUIPMENT OR CABLES.

THREE WORKING DAYS ADVANCE NOTICE IS REQUIRED BY THE UTILITY CO. FOR ANY INSPECTION SERVICE OR STANDBY MAN.

CALL MECO -- PH: 87-7777

EASEMENT DOCUMENT NO: _____

SUBSTATION: #23 - WAILEA
CIRCUIT: 1280 - KIHEI
12470 GRDY/7200V

ESTIMATED DEMAND: 130 kW

TAX MAP KEY: 2-01-08:42

REFER TO MAP(S): _____

APPLICATION NO: M117658

JOINT POLE NO: N/A

NO.	DATE	REVISIONS	BY	CHK'D	APP'D
1	5-6-91	Change 3'x5' to 4'x6' HANDHOLE	RF		K.

3Φ PADMOUNT TRANSFORMER INSTALLATION for

KAILEA GOLF COURSE - WELL #10

KAPILI STREET, WAILEA

DESIGNED RON FURUSHIMA | DRAWN FEB | DATE 4-6-91 | SCALE AS NOTED

CHECKED

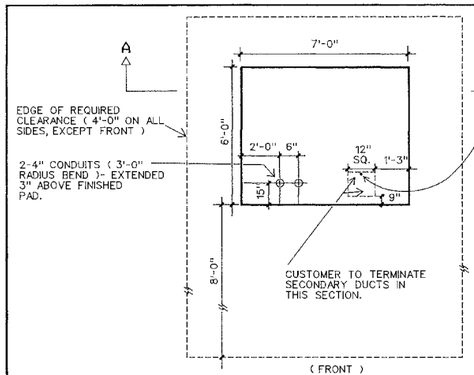
DESIGNER | SUPERVISOR | STAFF ENGINEER

MAUI ELECTRIC COMPANY, LTD.
KAHULUI, MAUI, HAWAII 96732

APPROVAL: Edward F. Reinhardt 4/6/91

DRAWING NUMBER 1-5-506

SHEET 1 OF 1

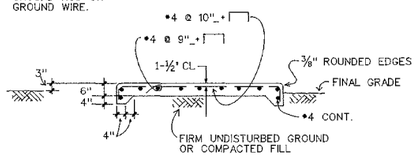


PLAN VIEW

N.T.S.

5/8" Ø x 8'-0" GROUND ROD FURNISHED BY UTILITY COMPANY AND INSTALLED BY CUST.

IF GROUND RESISTANCE EXCEEDS 25 OHMS, INSTALL ADDITIONAL GROUND ROD OR GROUND WIRE.



SECTION "A - A"

N.T.S.

DUCT NOTES

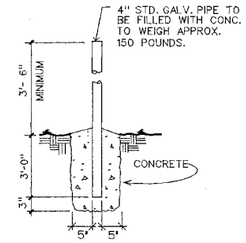
1. ALL CONDUITS TO BE PVC SCHEDULE 40.
2. ALL CONDUITS TO CONTAIN A POLYOLEFIN PULL LINE (JET LINE CAT. #232 OR EQUIVALENT).
3. AFTER THE CONDUITS ARE INSTALLED, THE CUSTOMER SHALL PASS A SMOOTH BULLET-SHAPED WOODEN TEST MANDREL THROUGH THE ENTIRE LENGTH OF EACH CONDUIT TO TEST FOR FREEDOM OF BURRS AND OBSTRUCTIONS.
4. BACKFILL LEGEND:

TYPE 'A' BACKFILL: BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH GRAVEL, THE MAXIMUM ROCK SIZE SHALL BE 1" AND THE MIXTURE SHALL CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES.

TYPE 'B' BACKFILL: BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH AND GRAVEL, THE MIXTURE MUST PASS A 1/2" MESH SCREEN AND CONTAIN NOT MORE THAN 20% BY VOLUME OF ROCK PARTICLES.

NOTE: IF THE NORMAL MATERIAL IN THE BOTTOM OF THE TRENCH IS NOT TYPE 'B', AN ADDITIONAL 3" SHALL BE EXCAVATED AND TYPE 'B' BACKFILL SHALL BE PROVIDED.

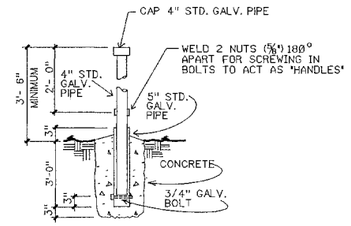
CONCRETE ENCASEMENT
STRENGTH 2500 PSI IN 28 DAYS
MAXIMUM AGGREGATE 3/4"



DETAIL "X"

NOTE:
BARRIER POSTS ARE TO BE PAINTED YELLOW ACCORDING TO ANSI SPEC Z53.1 TO COMPLY WITH OSHA STANDARDS FOR COLORING CODE.

UG-30-5000



DETAIL "X-1"

NOTE:
BARRIER POSTS ARE TO BE PAINTED YELLOW ACCORDING TO ANSI SPEC Z53.1 TO COMPLY WITH OSHA STANDARDS FOR COLORING CODE.

THE PIPE THAT IS TO BE PLACED DIRECTLY IN FRONT OF THE DOORS SHALL NOT BE FILLED WITH CONCRETE. THE PIPE SHALL BE CAPPED AND THE WELDED NUTS USED TO SCREW IN BOLTS TO ACT AS HANDLES FOR LIFTING. THE BOLTS ARE TO BE REMOVED AFTER INSTALLATION.

UG-30-5000

NOTES

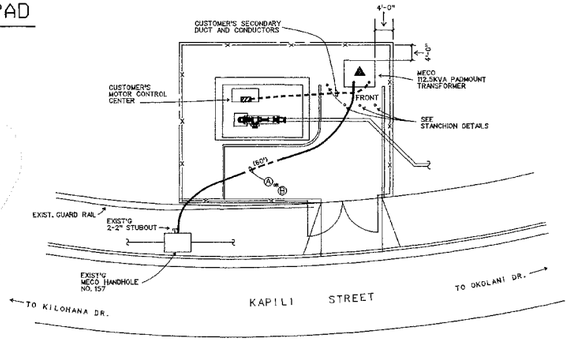
1. THE CUSTOMER IS TO FURNISH MATERIALS AND CONSTRUCT THE FACILITIES FOR THE PADMOUNTED TRANSFORMER INCLUDING THE CONCRETE PAD, PRIMARY AND SECONDARY DUCTS.
2. PRIMARY DUCTS, THE BENDS INTO THE PRIMARY COMPARTMENT OF THE PADMOUNTED TRANSFORMER MAY BE GALVANIZED STEEL CONDUIT OF SCHED. 40 PVC, WITH A 36"-48" RADIUS.
3. SECONDARY DUCTS: THE CUSTOMER IS TO SUPPLY AND INSTALL ALL THE SECONDARY DUCTS AND CABLES. THE SECONDARY CABLES ARE TO BE A MINIMUM OF 7'-0" LONG FROM THE END OF THE DUCT.
4. THE UTILITY COMPANY SHALL HAVE 24-HOUR ACCESS TO THE TRANSFORMER WITHOUT GOING THROUGH LOCKED AREAS.
5. THE UTILITY COMPANY SHALL HAVE A MINIMUM 10 FT. WIDE VEHICULAR ACCESS THAT IS APPROVED BY THE UTILITY CO. TO THE TRANSFORMER.
6. BENDS DUE TO CHANGES OF GRADE ARE TO HAVE A MINIMUM RADIUS OF 20'-0". THE CUSTOMER IS TO INSTALL THE DUCTS AS REQUIRED BY THE UTILITY COMPANY AND IN ACCORDANCE WITH DUCT ENCASEMENT DETAILS.
7. THE COPPERWELD GROUND ROD 5/8" x 8'-0", SUPPLIED BY THE UTILITY COMPANY, TO BE INSTALLED BY THE CUSTOMER IN EACH PAD AS SHOWN ON THE DRAWING. THE CUSTOMER IS TO PICK UP THE RODS AT THE UTILITY COMPANY SUPPLY ROOM. THE RODS ARE TO EXTEND 6" ABOVE THE FINISHED PAD. TIE RODS TO A GALV. IRON OR COPPER WATER PIPE WITH #1/0 COPPER WIRE. THIS MAY BE ELIMINATED WHERE THE WATER PIPE IS MORE THAN 25 FT. AWAY.
8. CONCRETE NOTES
   A. CONCRETE STRENGTH 3,000 P.S.I. IN 28 DAYS.
   B. CURING BY APPROVED METHOD.
   C. POUR CONCRETE ON FIRM, UNDISTURBED SOIL OR COMPACTED FILL.
9. NO PERMANENT OR TEMPORARY STRUCTURE OR OBJECT SHALL BE ERECTED OR PLACED WITHIN THE INDICATED CLEAR SPACE.
10. WHEN THE CONCRETE PADS ARE LOCATED IN THE VICINITY OF EXISTING OR FUTURE COMBUSTIBLE MATERIAL, COMBUSTIBLE BUILDINGS OR PARTS OF BUILDINGS, THE CUSTOMER SHALL PROVIDE SAFEGUARDS AS OUTLINED IN PARAGRAPH 450-26 OF THE NATIONAL ELECTRICAL CODE (LATEST REVISION), SUBJECT TO THE APPROVAL OF THE COUNTY BUILDING INSPECTOR. IF FIRE RESISTANT CONCRETE CURBS ARE REQUIRED, THE CUSTOMER SHALL ERECT A 5" WIDE BY 14" DEEP CONCRETE CURB AROUND THE TRANSFORMER PAD, 2 FT. FROM THE EDGES. THE CURB SHALL PROTRUDE 2" ABOVE THE PAD FINISHED GRADE, AND THE SPACE BETWEEN THE PAD AND THE CURB SHALL BE FILLED WITH 1" OF GRADE "A" CRUSHED LAVA ROCK.
11. THE FRONT SIDES OF THE CONCRETE PADS SHALL ALWAYS BE LOCATED TO FACE THE VEHICULAR ACCESS (SEE NOTES 4 & 5), AND SHALL BE FREE AND CLEAR OF ANY CONSTRUCTION OR PARKED VEHICLE AT ALL TIMES.
12. WHEN PARTS OF BUILDINGS OR STRUCTURES ARE LOCATED DIRECTLY OVER THE CONCRETE PADS, A MINIMUM VERTICLE CLEARANCE OF 15'-0" FROM THE PAD GRADE IS REQUIRED. IN ADDITION, 4'-0" CLEARANCE FROM ANY PERMANENT OR TEMPORARY OBJECT OR STRUCTURE SHALL BE REQUIRED FROM EITHER SIDES OF THE PAD TO FACILITATE TRANSFORMER REMOVAL OR CHANGEOUT. THE CUSTOMER SHALL PROVIDE ADEQUATE SAFEGUARDS AS OUTLINED IN PARAGRAPH 450-26 OF THE NATIONAL ELECTRICAL CODE (LATEST REVISION), AND SUBJECT TO APPROVAL OF THE COUNTY BUILDING INSPECTOR.
13. ALL DUCTLINGS SHALL CONTAIN A POLYOLEFIN PULL LINE (JET LINE CAT. #232 OR EQUIVALENT).
14. SELECT BACKFILL: AS SPECIFIED IN THE UTILITY COMPANY'S SERVICE INSTALLATION MANUAL.
15. THE UTILITY COMPANY'S METERING FACILITIES SHALL BE INSTALLED IN READILY ACCESSIBLE, PREFERABLY UNLOCKED AREAS, HOWEVER, WHEN THE UTILITY COMPANY'S METERING FACILITIES OR ANY OTHER EQUIPMENT ACCESSIBLE TO THE UTILITY COMPANY IS LOCATED IN ENCLOSED AREAS WHICH ARE LOCKED, THOSE AREAS SHALL BE PROVIDED WITH DOORS OR COVERS WHICH ARE PADLOCKABLE OR FITTED WITH A CYLINDER TYPE "BEST UNIVERSAL" LOCK. THE UTILITY COMPANY WILL PROVIDE THE PADLOCK OR CORE.
16. TWO PRIMARY DUCTS ARE REQUIRED TO FACILITATE MAINTENANCE OF SERVICE IN THE FUTURE. HORIZONTAL BENDS ARE TO HAVE A MINIMUM RADIUS OF 20'-0".
17. THE TRANSFORMER PADS ARE TO BE LOCATED BY THE CUSTOMER AND APPROVED BY THE UTILITY COMPANY. THE UTILITY COMPANY SHALL PROVIDE THE CUSTOMER WITH THE TRANSFORMER SOUND LEVEL FOR EACH PROJECT AND ONLY STANDARD NEMA SOUND LEVEL TRANSFORMERS SHALL BE INSTALLED. IT WILL BE THE RESPONSIBILITY OF THE CUSTOMER TO MEET THE ALLOWABLE SOUND LEVEL LIMITS AT THE PROPERTY LINES AND ALSO CONSIDER THE PROXIMITY OF THE TRANSFORMER TO THE BUILDINGS WINDOWS, WALLS, ETC. ON HIS PROPERTY TO LIMIT ANY OBJECTIONABLE NOISE TO OCCUPANTS IN THAT PROPERTY.
18. AFTER THE CONDUITS ARE INSTALLED, THE CUSTOMER SHALL PASS A SMOOTH BULLET-SHAPED WOODEN TEST MANDREL THROUGH THE ENTIRE LENGTH OF EACH CONDUIT TO TEST FOR FREEDOM OF BURRS AND OBSTRUCTIONS.
19. INSPECTION: THREE WORKING DAYS ADVANCE NOTICE REQUIRED BY THE UTILITY COMPANY FOR ANY INSPECTION SERVICE.

A UTILITY STAND-BY MAN IS REQUIRED TO BE AT THE SITE AT THE TIME ANY NON-UTILITY CO. PERSONNEL WILL BE BREAKING INTO OR ENTERING ANY FACILITIES THAT CONTAIN ENERGIZED UTILITY EQUIPMENT OR CABLES.

CALL MECO - PHONE 871-7777

75 - 300 KVA TRANSFORMER PAD

LINE	SMU	CODE	DESCRIPTION	QTY
1		07623	CONDUCTOR: 3-1/C - #2AL PEICN 15KV	510'
2	23-2012		3Ø PADMT. TRANSF. DEADFRONT #2AL PEICN PRIM. CONN.	1
3	26-2003-5		3-1/C DISC. T SPLICE #4/0 PEICN RUN W/#2 PEICN TAP	1
4		11670	TERM. CBL. ELBOW NON-LOADBREAK #2AL	3
5		11650	BAILING ASSY. PREFAB 15KV SPLICE	3
6		11428	TERM. COMPR. 1 HOLE TD - CU 1/0	3
7		03125	INDICATOR, CABLE FAULT	3

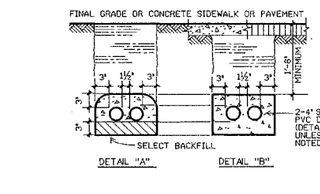


INSET "A"

SCALE: 1" = 10'

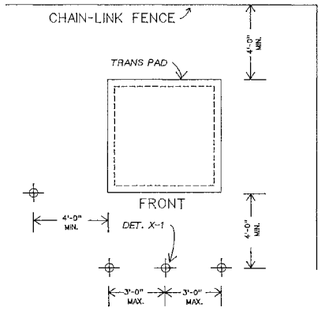
POST TYPE BARRIER (STANCHION)

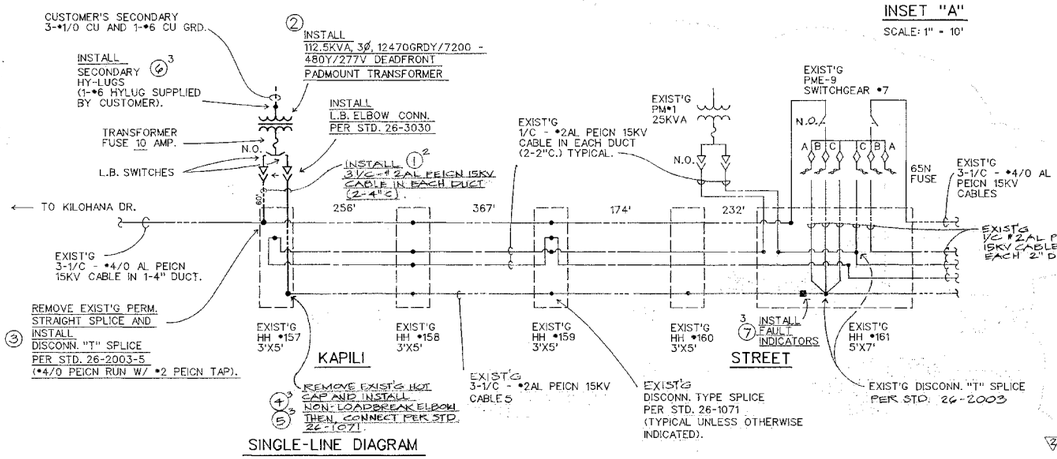
N.T.S.



DUCT ENCASEMENT DETAIL

N.T.S.





SINGLE-LINE DIAGRAM

N.T.S.

CONSTRUCTION NOTES:

1. THIS PROJECT IS SUBJECT TO THE COMPLETION OF UNDERGROUND CABLE INSTALLATION FOR WAILEA RESORT (KAPILI STREET) BY LARRY BERNADES' PROJECT NO. M103552. ALSO THE COMPLETION OF OR COORDINATION WITH THE 3 PHASE PADMOUNT INSTALLATION FOR WAILEA GOLF COURSE WELL NO. 10 BY RON FUKUSHIMA'S PROJECT NO. M117658.
2. C.T. INSTALL METER (CTY. INSP.: _____). 3Ø, 4W, 13-JAW, 277/480V RATE "J".

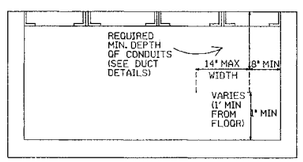
REFERENCE DWG.

MECO DWG. NO.: 1-5-372 U.G. CABLE INSTALLATION FOR WAILEA RESORT (KAPILI STREET)

MECO DWG. NO.: 1-5-506 3Ø PADMT. TRANSFORMER INSTALLATION FOR WAILEA GOLF COURSE WELL NO. 10

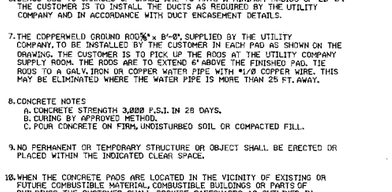
ELECTRICAL LEGEND:

- EXISTING PADMOUNT TRANSFORMER
- EXISTING PADMOUNT SWITCHGEAR
- EXISTING HANDHOLES
- EXISTING UNDERGROUND
- EXISTING STREET LIGHT
- NEW METER LOOP
- NEW PADMOUNT TRANSFORMER
- NEW UNDERGROUND SECONDARY (BY CUSTOMER)
- NEW UNDERGROUND 3Ø PRIMARY FEEDER



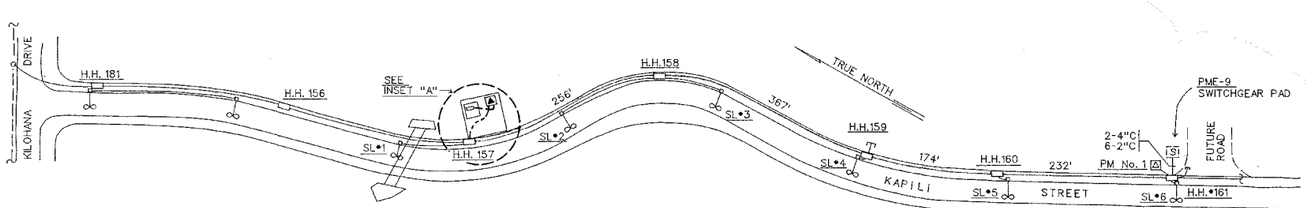
HANDHOLE LONGITUDINAL SECTION FOR CONDUIT ENTRANCE

N.T.S.



LOCATION MAP

N.T.S.



ELECTRICAL SITE PLAN

SCALE: 1"=100'

A UTILITY CO. STANDBY MAN IS REQUIRED TO BE AT THE SITE AT THE TIME ANY NON-UTILITY CO. PERSONNEL WILL BE BREAKING INTO OR ENTERING ANY FACILITIES THAT CONTAIN ENERGIZED UTILITY CO. EQUIPMENT OR CABLES.

THREE WORKING DAYS ADVANCE NOTICE IS REQUIRED BY THE UTILITY CO. FOR ANY INSPECTION SERVICE OR STANDBY MAN.

CALL MECO -- PH: 871-7777

EASEMENT DOCUMENT NO: N/A

SUBSTATION: 25 WAILEA
CIRCUIT: 1280 KIHEI
12.47KV
ESTIMATED DEMAND: 80KW
TAX MAP KEY: 2-1-08:42
REFER TO MAP(S): 4326 & 4328
APPLICATION NO: M117657
JOINT POLE NO: N/A

NO.	DATE	REVISIONS	BY	CHK'D	APP'D
2	8/1/92	REVISE PER CHANGES ON KAPILI ST PROJECT	ASM	ASM	[illegible]
1	7/14/92	REVISE PER CHANGES BY DLW-WATS ELEC	ASM	ASM	[illegible]

WAILEA GOLF COURSE WELL No. 9

KAPILI STREET — KIHEI

DESIGNED A. MIYAZAKI	DRAWN TL	DATE 3/27/90	SCALE AS NOTED	
CHECKED		MAUI ELECTRIC COMPANY, LTD. KAHULUI, MAUI, HAWAII 96732		
DESIGNER	SUPERVISOR	STAFF ENGINEER		
APPROVAL: Richard L. Reinhardt 9/6/90		DRAWING NUMBER 1-5-507		
		SHEET 1 OF 1		

GENERAL NOTE:
ALL MECO SYMBOLS ARE NOT TO SCALE

KILOHANA DRIVE

to Piilani Hy.

to S. Kihei Rd.

WAILEA ALANUI DRIVE

TRUE NORTH

BUILDING SETBACK

PROPERTY LINE

CUSTOMER TO CORE 2-2" DUCTS (CALL MECO UG INSPECTOR TO HAVE THE BOX MARKED)

EXISTING 4" DUCT

EHH #177 3'x5'

EHH #143 3'x5'

EHH #142 3'x5'

EHH #144 3'x5'

SEE SINGLE LINE DIAGRAM

PM-1 50 KVA

PM-2 50 KVA

PM-3 50 KVA

PM-4 50 KVA

PM-5 25 KVA

PM-6 25 KVA

PM-7 25 KVA

PM-8 50 KVA

HH-1 4'x6'

HH-2 3'x5'

HH-3 3'x5'

HH-4 4'x6'

HH-5 3'x5'

HH-6 3'x5'

HH-7 4'x6'

HH-8 4'x6'

HH-9 4'x6'

HH-10 4'x6'

HH-11 4'x6'

ROAD A

ROAD B

ROAD C

ROAD D

ROAD E

ROAD A1

ROAD B1

2"x4" CONC. PB

8' MIN.

CUSTOMER TO INSTALL STANCHIONS (SEE DETAIL ON SHT. 2)

UNIT 1
UNIT 2
UNIT 3
UNIT 4
UNIT 5
UNIT 6
UNIT 7
UNIT 8
UNIT 9
UNIT 10
UNIT 11
UNIT 12
UNIT 13
UNIT 14
UNIT 15
UNIT 16
UNIT 17
UNIT 18
UNIT 19
UNIT 20
UNIT 21
UNIT 22
UNIT 23
UNIT 24

MANAGER'S UNIT

POOL

FITNESS CENTER

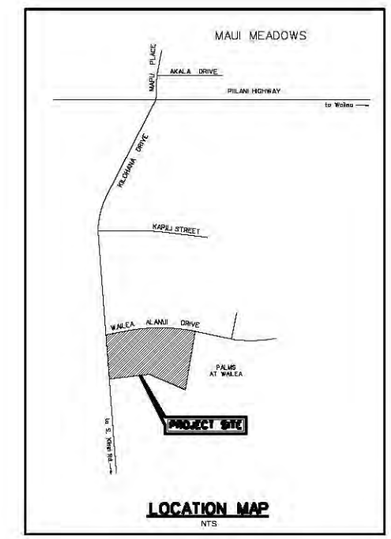
E6

E7A

E7

SITE PLAN

APPROX. SCALE: 1"=40'



LOCATION MAP

NTS

REFERENCE DRAWINGS:

MECO DRAWING 1-5-493 THE PALMS CONDO PHASE II @ WAILEA

EASEMENT DOCUMENT NO: M

SUBSTATION: SUB 25 WAILEA

CIRCUIT: 1280 KIHEI
12.47 KV

ESTIMATED DEMAND: 188 KW

TAX MAP KEY: 2-1-008:084

REFER TO MAP(S): 4328

APPLICATION NO: M0018629

JOINT POLE NO: N/A

NO.	DATE	REVISIONS	BY	CHK'D	APP'D

SINGLE-PHASE UNDERGROUND DISTRIBUTION SYSTEM FOR

PAPALI WAILEA

WAILEA ALANUI DR. — WAILEA

DESIGNED W. SHIMIZU — DRAWN WS — DATE 3/21/06 — SCALE AS SHOWN

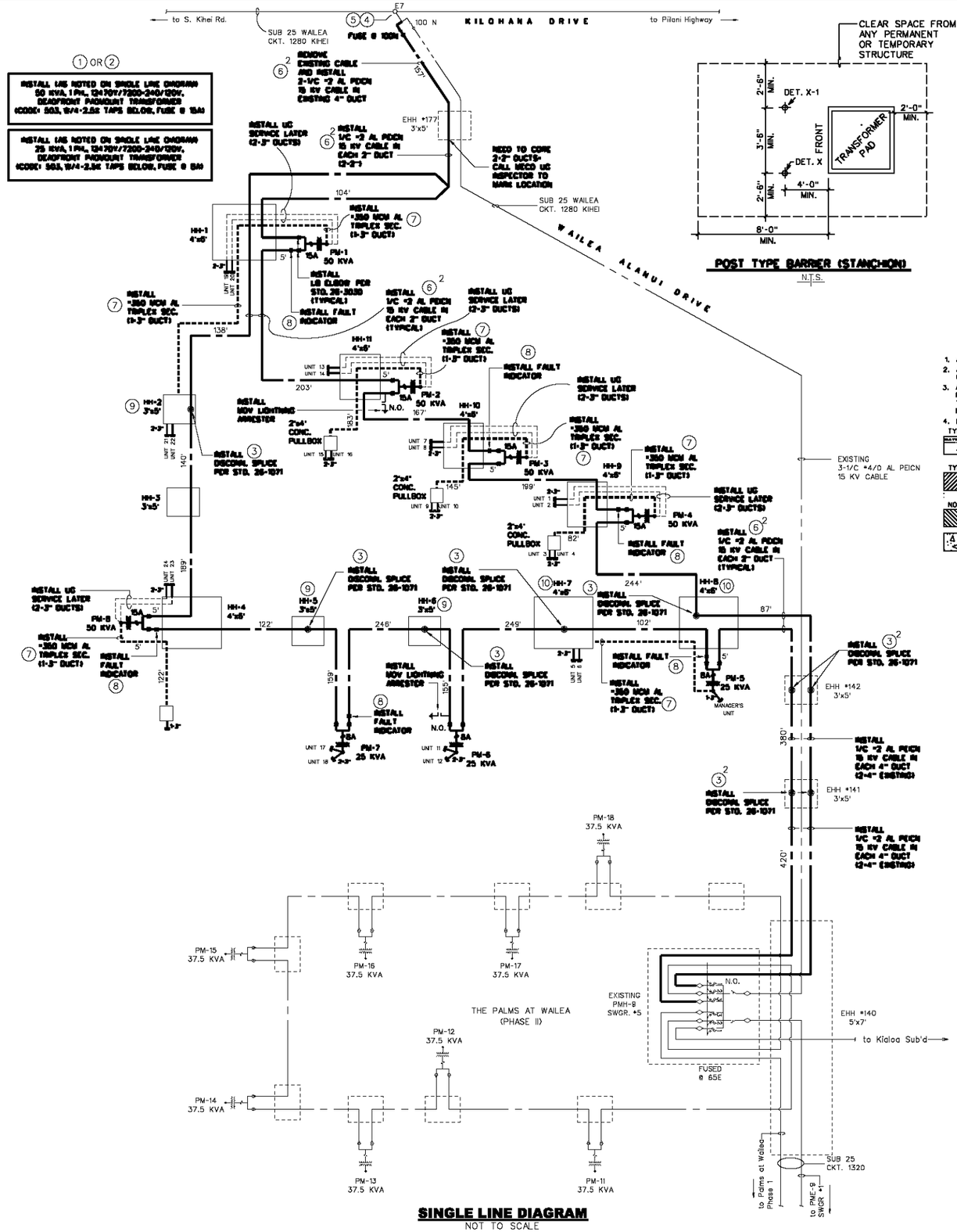
CHECKED — RV II CONSTRUCTION — CONSTRUCTION

DESIGNER — SUPERVISOR — STAFF ENGINEER

MAUI ELECTRIC COMPANY, LIMITED
KAHULUI, MAUI, HAWAII 96732

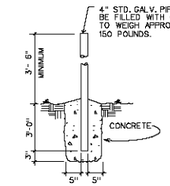
APPROVAL: Gregory Kauki

DRAWING NUMBER
1-5-944
SHEET 1 of 3



SINGLE LINE DIAGRAM
NOT TO SCALE

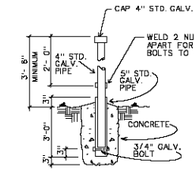
POST TYPE BARRIER (STANCHION)
N.T.S.



DETAIL "X"
N.T.S.

NOTE:
BARRIER POSTS ARE TO BE PAINTED YELLOW ACCORDING TO ANSI SPEC Z53.1 TO COMPLY WITH OSHA STANDARDS FOR COLORING CODE.

UG-30-5000



DETAIL "X-1"
N.T.S.

NOTE:
BARRIER POSTS ARE TO BE PAINTED YELLOW ACCORDING TO ANSI SPEC Z53.1 TO COMPLY WITH OSHA STANDARDS FOR COLORING CODE.

THE PIPE THAT IS TO BE PLACED DIRECTLY IN FRONT OF THE DOORS SHALL NOT BE FILLED WITH CONCRETE. THE PIPE SHALL BE CAPPED AND THE WELDED NUTS USED TO SCREW IN BOLTS TO ACT AS HANDLES FOR LIFTING. THE BOLTS ARE TO BE REMOVED AFTER INSTALLATION.

UG-30-5000

LINE	SMU	PART NO.	DESCRIPTION	QTY.
1	23-1020-1		1 PH. PADMOUNT TRANSF. DF PRI. CONN.	6
2	23-1020-2		1 PH. PADMOUNT TRANSF. DF OPEN PT. PRI. CONN.	2
3	26-1071-M1		1/C #2 AL PEICN 15 KV DISCONN. SPLICE	9
4	13-2001-52		1 PH. 4" RISER CONDUIT	1
5	13-2250-1A	(SIMILAR)	1PH. SINGLE PRI. RISER INSTALL W/CO FIG. 1	1
6		07620	1/C #2 AL PEICN 15 KV CABLE	5220'
7		08030	#350 MCM AL TRIPLEX 600V	1015'
8			FAULT INDICATOR (000130035)	6
9	21-1046-4		HANDHOLE RACKING AND GROUND BUS 3'x5'	3
10	21-1046-3		HANDHOLE RACKING AND GROUND BUS 4'x6'	1

CONSTRUCTION NOTES:

1. INSTALL (23) SPANS 1/C #2 AL PEICN 15 KV CABLE.
2. INSTALL 1-4" RISER AT POLE E7.
3. INSTALL (5) 50 KVA AND (3) 25 KVA, 1PH., 12470Y/7200-240/120V, PADMOUNT TRANSFORMERS.
4. INSTALL (12) SPANS #350 MCM AL TRIPLEX SECONDARY.

CUSTOMER NOTES:

1. EASEMENTS ARE REQUIRED AND THEY HAVE TO BE RECORDED PRIOR TO THE ENERGIZING OF THE PROJECT.

DUCT NOTES

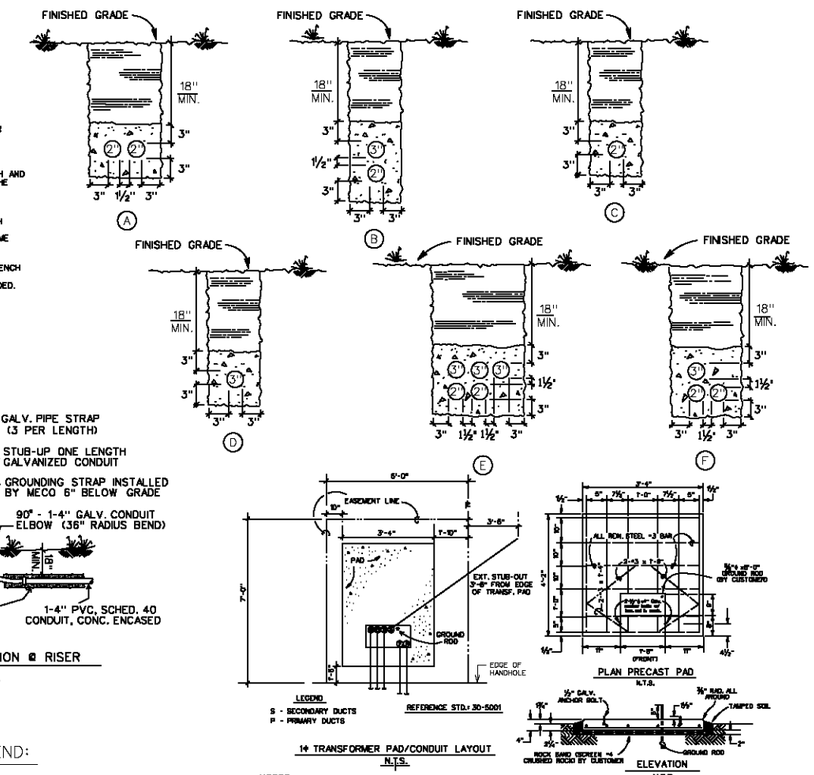
1. ALL CONDUITS TO BE PVC SCHEDULE 40.
2. ALL CONDUITS TO CONTAIN A "MULE TAPE" PULL LINE (WESCO CAT. #0725-92000 OR EQUIVALENT).
3. AFTER THE CONDUITS ARE INSTALLED, THE CUSTOMER SHALL PASS A SMOOTH BULLET-SHAPED WOODEN TEST MANDREL THROUGH THE ENTIRE LENGTH OF EACH CONDUIT TO TEST FOR FREEDOM OF BURRS AND OBSTRUCTIONS.
4. BACKFILL LEGEND:

TYPE "A" BACKFILL: BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH AND GRAVEL, THE MAXIMUM ROCK SIZE SHALL BE 1" AND THE MIXTURE SHALL CONTAIN NOT MORE THAN 50% BY VOLUME OF ROCK PARTICLES.

TYPE "B" BACKFILL: BEACH SAND, EARTH, OR EARTH AND GRAVEL. IF EARTH AND GRAVEL, THE MIXTURE MUST PASS A 1/2" MESH SCREEN AND CONTAIN NOT MORE THAN 20% BY VOLUME OF ROCK PARTICLES.

NOTE: IF THE NORMAL MATERIAL IN THE BOTTOM OF THE TRENCH IS NOT TYPE "B", AN ADDITIONAL 3" SHALL BE EXCAVATED AND TYPE "B" BACKFILL SHALL BE PROVIDED.

CONCRETE ENCASEMENT STRENGTH: 2500 PSI IN 28 DAYS MAXIMUM AGREGATE: 3/4"



LEGEND
S - SECONDARY DUCTS
P - PRIMARY DUCTS

REFERENCE STD.: 30-5001

1Φ TRANSFORMER PAD/CONDUIT LAYOUT
N.T.S.

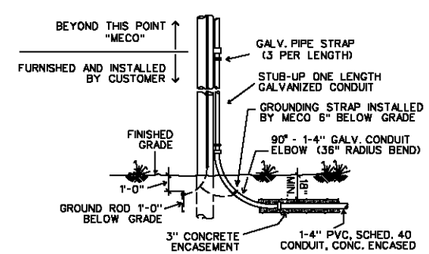
PLAN PRECAST PAD
N.T.S.

ELEVATION
N.T.S.

NOTES:

1. COMPRESSIVE STRENGTH OF CONCRETE SHALL BE 3,000 P.S.I. AT 28 DAYS
2. TOP OF PAD SHALL BE SMOOTH, TRUE, LEVEL, AND OTHER EXPOSED SURFACES SHALL BE SMOOTH AND FREE FROM DEFECTS.
3. CONCRETE SHALL BE CURED BY APPROVED METHOD (ASTM A70).
4. REINF. BARS SHALL BE CLEAN DEFORMED BARS.
5. PRECAST PAD MADE BY AMERON, MAUI.
6. ALL ITEMS SHALL BE FURNISHED IN PLACE COMPLETE BY CUSTOMER.
7. PAD SITE SHALL BE GRADED AND COMPACTED. COMPACTION SHALL MEET THE REQUIREMENTS OF THE COUNTY OF MAUI-"STANDARD SPECIFICATIONS FOR COMPACTING SIDEWALK AREA". THE HIGHER FRONT OR SIDEWALK CORNER SHALL MATCH THE ADJACENT SIDEWALK GRADE. SLOPE SHALL BE TOWARDS THE SIDEWALK OR ROAD, NOT EXCEEDING 1/2" PER FOOT.
8. AREA SURROUNDING THE TRANSFORMER SITE SHALL BE SUFFICIENTLY GRADED OR A SUITABLE RETAINING WALL BUILT TO PREVENT FUTURE FILLING IN OF THE LOT.
9. AN AREA 3'-8" x 4'-6" AND 3" DEEP SHALL BE EXCAVATED AFTER COMPACTION. THIS AREA SHALL BE FILLED WITH THE 2" BASE MATERIAL AND COMPACTED TO EXCAVATION.
10. AFTER THE CONDUITS ARE INSTALLED, THE CUSTOMER SHALL PASS A SMOOTH BULLET-SHAPED WOODEN TEST MANDREL THROUGH THE ENTIRE LENGTH OF EACH CONDUIT TO TEST FOR FREEDOM OF BURRS AND OBSTRUCTIONS.

CONCRETE PAD FOR PADMOUNT TRANSFORMER
N.T.S.



CONDUIT INSTALLATION @ RISER
N.T.S.

ELECTRICAL LEGEND:

- EXISTING POLE
- EXISTING ANCHOR
- EXISTING OVERHEAD CONDUCTORS
- EXISTING HANDHOLES
- EXISTING UNDERGROUND
- NEW 3'x5' HANDHOLE
- NEW 4'x6' HANDHOLE
- NEW 2'x4' PULLBOX
- FRONT NEW PADMOUNT TRANSFORMER
- NEW UNDERGROUND SECONDARY
- NEW UNDERGROUND 1Φ PRIMARY FEEDER
- NEW 3" STUBOUT

A UTILITY CO. STANDBY MAN IS REQUIRED TO BE AT THE SITE AT THE TIME ANY NON-UTILITY CO. PERSONNEL WILL BE WORKING INTO OR OUTSIDE ANY FACILITIES THAT CONTAIN ENERGIZED UTILITY CO. EQUIPMENT OR CABLES.

THREE WORKING DAYS ADVANCE NOTICE IS REQUIRED BY THE UTILITY CO. FOR ANY INSPECTION SERVICE OR STANDBY MAN.

CALL MECO -- PH# 871-7777

MECO DRAWING 1-5-493 THE PALMS CONDO PHASE II @ WAILEA

EASEMENT DOCUMENT NO: M
SUBSTATION: SUB 25 WAILEA
CIRCUIT: 1280 KIHEI
12.47 KV
ESTIMATED DEMAND: 188 KW
TAX MAP KEY: 2-1-008:084
REFER TO MAP(S): 4328
APPLICATION NO: M0018629
JOINT POLE NO: N/A

NO.	DATE	REVISIONS	BY	CHK'D	APP'D

SINGLE-PHASE UNDERGROUND DISTRIBUTION SYSTEM FOR

PAPALI WAILEA

WAILEA ALANUI DR. — WAILEA

DESIGNED W. SHIMIZU	DRAWN WS	DATE 3/21/06	SCALE AS SHOWN
CHECKED	RV II CONSTRUCTION	CONSTRUCTION	MAUI ELECTRIC COMPANY, LIMITED KAHULUI, MAUI, HAWAII 96732
DESIGNER	SUPERVISOR	STAT. ENGINEER	

APPROVAL: Gregory Kauhi

DRAWING NUMBER **1-5-944**

SHEET 2 of 3

APPENDIX D-2

Preliminary Cost Estimate

ROUGH COST ESTIMATE						
Wailea SF-S CPR Condo Development						
10/31/2019						
DESCRIPTION	UNIT	QTY	Material Cost	Total Material		Total Labor & Material
Install 6'x11'hh (MECO)	EA	1	$18,000	$18,000		$22,500
Install 5'x7'hh (MECO)	EA	1	$11,400	$11,400		$14,250
Install 4'x6'hh (MECO)	EA	23	$8,840	$203,320		$254,150
Install 2'x4'pb (MECO)	EA	40	$1,625	$65,000		$81,250
Install 4'x6'hh (HTCO)	EA	3	$8,840	$26,520		$33,150
Install 3'x5'hh (HTCO)	EA	2	$7,410	$14,820		$18,525
Install 2'x4'pb (HTCO)	EA	25	$1,625	$40,625		$50,781
Install 436Tpb (HTCO)	EA	37	$220	$8,140		$10,175
Install 3'x5'hh (CATV)	EA	2	$7,410	$14,820		$18,525
Install 2'x4'pb (CATV)	EA	28	$1,625	$45,500		$56,875
Install 436Tpb (CATV)	EA	10	$220	$2,200		$2,750
Install 434Tpb (CATV)	EA	27	$300	$8,100		$10,125
Install 436Tpb (private)	EA	25	$220	$5,500		$6,875
Install street light base (private)	EA	18	$1,700	$30,600		$38,250
Install street light pole.fixture (private)	EA	18	$6,000	$108,000		$135,000
Install 4" conduit	LF	16465	$15	$246,975		$308,719
Install 3" conduit	LF	1005	$13	$12,563		$15,703
Install 2" conduit	LF	22145	$9	$193,769		$242,211
Install 1" conduit	LF	4780	$5	$23,900		$29,875
Trench & backfill	LF	10225	$10	$102,250		$127,813
Concrete encasement	CY	841	$60	$50,460		$63,075
UG marking tape, 6" wide	LF	19375	$2	$38,750		$48,438
Install PME switchgear pad	EA	2	$5,000	$10,000		$12,500
Install 1-phase transformer pad	EA	20	$1,000	$20,000		$25,000
Install fiber pad (HTCO)	EA	1	$1,000	$1,000		$1,250
Install fiber pad (CATV)	EA	1	$1,000	$1,000		$1,250
SUBTOTAL				$1,303,211		$1,629,014
CONTINGENCY 15%	15%					$244,352
SUB TOTAL						$1,873,366
GET 4.17%	4.17%					$78,119
ELECT. CONTR TOTAL						**$1,951,486**
The total above does not include any mobilization, coring, easements, off-site improvements						
or requirements by the utilities, utility charges, etc.						

BIOLOGICAL RESOURCES SURVEY

APPENDIX

D

BIOLOGICAL RESOURCES SURVEY

for the

WAILEA LOT SF-S PROJECT

WAILEA, MAUI, HAWAII

by

Robert W. Hobdy
Kokomo, Maui
May 2019

Prepared for: Wailea Resort SF-S Partners, LP

BIOLOGICAL RESOURCES SURVEY
WAILEA LOT SF-S PROJECT
WAILEA, MAUI

INTRODUCTION

The Wailea Lot SF-S project is located on 23.104 acres of undeveloped land in Wailea Maui TMK (2) 2-1-08:115 (see Figures 1 & 2). The project area is bounded on the west side by Wailea Alanui Drive, on the east side by Kapili Street, on the north side by an unnamed gully and on the south side by residential properties. This biological survey was initiated by the owners to assess the flora and fauna resources in fulfillment of environmental requirements and the planning process.

SITE DESCRIPTION

The terrain within the project area is gently to moderately sloping with a few steeper spots. The vegetation consists of a dense open grassland with scattered trees. The soils are characterized by a combination of Makena Loam, Stony Complex, 2 – 15 % slopes (MSC) and Keawakapu Extremely Stony Silty Clay Loam, 3 – 25% slopes (KNXD) (Foote et al, 1972). Rainfall averages around 15inches per year with most occurring during the winter months (Armstrong, 1983).

BIOLOGICAL HISTORY

In pre-contact times this area would have supported a diverse dry forest/grassland with many species of native trees, shrubs, vines and grasses and a few seasonal herbs and ferns, as well as a complement of native birds and insects. We can still observe fragments of this diversity in relictual pockets of native vegetation in a few places between Kīhei and Mākena. This diversity of native species was drastically reduced by over a century of browsing and grazing by wild and domesticated herbivores and replaced by aggressive, non-native plant species. Charred stumps indicate that at least portions of the property have burned in the recent past, further reducing species diversity. The area now contains only some of the hardier native species and many non-native species that have proven to be stronger competitors and more resistant to disturbance.

SURVEY OBJECTIVES

This report summarizes the findings of a flora and fauna survey of the proposed Wailea SF-S project area in Wailea, Maui which was conducted during May 2019. The objectives of the survey were to:

1. Document what plant and animal 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.

BOTANICAL SURVEY REPORT

SURVEY METHODS

A walk-through botanical survey method covering all portions of this property was used following routes to ensure complete coverage of the area. Areas most likely to harbor native or rare plants such as rocky outcroppings were more intensively examined. Notes were made on plant species, distribution and abundance as well as on terrain and substrate.

DESCRIPTION OF THE VEGETATION

The vegetation in the project area was composed of a grassland with scattered trees. One species dominated the entire area, buffelgrass (*Cenchrus ciliaris*). Two other species were common, kiawe trees (*Prosopis pallida*) and 'ilima (*Sida fallax*). A total of only fifteen plant species were recorded during two site visits to the area.

Just two indigenous native plant species were found, the 'ilima and the 'uhaloa (*Waltheria indica*), both of which are widespread throughout Hawaii. The remaining thirteen species are all non-native plants that are of no particular concern.

DISCUSSION AND RECOMMENDATIONS

The vegetation in the project area is predominantly non-native in character. Just two common native species were found during the survey, the 'ilima and the 'uhaloa. These two species are widespread throughout Hawaii, and both species occur naturally on other Pacific islands as well. Neither species is of any conservation concern.

No Threatened or Endangered plant species (USFWS, 2019) occur in the project area. No special native plant habitats occur here either. There is little of botanical concern with regard to the project area. The proposed development plans are not expected to have a significant negative impact on the botanical resources in this part of Maui.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of two groups Monocots and Dicots. Taxonomy and nomenclature of the flowering plants (Monocots and Dicots) 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 Hawaiians during 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.

COMMON NAME	SCIENTIFIC NAME	STATUS	ABUNDANCE
MONOCOTS			
POACEAE (Grass Family)			
Cenchrus ciliaris L.	buffelgrass	non-native	abundant
DICOTS			
AMARANTHACEAE (Amaranth Family)			
Chenopodium murale L.	'aheahea	non-native	rare
APOCYNACEAE (Dogbane Family)			
Asclepias physocarpa (E.Mey.) Schlect.	balloon plant	non-native	uncommon
Stapelia gigantea N.E. Brown	Zulu giant	non-native	rare
ASTERACEAE (Sunflower Family)			
Conyza bonariensis (L.) Cronq.	hairy horseweed	non-native	rare
Verbesina encelioides (Cav.) Benth. & Hook.	golden crown-beard	non-native	uncommon
FABACEAE (Pea Family)			
Leucaena leucocephala (Lam.) de Wit	koa haole	non-native	uncommon
Prosopis pallida (Humb. & Bonple. ex Willd.) Kunth	kiawe	non-native	common
Senna alata (L.) Roxb.	candle flower	non-native	rare
LAMIACEAE (Mint Family)			
Leonotis nepetifolia (L.) R.Br.	lion's ear	non-native	rare
MALVACEAE (Mallow Family)			
Abutilon grandifolium (Willd.) Sweet	hairy abutilon	non-native	rare
Sida fallax Walp.	'ilima	indigenous	common
Waltheria indica L.	'uhaloa	indigenous	uncommon
NYCTAGINACEAE (Four-o'clock Family)			
Boerhavia coccinea Mill.	scarlet spiderling	non-native	rare
VERBENACEAE (Verbena Family)			
Lantana camara L.	lantana	non-native	rare

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 Endangered Hawaiian hoary bat *(Lasiurus cinereus semotus)* in the area.

RESULTS

MAMMALS

Just one non-native mammal species was observed during two site visits in the project area. Taxonomy and nomenclature follow Tomich (1986).

Axis deer were common in the project area. A herd of ten animals were seen, and their trails, tracks, droppings and signs of feeding were everywhere. Other mammals one would expect in this habitat include mice (*Mus domesticus*), rats (*Rattus* spp.), mongoose (*Herpestes auropunctatus*), domestic cats (*Felis catus*) and domestic dogs (*Canis familiaris*).

A special effort was made to look for the Hawaiian hoary bat by making an evening survey at two locations in the area. A bat detecting device (Batbox IIID) was used, set to the frequency of 27,000 Hertz that these bats are known to use when echo-locating for nocturnal flying insect prey. No bats were detected with the use of this device.

BIRDS

Birdlife was moderate in species and in total numbers in this dry habitt. Taxonomy and nomenclature follow American Ornithologists' Union (2019). Ten species of non-native birds were observed during two site visits in the project area. Three species were common, the zebra dove (*Geopelia striata*), the mourning dove (*Zenaida macroura*) and the gray francolin (*Francolinus pondicerianus*). Less common were the spotted dove (*Streptopelia chinensis*), the common myna (*Acridotheres tristis*) and the African silverbill (*Lonchura cantans*). Four other species were of rare occurrence.

REPTILES

Two species of non-native lizards were observed, the garden skink (*Lampropholis delicata*) and the mourning gecko (*Lepidodactylus lugubris*).

MOLLUSKS

One non-native snail species was seen, the giant African snail (*Achatina fulica*).

INSECTS

Insect life was modest in the project area. Seven species of non-native insects were seen during two site visits. Taxonomy and nomenclature follow Nishida et al (1992). Two species were common, the short-horned grasshopper (*Oedaleus abruptus*) and the dung fly (*Musca sorbens*). Less common was the monarch butterfly (*Danaus plexippus*). Four other species were of rare occurrence.

DISCUSSION AND RECOMMENDATIONS

The fauna species recorded during the survey, including all mammals, birds, reptiles, mollusks and insects were entirely non-native species that are of no conservation concern.

While not detected during the survey, the Hawaiian hoary bat could occasionally occur in this habitat. These bats are highly mobile and move around to take advantage of spikes in insect activity that provide the food they depend on. The U.S. Fish and Wildlife Service has federal jurisdiction over these bats under provisions of the Endangered Species Act (1973). They may provide guidance on how to proceed with this project without potentially harming these bats, should they show up.

The project area does not provide suitable habitat for any other protected native fauna such as nēnē, forest birds or water birds.

A further recommendation relates to seabirds. Some seabirds such as the Endangered dark rumped petrel (*Pterodroma phaeophygia sandwichensis*) and the commoner wedge-tailed shearwater (*Puffinus pacificus chlororhynchus*) nesting on the summit of Haleakalā and the coastal sites of Wailea Point and Molokini respectively, leave their burrows before dawn and return after sunset. These birds can become attracted to and confused by bright lights, crash and be killed by vehicles or cats and dogs that find them. Young birds are especially vulnerable when they fledge in late fall and take their first tentative flights. It is recommended that all significant outdoor lighting in any future development be hooded to direct the light downward.

There are no other specific environmental concerns with reference to the fauna in this project area. Following the above recommendations, this project should be able to move forward without having any significant negative impacts on the fauna resources int his part of Maui.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within four groups: Mammals, Birds, Insects, Mollusks and Reptiles. 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			
CERVIDAE (Deer Family			
Axis axis Erxleben	axis deer	non-native	common
BIRDS			
COLUMBIDAE (Dove Family)			
Geopelia striata L.	zebra dove	non-native	common
Streptopelia chinensis Scopoli	spotted dove	non-native	uncommon
Zenaida macroura L.	mourning dove	non-native	common
ESTRILDIDAE (Estrildid Finch Family)			
Lonchura cantans Gmelin	African silverbill	non-native	uncommon
FRINGILLIDAE (Carduelin Finch Family)			
Carpodacus mexicanus Muller	house finch	non-native	rare
PASSERIDAE (Sparrow Family)			
Passer domesticus L.	house sparrow	non-native	rare
PHASIANIDAE (Pheasant Family)			
Francolinus pondicerianus Gmelin	gray francolin	non-native	common
PSITTACULDAE (Old World Parrot Family)			
Agapornis roseicollis Vieillot	rosie-faced lovebird	non-native	rare
STURNIDAE (Starling Family)			
Acridotheres tristis L.	common myna	non-native	uncommon
ZOSTEROPIDAE (White-eye Family)			
Zosterops japonicus Temmink & Schlegel	Japanese white-eye	non-native	rare
REPTILES			
GEKKONIDAE (Gecko Lizard Family)			
Lepidodactylus lugubris Dumeril & Bibron	mourning gecko	non-native	rare
SCINCIDAE (Skink Lizard Family)			
Lampropholis delicata De Vis	garden skink	non-native	uncommon
MOLLUSKS			
ACHATINIDAE (Achatinid Snail Family)			
Achatina fulica Ferussac	African snail	non-native	rare

COMMON NAME	SCIENTIFIC NAME	STATUS	ABUNDANCE
INSECTS			
Order COLEOPTERA - beetles			
SCARABAEIDAE (Scarab Beetle Family)			
Protaetia orientalis Burmeister	Oriental flower beetle	non-native	rare
Order DIPTERA - flies			
MUSCIDAE (Housefly Family)			
Musca sorbens Wiedemann	dung fly	non-native	common
Order HYMENOPTERA - bees, wasps, ants			
FORMICIDAE (Ant Family)			
Pheidole megacephala Fabricius	big-headed ant	non-native	rare
VESPIDAE (Vespid Wasp Family)			
Polistes aurifer Saussure	golden paper wasp	non-native	rare
Order LEPIDOPTERA - butterflies, moths			
NYMPALIDAE (Brush-footed Butterfly Family)			
Danaus plexippus L.	monarch butterfly	non-native	uncommon
Order MANTODEA - mantises			
MANTIDAE (Praying Mantis Family)			
Tenodera angustipennis Saussure	narrow-winged mantis	non-native	rare
Order ORTHOPTERA - grasshoppers, crickets			
ACRIDIDAE (Grasshopper Family)			
Oedaleus abruptus Thunberg	short-horned grasshopper	non-native	common

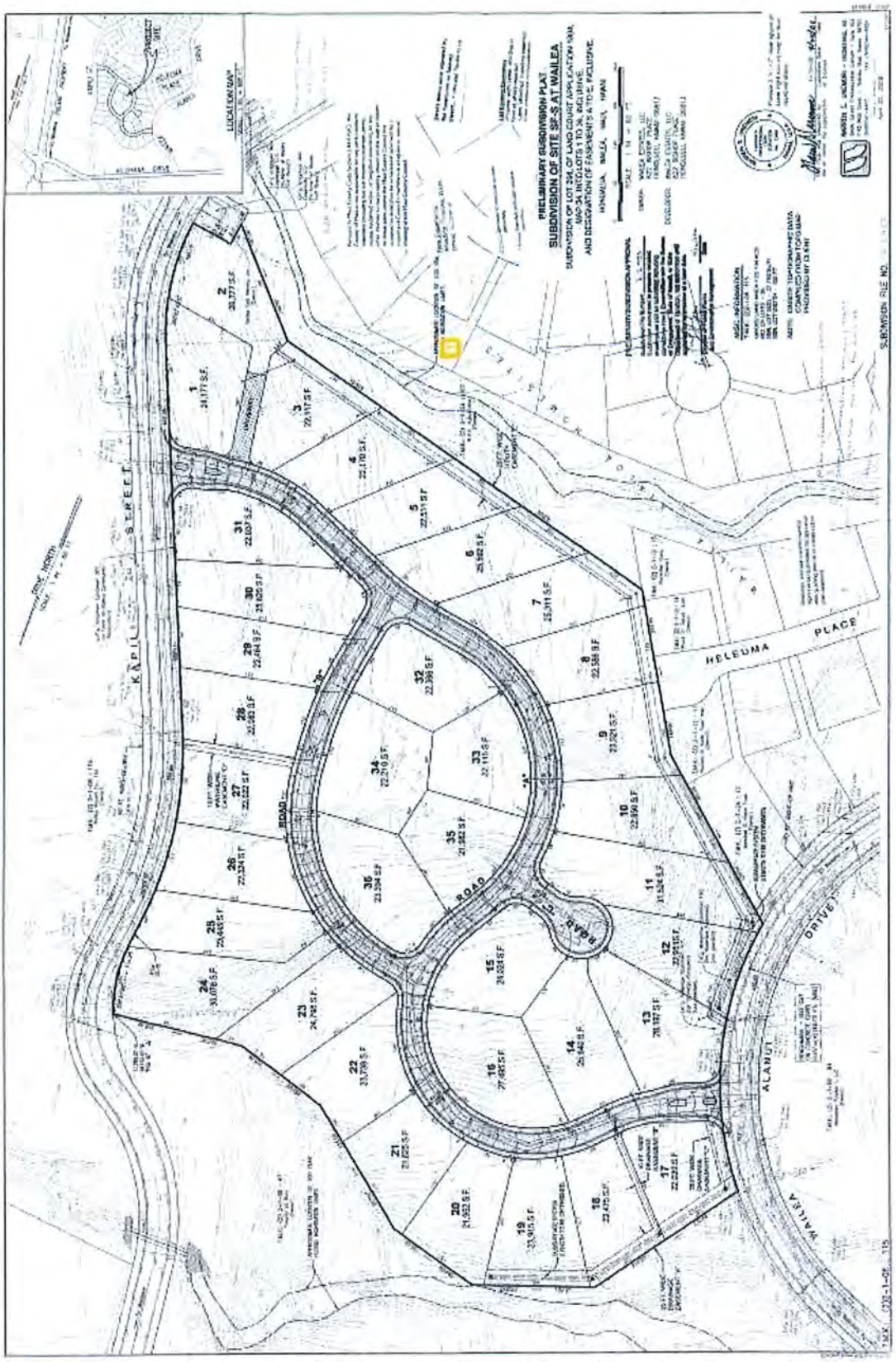


Figure 1. Project Map Lot SF-S Wailea, Maui TMK (2) 2-1-08:115 23.104 acres

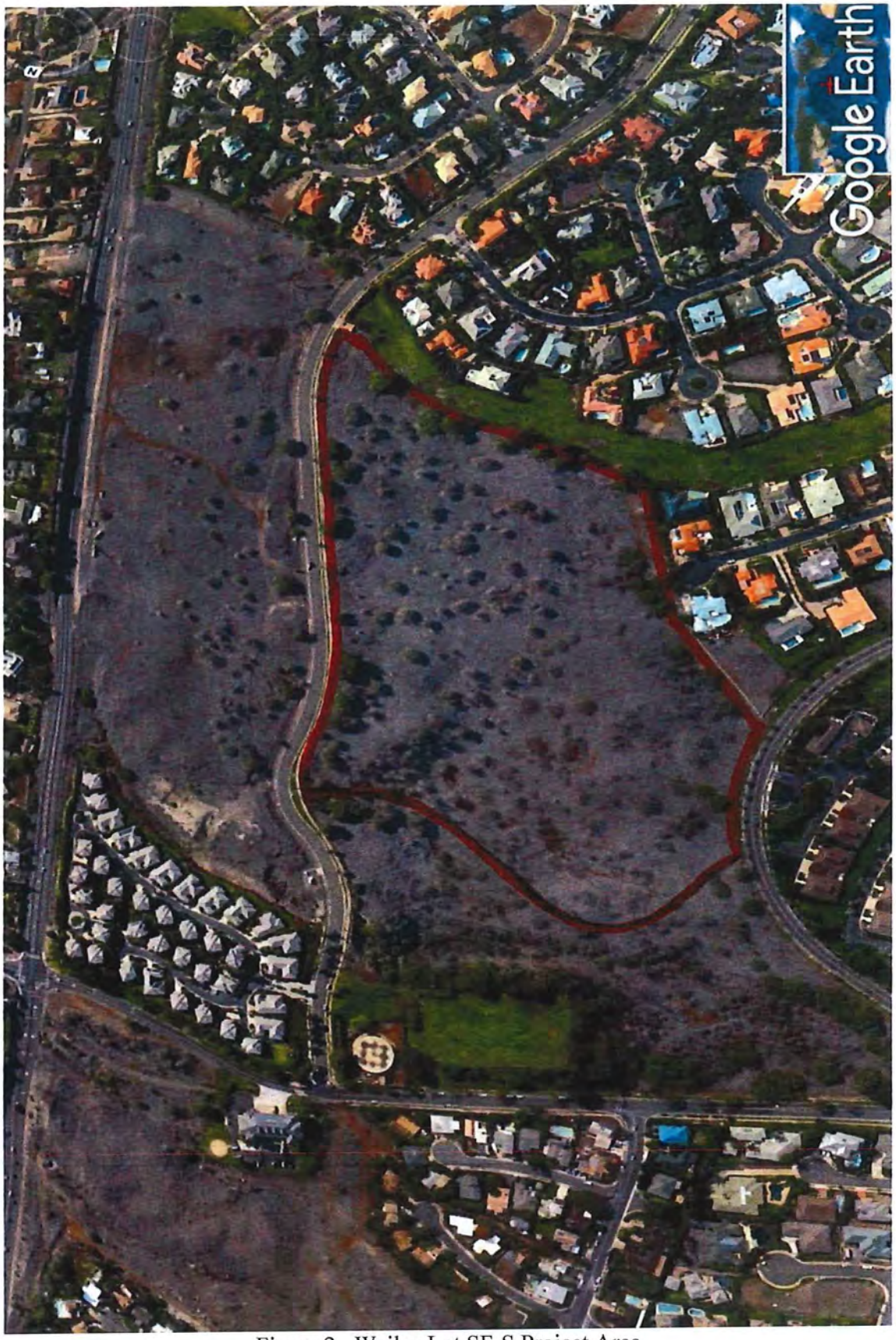


Figure 2. Wailea Lot SF-S Project Area

Literature Cited

American Ornithologists' Union 2019. 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.

Nishida, G.M., G.A. Samuelson, J.S. Strazanac, K.S. Kami. 1992. Hawaiian Terrestrial Anthropod Checklist. Hawaii Biological Survey.

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

U.S. Fish and Wildlife Service. 2019. Endangered and threatened wildlife and plants. 50 CFR 17.11 & 17.12

Wagner, W. L., D.R. Herbst, and S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawaii. University of Hawaii Press and Bishop Museum Press. Honolulu.

93rd United States Congress. 1973. Endangered Species Act.

ARCHAEOLOGICAL INVENTORY SURVEY

APPENDIX

E

SCS Project Number 2350-4

ARCHAEOLOGICAL INVENTORY SURVEY OF 23 ACRES IN PAEAHU AHUPUA'A

MAKAWAO DISTRICT
ISLAND OF MAUI
HAWAI'I

TMK: (2) 2-1-008:145

Prepared by:
Kepa Lyman, M.A.,
and
Michael Dega, Ph.D.

April 2020

DRAFT

Prepared for:

Wailea Resort SF-S Development Partners LP

SCIENTIFIC CONSULTANT SERVICES, Inc.

1347 Kapiolani Blvd., Suite 408 Honolulu Hawai`i 96814

Copyright © Scientific Consultant Services, Inc. 2017. All rights reserved.

TABLE OF CONTENTS

INTRODUCTION	**4**
ENVIRONMENTAL SETTING	**7**
Location and Topography	**7**
Vegetation	**7**
Soils	**8**
Climate	**9**
METHODOLOGY	**9**
RESULTS OF FIELDWORK	**10**
SUMMARY AND DISCUSSION	**14**
Traditional Features	**14**
Military Features	**14**
SITE 50-50-14-4791	**15**
RECOMMENDATIONS	**22**
BIBLIOGRAPHY	**23**
APPENDIX A: FEATURE DATA	**24**
APPENDIX B: TEST UNIT DETAILS	**69**

LIST OF FIGURES

Figure 1. Project Area (portion of USGS Makena quadrangle 1998). 5

Figure 2. Tax Map Key map of the project area. 6

Figure 3. Aerial mosaic of the project area (Google 2019). 7

Figure 4. Soils near the project area. 8

Figure 5. Features by formal type documented during the AIS. 12

Figure 6. Archaeological features by SIHP site designation (ESRI basemap 2018). 13

Figure 7. Plan view of Site 50-50-14-4791 wall from Sinoto et al. 1999:13. 16

Figure 8. Portion of F.S. Dodge (1885) map showing the project area and Site 50-50-14-4741 in relation to the Kula-Honua'ula moku boundary. 17

Figure 9. Aerial mosaic (Google 2019) showing portions of the boundary wall continuing to the east/upland. 18

Figure 10. Site 50-50-14-4791 wall remnant of boundary wall (1924 USGS topographic quad). 19

Figure 11. Site -4791 profile showing boulder bottom course and core-filled construction in interior cavity (view to E). 20

Figure 12. Site -4791 showing trapezoidal profile shape (view to E). 21

LIST OF TABLES

Table 1. Features recorded during the inventory survey and significance assessments and recommendations. 11

Table 2. Test unit details and layer descriptions. 70

INTRODUCTION

At the request of Wailea Resort SF-S Development Partners LP, Scientific Consultant Services, Inc. (SCS) conducted an archaeological inventory survey (AIS) of 23 acres of undeveloped land (labeled SF-S) in Paeahu Ahupua'a, Makawao District, Island of Maui [TMK (2) 2- 1-008:145] (Figures 1 and 2).This follows a State Historic Preservation Division (SHPD) letter recommending an archaeological work plan for the project area (December 2019) and a field inspection conducted by SCS in October 2018. The work plan was accepted on March 11, 2020. Per HAR § 13-276-5 (3), the historic and archaeological background sections are not repeated in this document as they were accepted in the work plan.

Two archaeological surveys have also been previously conducted in the project area (Pantaleo and Sinoto 1991; Sinoto et al. 1999) in which one site consisting of a historic wall was documented (SHIP # 50-50-14-4791). The current survey led to the identification of seven temporary sites composed of twelve features. These include four modified outcrops, one U-shape, one L-shape, two C-shapes, two mounds, and two fencepost molds. All of the features were composed of basalt boulders/cobble utilizing exposed bedrock when available. The features have initially been assessed to be associated with traditional agriculture, historic ranching, and historic military activities and have been grouped into two project area-wide site landscapes delineated by age/function: Site 50-50-14-8709 containing seven traditional agricultural features; 50-50-14-8710 composed of three historic military-related features; and two historic fencepost molds which have been added to Site 50-50-14-4791 as additional features. Both sites are recommended as significant under Criterion D. Additional research on the previously recorded wall, Site -4791, has determined that it is possibly a remnant segment of an early historic period moku boundary wall, which was re-utilized as a historic-era cattle wall as noted in the 1991 AIS. This site is recommended as significant under Criteria A, C, and D.

This archaeological inventory survey was conducted in order to identify and document historic properties, to gather sufficient information on these properties, to evaluate the significance of any newly identified historic properties, to determine the project effect on these properties, and to make mitigation recommendations to address possible adverse impacts to identified historic properties, pursuant to HAR § 13-284 and HAR § 13-276. This AIS was survey-focused through full pedestrian survey of the project area, re-location and assessment of the formerly identified site (-4791), recording of newly identified sites, and mapping of each feature in the project area.

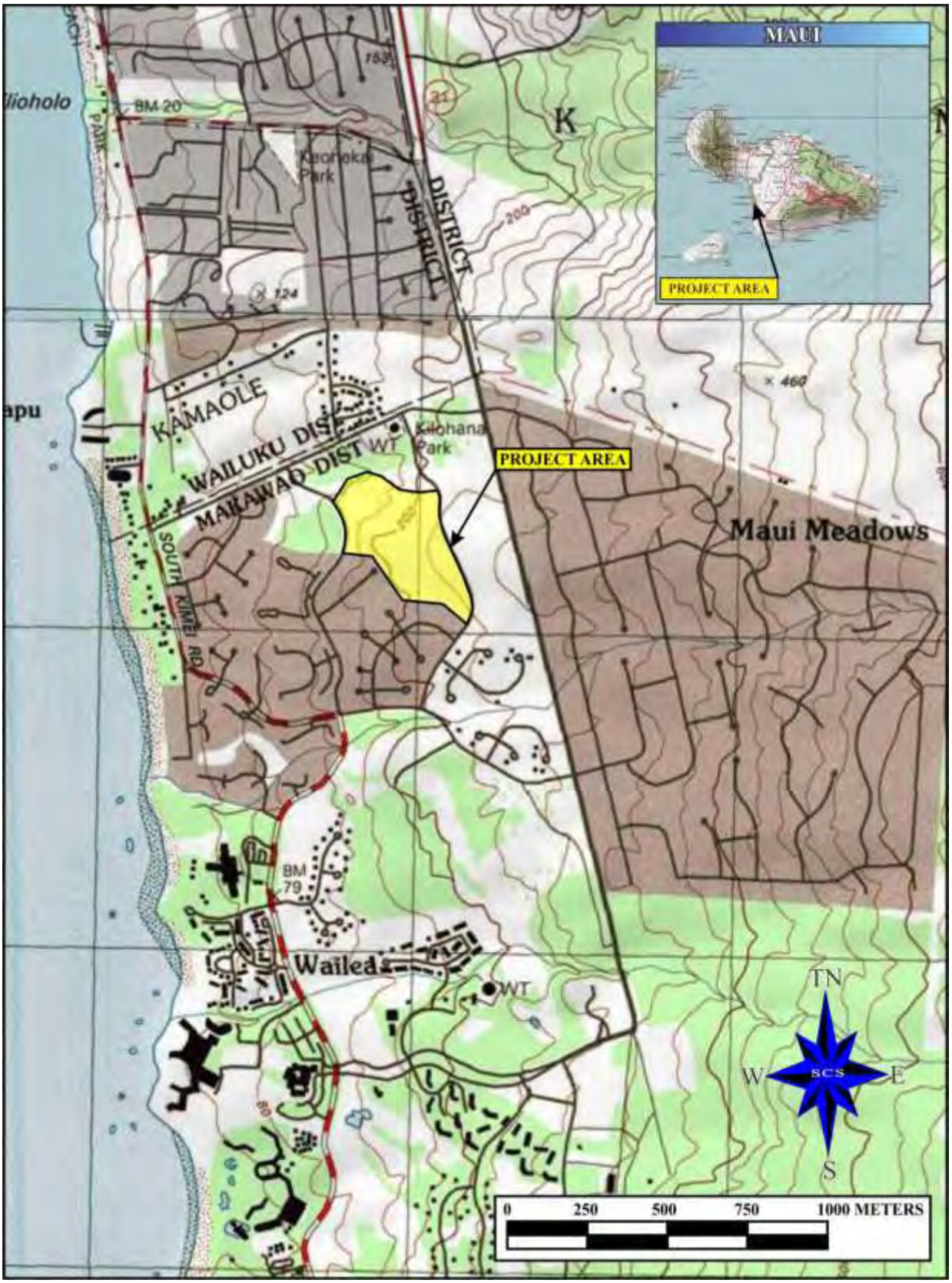


Figure 1. Project Area (portion of USGS Makena quadrangle 1998).

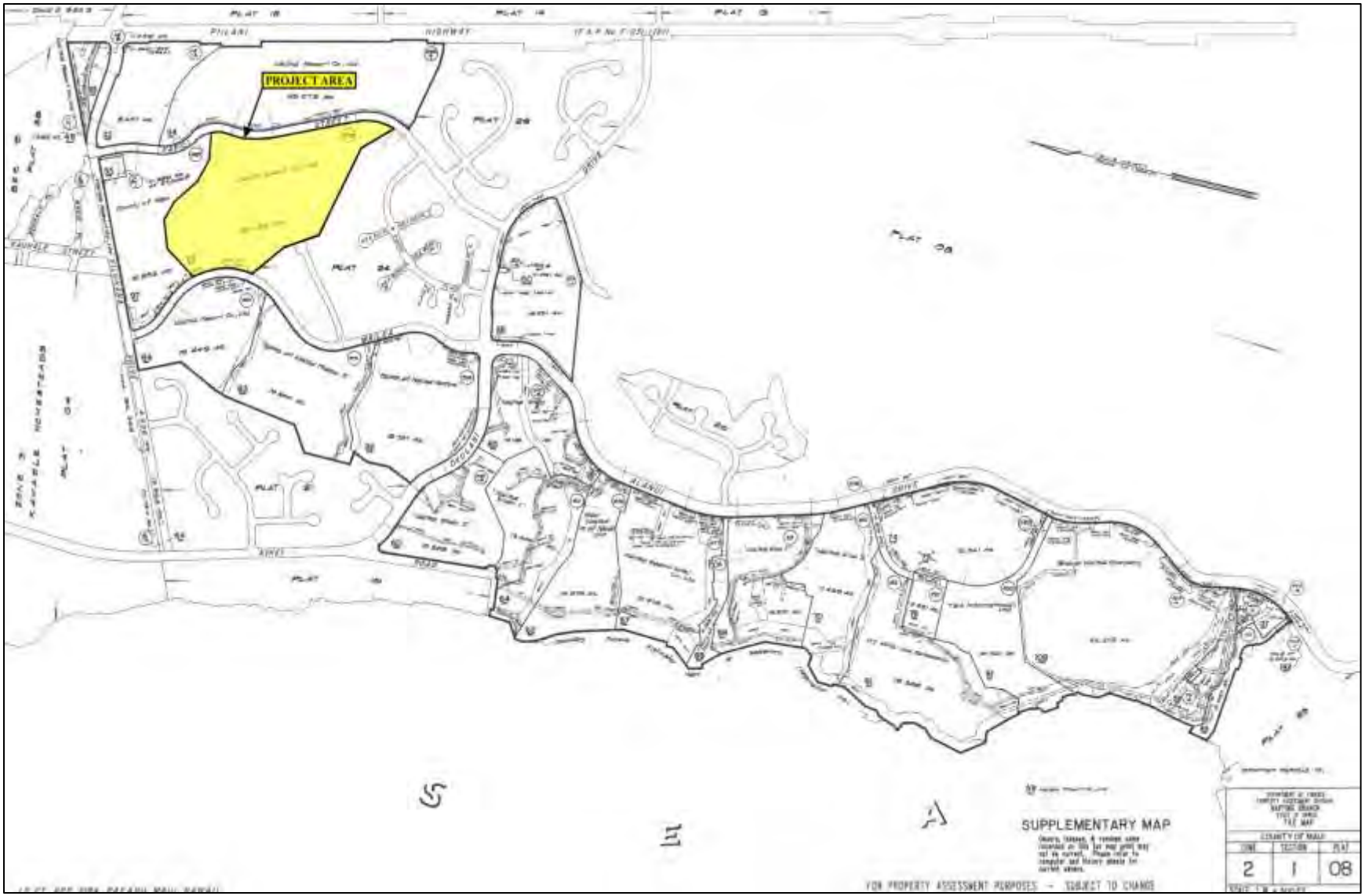


Figure 2. Tax Map Key map of the project area.

ENVIRONMENTAL SETTING

LOCATION AND TOPOGRAPHY

The project area is located in northwest Paeahu ahupua'a, 700 m inland from the coast and 300 m makai of Pi'ilani Highway. Elevation of the project area is from 40 to 80 m asl. The project area is bounded on the south by a residential development, to the north by undeveloped land and Kilohana Park, Wailea Alanui Drive to the west, and Kapili Street to the east (Figure 3).

Figure 3. Aerial mosaic of the project area (Google 2019).

VEGETATION

The majority of the flora found within the confines of the current project area consists almost entirely of invasive species. The entire project area is blanketed in buffel grass. The primary trees are kiawe and haole koa trees.

SOILS

Soils in the project area are split between the Keawakapu Series (KNXD) and the Makena Series (MXC; Figure 4) . The Keawakapu series consists of well-drained, extremely stony soils on the uplands of Maui (Foote et al. 1972:68). The soil has developed in volcanic ash and are gently sloping to moderately steep. A representative profile shows an upper layer of dark reddish brown extremely stony silt loam over subsoil of dark reddish brown silty clay loam and silty clay occurring over fragmental a'a lava. Soils of the Makena series consist of well-drained soils on the uplands of Maui that have developed in volcanic ash (Foote et al. 1972:91). The series consists of Makena loam and Stony land. In profile, the upper layer is composed of dark brown loam while the subsoil consists of grayish brown silt loam and cobbly silty loam.

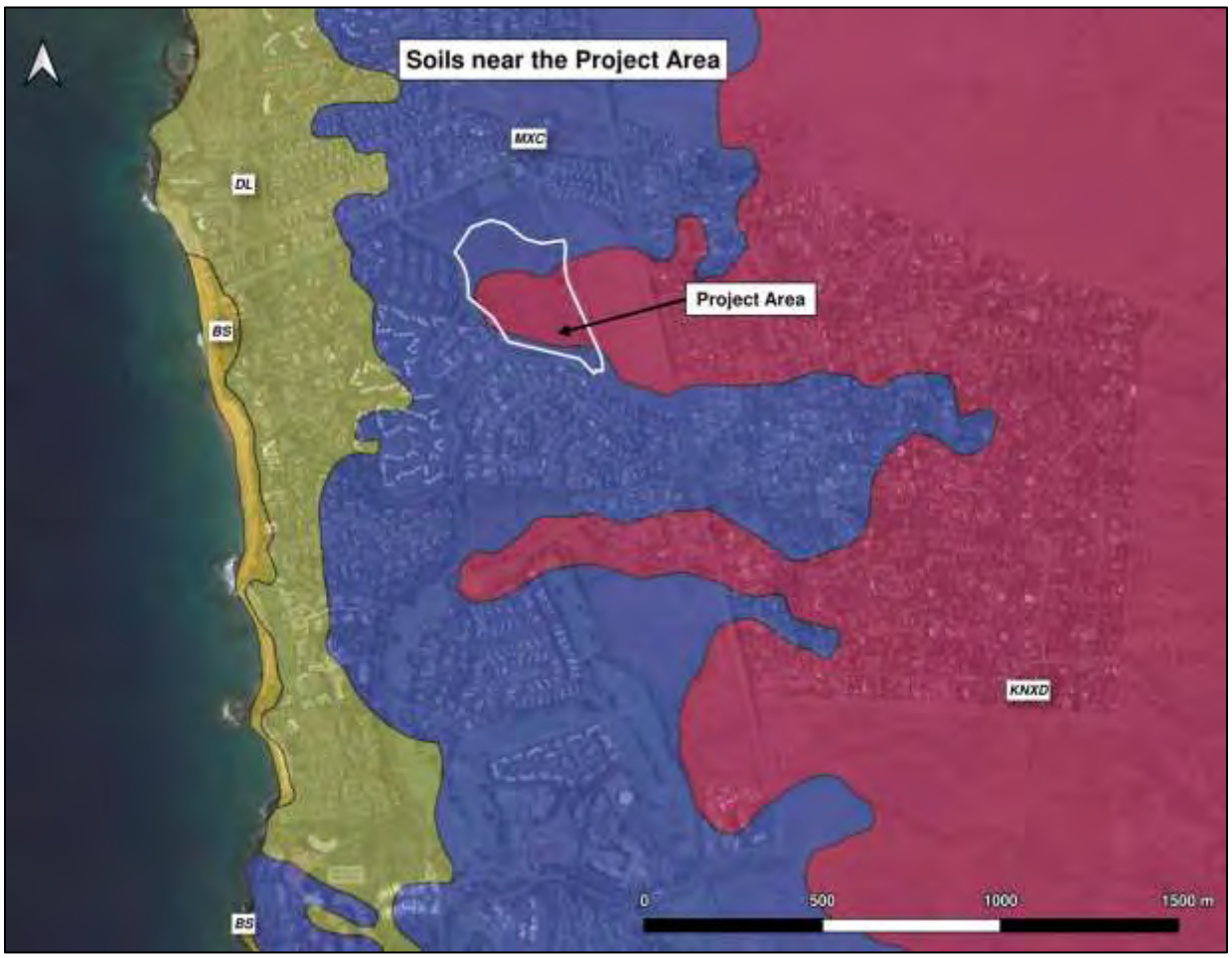


Figure 4. Soils near the project area.

A geotechnical report in June 2019 documented the lack of soil deposits within the project area parcel (Hawaii Geotechnical Consulting, Inc. 2019). The report discusses the results of ten backhoe trenches that were excavated across a representative portion of the project area. The sediment sequence was shallow, with mixed silt, sand, and gravel from the surface to 0.30

meters below surface (mbs) overlying cobble and silty gravel to 0.60 mbs. Trenching was difficult due to the sands and gravels in the upper stratum and boulders and bedrock causing a cessation in excavation at the base. The backhoe met "refusal by boulders" in most cases between 0.70-1.20 mbs.

CLIMATE

Annual rainfall in the project area is less than 478 millimeters (mm) (10-20 inches) annually, one of the lowest on Maui, making this region one of the driest in the Hawaiian Island archipelago (Giambelluca et al. 2013; Foote et al. 1972). Winter months account for the majority of the rainfall and during these months the drainage may intermittently flow or be subject to a rapid flow/flood-type event. Temperatures average between the low 60s and mid-90s Fahrenheit (F), with the warmer temperatures occurring in the summer months of July and August (Armstrong 1983). Wind speeds in this leeward area average 16 knots (18.4 mph) in the prevailing northeasterly trade wind pattern.

METHODOLOGY

The AIS fieldwork was divided three tasks: pedestrian survey, site recordation, and testing of sites. All the tasks were be done in compliance with HRS HAR 13-276-4 and followed the AIS work plan approved by SHPD.

Full pedestrian survey (100%) was conducted by a team of 2-3 SCS archaeologists. The crew walked north-south transects spaced at 5 m, depending on ground visibility. Identified sites were flagged for recording. Handheld GPS (accurate to 15m at Sigma-2) was utilized to record the location of each identified site. Landscape modifications, site locations, flora and fauna, and other pertinent information were noted to better understand the landscape and sites. General views of the project area were also photographed showing the landscape topography and vegetation.

Sites were then recorded in text, map, photograph, and illustration using tape, compass, and sub-meter accurate GPS (Trimble Geo 7x). Plan view maps and photographs were created for each feature. Features were photographed with handheld digital camera and archived in the SCS database. Typically, boundaries of the sites in this region are determined by the presence/absence of surface architecture and/or presence of surface cultural materials that may occur outside site architecture.

Manual Testing was conducted at select features to provide a distribution of site types and function. No cultural materials or subsurface features were identified in any unit. As specified by SHPD, test units were excavated directly through site architecture. Test units were manually

excavated at 10 cm levels within natural strata to the maximum depths of bedrock or sterile sediment. Given the paucity of subsurface findings in this area during previous projects, 1 x .5 m and 1 x 1 m unit sizes were utilized as a starting point for examining subsurface site contexts before attempting to expand to 1 x 2 m as specified by SHPD in the work plan. However, in the field this was found impractical given the small size of the features and frequency of natural bedrock outcrops.

Profile and standard plan view maps were created for each test unit excavated. Sediment acquired from excavation was screened through ¼" wire mesh screen.

Due to the findings from the geotechnical report (2019), neither manual nor mechanical trenching was conducted outside of areas with site architecture due to the limited depth range of the sediments on the parcel. The report clearly shows gravelly and silty deposits extending only 2.5 feet below the surface (0.76 mbs) in most parts of the parcel.

All AIS notes, photographs, illustrations, and other data is curated at the SCS Honolulu facility.

RESULTS OF FIELDWORK

AIS fieldwork in the project area led to the identification of 7 temporary sites consisting of 12 features (Table 1). These include four modified outcrops, one U-shape, one L-shape, two C-shapes, two mounds, and two fencepost molds (Figure 5). Seven features were determined to be from the pre-Contact/Early Historic periods and five from the Historic period. Seven features were determined to be associated with agriculture, three with a suspected WWII military training function, and two boundary features associated with historic ranching. Three site aggregations of features have been formed based on construction style, form type, and function (Figure 6).

Appendix A contains site plan views, text descriptions, feature photographs, and test unit details. Appendix B contains a summary of test unit information in tabular form.

Table 1. Features recorded during the inventory survey and significance assessments and recommendations.

Temporary Site	SIHP (50-50-14-)	Feature	Physical condition	Type	Age	Function	Recommendation	Description
TS-1	8710	1	Good	U-shape	Historic	Military	D; No Further Work	TS-1 Feature 1 is a U-shape structure composed of two courses to a height of 55 cm (max)/ 30 cm (avg) located on the sloping edge of a ridge. The stacking consists of basalt boulders from 20 to 40 cm in size and utilized natural bedrock in some section. The U-shape opens down-slope to the NW. Vegetation in the area consists of grass and kiawe.
TS-1	8710	2	Fair	C-shape	Historic	Military	D; No Further Work	TS-1 Feature 2 is a one-course high C-shape open to the northwest. The walls are constructed of basalt boulders (maximum height of 35 cm.) placed on a natural outcrop. It is possible that the walls originally consisted of more courses as there is some tumble visible around the feature and it appears to have been mechanically altered.
TS-3	4791	1	Good	fence post mold	Historic	Boundary	D; No Further Work	TS-3 Feature 1 is a circular formation of stacked lava rock with a hole in the center. Given its proximity to and alignment with SIHP -4791 wall it is probable that this feature contained a fence post.
TS-4	8709	1	Poor	modified outcrop	Pre-Contact/ Early Historic	Agriculture	D; No Further Work	TS-4 Feature 1 is a modified outcrop/retaining wall located along the slope of a ridge. The feature consists of tumbled basalt boulders around a natural exposed bedrock outcrop which still retains soil. The feature is 7.5 m long by 2.5 m in width by 1 m high (max). Based on its structure and morphology, the feature most likely served an agricultural function.
TS-4	4791	2	Fair	fence post mold	Historic	Boundary	D; No Further Work	TS-4 Feature 2 is a circular formation of stacked lava rock with a hole in the center.
TS-5	8709	1	Good	L-shape	Pre-Contact/ Early Historic	Agriculture	D; No Further Work	TS-5 Feature 1 is a small L-shape located atop a natural exposed outcrop. The feature consists of large stacked basalt boulders (40-60 cm in size) from two to three courses forming a retaining wall 85 cm maximum height. The L-shape encloses a level soil interior. TS-5 was interpreted to have functioned as a pre-Contact/Early Historic agricultural feature.
TS-6	8709	1	Fair	modified outcrop	Pre-Contact/Early Historic	Agriculture	D; No Further Work	TS-6 Feature 1 is a modified outcrop augmented with stacking to form a small terrace. The stacking consists of basalt boulders from 30 to 50 cm in size forming two courses. The upslope/interior of the feature still retains soil. Based on its location within the landscape and construction, TS-6 Feature 1 is interpreted to have served as an agricultural feature.
TS-6	8709	2	Poor	modified outcrop	Pre-Contact/ Early Historic	Agriculture	D; No Further Work	TS-6 Feature 2 is also a modified outcrop forming a short terrace/retaining wall. The feature is mostly natural exposed bedrock augmented in places by stacked basalt boulders. The feature forms a retaining wall that supports a level soil area upslope. Based on its location and similar construction style, TS-6 Feature 2 and Feature 1 were grouped in the same site and both were interpreted to have been pre-Contact/Early Historic agricultural features. Both features also appear to have been impacted by mechanical activity.
TS-7	8710	1	Good	C-shape	Historic	Military	D; No Further Work	TS-7 Feature 1 is a small C-shape consisting of one to two courses of stacked basalt boulders. The opening of the feature faces to the east. During excavation it was noted that the architecture did not extend below the surface. Based on its construction and location, TS-7 Feature 1 is interpreted to have served in an historic period military (defense) or military-training related function.
TS-11	8709	1	Fair	mound	Pre-Contact/ Early Historic	Agriculture	D; No Further Work	TS-11 Feature 1 is a linear mound located on the sloping edge of a ridge aligned roughly NNE/SSW. The feature is in fair condition and consists of stacked basalt boulders from 20 to 40 cm in size and to 30 cm in height. The feature is located on natural exposed bedrock. A basalt upright boulder 40 cm in height is located in the NE corner of the feature. Based on shape and construction, the feature may have served a pre-Contact/Early Historic agricultural function.
TS-11	8709	2	Fair	mound	Pre-Contact/ Early Historic	Agriculture	D; No Further Work	TS-11 Feature 2 is a linear mound aligned NE/SW. The mound is in fair condition and composed of basalt boulders atop natural exposed bedrock. The boulders are from 30-50 cm in size and stacked to two courses. The feature is located on a sloping ridge and it appears that it has been previously altered by mechanical disturbance. Similar to Feature 1, the feature may have served in a pre-Contact/Early Historic agricultural function.
TS-11	8709	3	Poor	modified outcrop	Pre -Contact/ Early Historic	Agriculture	D; No Further Work	TS-11 Feature 3 is the remnant of a retaining wall/alignment along the base of a slope. The feature consists of one course of basalt boulders running perpendicular (N/S) to a slope. The feature is in poor condition and appears to have been mechanically altered. Based on its structure and location the feature is interpreted to have served an agricultural function.
4791	4791	1	Good	wall	Early Historic/ Historic	Boundary/ Ranching	A, C, D; No Further Work	Site -4791, previously identified by Pantaleo and Sinoto (1991) and Sinoto et al. (1999), was relocated and assessed.

Figure 5. Features by formal type documented during the AIS.

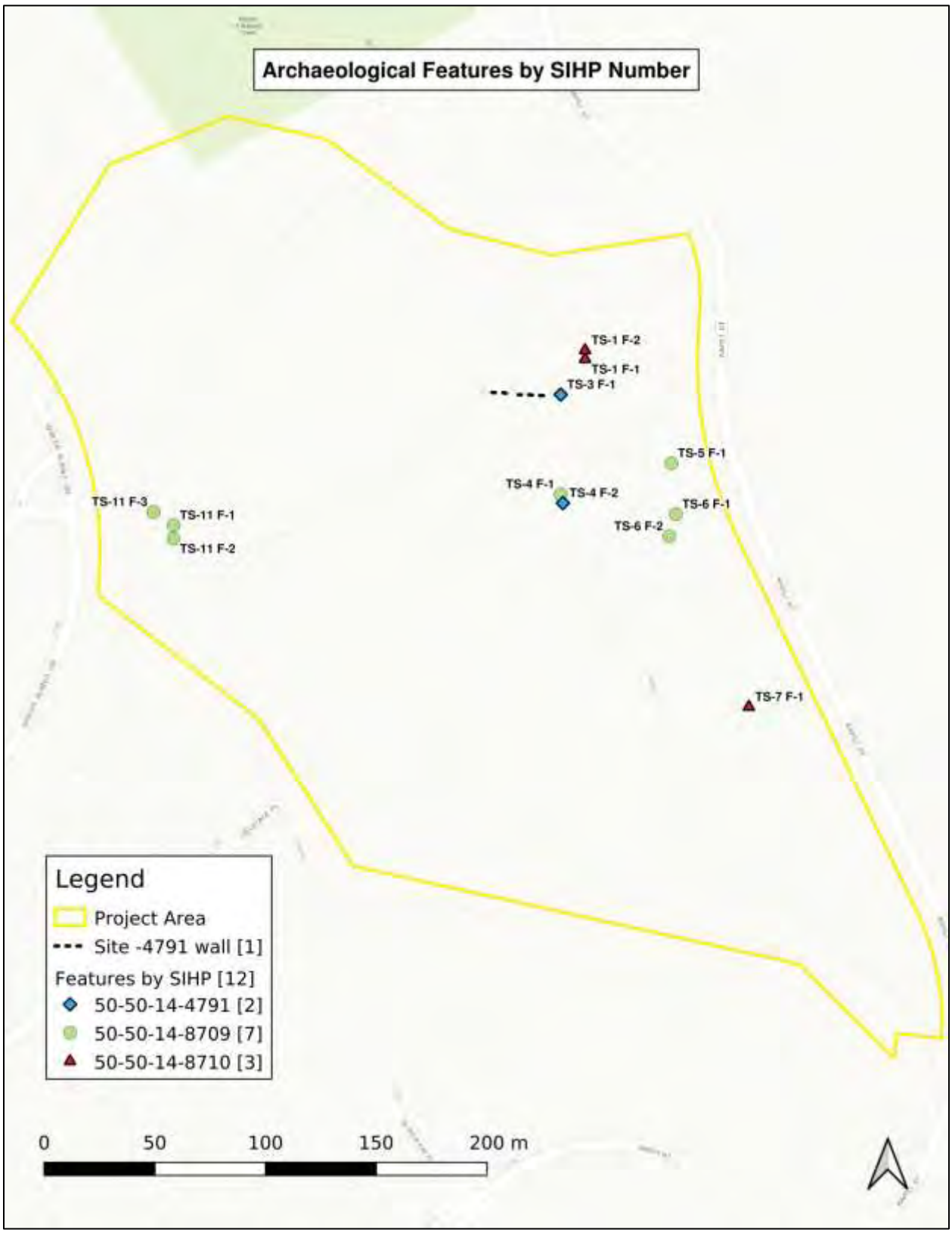


Figure 6. Archaeological features by SIHP site designation (ESRI topographic basemap 2018).

SUMMARY AND DISCUSSION

Archaeological features in the project area have not been well-preserved. It is probable the extensive mechanical alteration observed in the project area, perhaps associated with construction base yard activities or firebreaks, has extensively destroyed or damaged what features were once located here. Most of the features appeared to be the surviving remnants of earth-moving and landscape-altering equipment and probably retain only a fraction of their original extent.

TRADITIONAL FEATURES

Seven features are associated with the pre-Contact/Early Historic period and exhibit Traditional Hawaiian architecture. These features, consisting of four modified outcrops, two linear mounds, and an L-shape were determined in the field to be related to an agricultural function. In the Traditional period, this area could have been utilized for temporary habitation and subsistence agriculture to support more permanent habitation along the shoreline. It could also be likely that the agricultural features are associated with the early historic effort to raise potato for export to the California market. These features were combined into one formal site landscape based on their similar construction style and function as SIHP 50-50-14-8709.

The current project area does not contain any ceremonial sites such as heiau, burials, or ahu. This absence bespeaks to the temporary nature of activities in the area. Ultimately, this medial or “barren” landscape characteristic may be accurate in describing the landscape itself, with no perennial water sources, limited overstory, and shallow soils, but it cannot be claimed to be a barren area when it comes to the presence or absence of historic properties.

MILITARY FEATURES

Three military-related features were also documented and included in one site landscape as SIHP 50-50-14-8710. These features consisted of roughly stacked basalt in one to two courses forming C and U shapes and are similar in construction style to those found throughout the Makena area. Although these feature types can be similar to pre-Contact/Early Historic period features also found in the area, several criteria can be used to distinguish these sites in the field. Clark (1986:196-199) provides several criteria for defining military shelters from other shelters. While C-shapes and L-shapes were used by the military, U-shaped structures were the most common, based on fieldwork in former training areas on Hawai'i Island. The interior of these structures were narrow and oval to rectangular in shape. Military shelters were generally smaller than Hawaiian shelters. Of particular interest is Clark (1986) notes that Hawaiian shelters occurred as isolated features or in small groups associated with agricultural features,

while military structures usually occurred in large numbers (i.e., TS-1, 2, 3). Further, Clark (1986:19) notes:

> Sites interpreted as fortifications included C-shapes, low walls, and alignments; these sites probably served as bivouac or training areas. The sites were characterized by military debris, poorly constructed features, and the presence of earth-staining on the rocks used as building materials, indicating that such features were relatively recent constructions…Military related sites tended to occur on the tops of ridges and are present throughout the project area…

As shown for the current project area, many of these criteria are similar. These WWII training sites represent the "opportunistic construction of small features, rather than large-scale or pre-planned construction projects" (Clark 1986). It should also be noted that military construction in the area could have potentially adversely impacted earlier constructed sites, those from pre-contact/early Historic times and may have, in some cases, even adapted these earlier sites into structures necessary for training. Thus, this military construction does make it difficult at times to determine pre-WWII military activities in the project area.

Another discrepancy between early sites and military training sites are site/feature orientation (blocking the wind or facing the wind, respectively), as well as structural arcs of the sites/features which either can allow or not allow the features to become sediment traps, thereby allowing for cultivation within the structures. One final criteria was the presence/absence of vegetation within or near a site, assuming some stability in hydration resources over time. Often sites found in these dry areas that contain kiawe and haole koa trees are near pre-Contact/early Historic agricultural sites, likely for the same reasons.

SITE 50-50-14-4791

Site -4791, previously identified by Pantaleo and Sinoto (1991) and Sinoto et al. (1999), was relocated and reassessed. The site was not re-mapped or subjected to manual testing. Sinoto et al. (1999:9) states:

> The current survey identified a solitary archaeological feature, a free-standing wall remnant, located on the northwest facing slope of a ridge, roughly 300 feet west of Kapili Street. This wall segment measures 29 meters in total length with a 4.5 meter breach following the eastern 13 meter segment from the top of the ridge down onto a grassy swale. The western segment is badly collapsed and measures 11.5 meters in length. The wall segment is oriented 268 degrees of Magnetic North, nearly on an east-west alignment.
>
> The intact eastern portion of the double-faced, rubble-filled wall measures .80 meters wide at the bottom and tapers to .55 meters at the top. It ranges in height from 1.5 to 1.8 meters representing six to nine courses of cobbles and boulders. The western wall portion ranges in height from .75 to 1.15 meters with the upper portions tumbled. The breach appears to have been bulldozed from the south as evidenced by the tailings

leading northward from the ends of both segments. No other segments of this wall was observed in the vicinity or elsewhere within the subject parcel.

This wall remnant is the same one recorded during the previous survey by Bishop Museum and given the temporary designation Site #10. This remnant wall feature has been assigned State Site Number 50-50-14-4791.

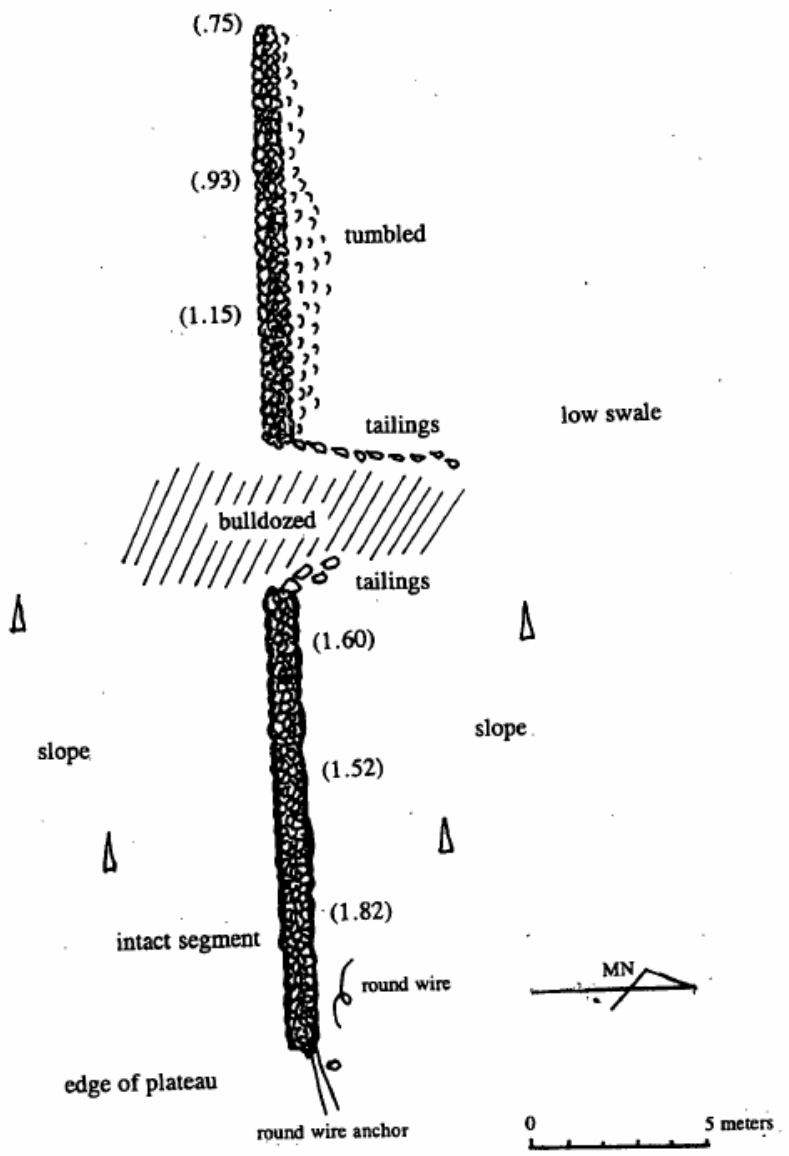


Figure 8. Plan of Remnant Wall Segment, Site 50-50-14-4791.

Figure 7. Plan view of Site 50-50-14-4791 wall from Sinoto et al. 1999:13.

The wall was found to be in fair to good condition and unaltered since its original assessment. However, additional information from informal consultation, fieldwork, and archival research suggests that this small segment is part of a much larger wall that demarcated the original Traditional/Early Historic boundary between Kula and Honua'ula moku/Paeahu and Kamaole ahupua'a (Figure 8). An additional wall segment was noted in the neighboring parcel to the east bordering the Pi'ilani Highway (TMK 2 2-1-008:114). The wall was also observed to continue upland east of the Maui Meadows subdivision (Figure 9).

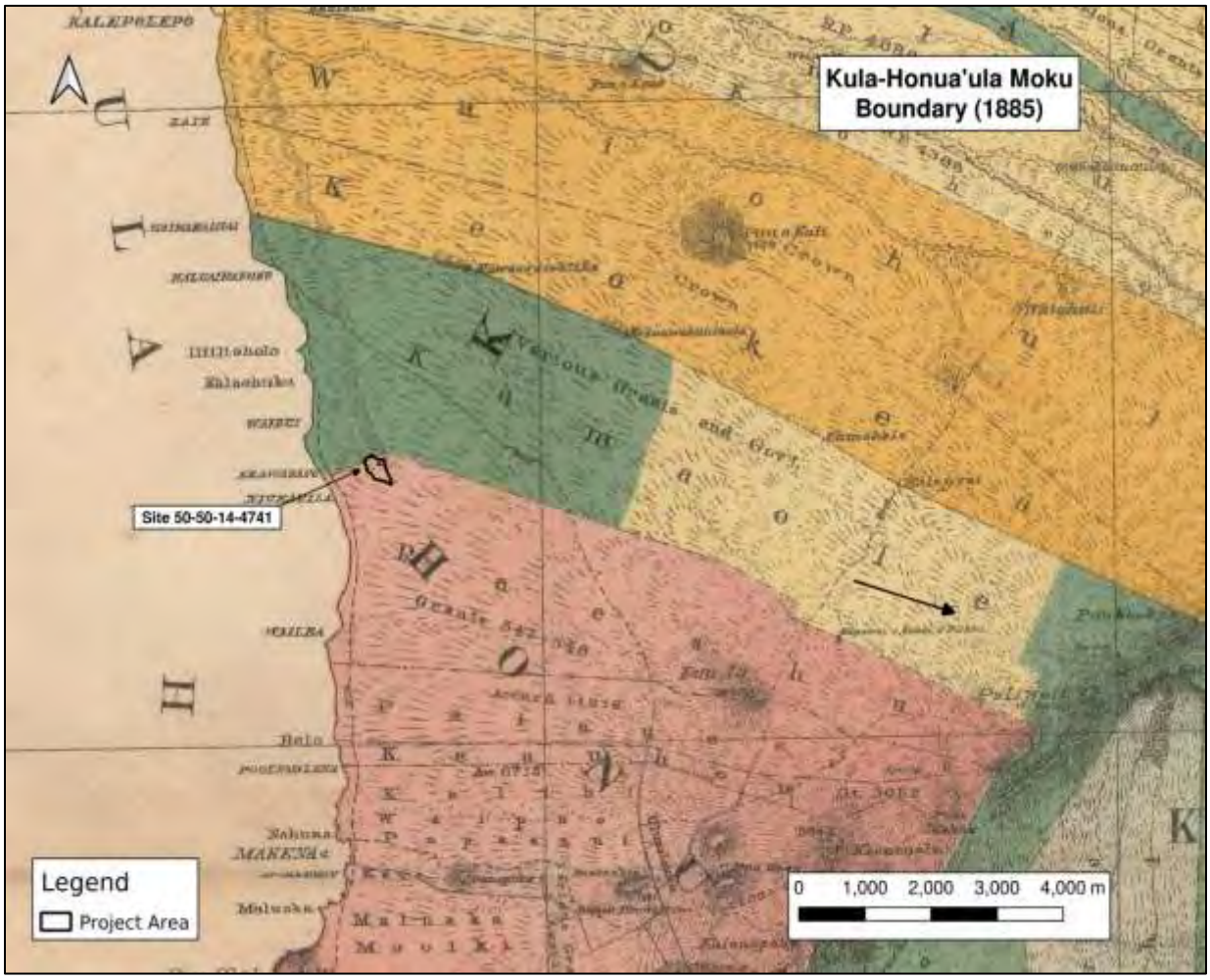


Figure 8. Portion of F.S. Dodge (1885) map showing the project area and Site 50-50-14-4741 in relation to the Kula-Honua'ula moku boundary.

It appears that during the late historic period, portions of the wall were reutilized for ranching activities. A 1924 topographic map shows that sections of the wall have been replaced with wire fencing, such as a portion adjacent to the wall within the project area (Figure 10). Presumably, the missing segments of the wall had been damaged or salvaged by prior historic period activity.

Figure 9. Aerial mosaic (Google 2019) showing portions of the boundary wall continuing to the east/upland.

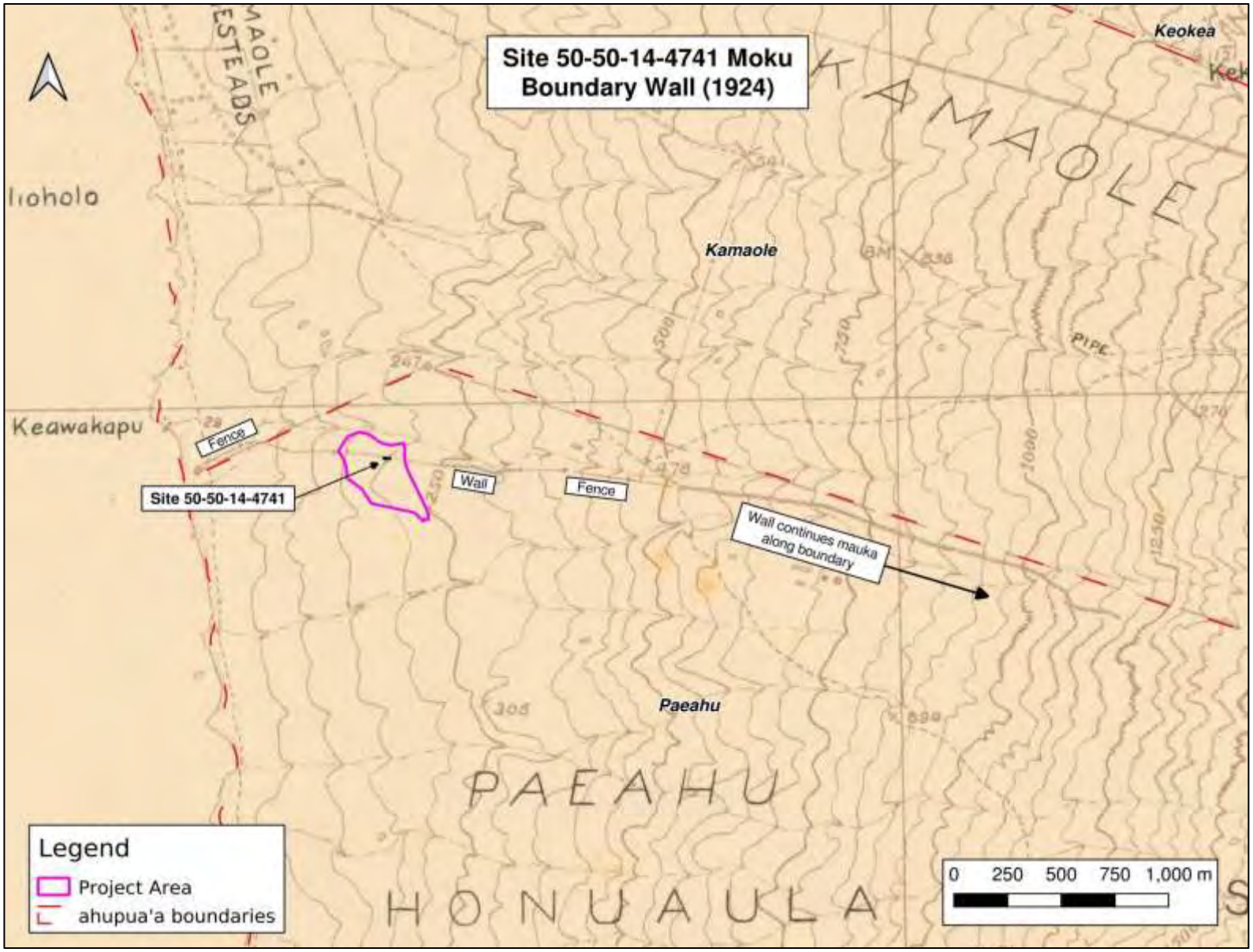


Figure 10. Site 50-50-14-4791 wall remnant of boundary wall (1924 USGS topographic quad).

Overall, the site exhibits finer attention to detail in its construction and complexity typical of historic period ranching walls. Closer assessment shows that the wall features characteristics of Traditional period/Early Historic construction methods. The wall is placed to utilize existing natural outcrops and incorporates large boulders along its lower course when available (Figure 11). In profile the wall is nicely stacked and faced using small boulders, and the top is squared and leveled with cobble and gravel clinking. The wall cross section is trapezoidal (Figure 12). Interior details show that in some sections the wall is core-filled with basalt cobble.

Figure 11. Site -4791 profile showing boulder bottom course and core-filled construction in interior cavity (view to E).

Figure 12. Site -4791 showing trapezoidal profile shape (view to E).

Temporary Site TS-3 Feature 1, a stacked basalt circular fence post mold, was documented near the east end of the wall. It is likely that it contained a fencepost supporting the wire sections noted on Figure 10. This feature has been designated as an additional feature of -4791. Temporary Site TS-4 Feature 2, also a stacked basalt circular fence post mold, was documented in the vicinity of the wall. It is probable that it also contained a fencepost supporting a wire fence in association with the wall, although it is not in the direct east-west alignment. This feature has also been included as an additional feature of Site -4791.

Given its construction detail, state of preservation, and association with early historic land use and possible political demarcation, Site 50-50-14-4791 is assessed to be significant under Criteria A, C, and D.

RECOMMENDATIONS

Sites 50-50-14-8709 and -8710 were found to be significant under Criterion D. No Further Work is recommended for these sites. These sites are in marginal condition, do not exemplify the characteristics of their type, and can only provide limited further value for archaeological research. No further work is also recommended for the three features of Site 50-50-14-4791. Site significance assessments and recommendations are included in Table 1.

BIBLIOGRAPHY

Armstrong, R. W.
1983. “Climate.” In Atlas of Hawaii. The University Press of Hawaii, Honolulu.

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 and University of Hawaii Agricultural Experiment Station. Washington, D.C., Government Printing Office

Giambelluca, T.W., M.A. Nuller, and T.A. Schroeder
1986 Rainfall Atlas of Hawai'i. Report R76. Water Resources Research Center, University of Hawai'i, Manoa, for the Department of Land and Natural Resources, State of Hawai'i, Honolulu, HI.

Pantaleo, J. and A. Sinoto
1991 Archaeological Surface Assessment of Four Alternative Lots for the Kihei School Site Selection, Kihei, Wailea, Makawao, Maui Island. Prepared for Comprehensive Consulting Services of Hawaii. Applied Research Group. Bishop Museum. Honolulu.

Sinoto, A., L. Rotunno-Hazuka, and J Pantaleo
1999 An Archaeological Inventory Survey of the Proposed One Wailea Parcel, Wailea, Paeahu Ahupua’a, Makawao, HI TMK 2-1-08:115. Aki Sinoto Consulting: Honolulu.

State of Hawaii. State Historic Preservation Division
2002a Hawaii Administrative Rules Title 13 DLNR, Subtitle 13 SHPD Rules Chapter279 Rules Governing Minimal Standards for Archaeological Monitoring Studies and Reports.

2002b Hawaii Administrative Rules Title 13 DLNR, Subtitle 13 SHPD Rules Chapter 300 Rules Governing Inadvertent Discovery of Human Remains.

United States Department of Agriculture (USDA) Web Soil Survey.
(Accessed December 2019) https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

University of Hawaii at Manoa. MAGIS Collection. http://magis.manoa.hawaii.edu/
(Accessed December 2019)
1885 Maui topographic map. F.S. Dodge 1:90,000 scale.
1924 Makena Topographic Quadrangle Advance Sheet. 1:2400 scale.
1956 Makena Quadrangle Map. 1:24000 scale.

APPENDIX A: FEATURE DATA

TS-1 Feature 1 (SIHP 50-50-14-8710)

TS-1 Feature 1 is a U-shape structure composed of two courses to a height of 55 cm (max)/ 30 cm (avg) located on the sloping edge of a ridge. The stacking consists of basalt boulders from 20 to 40 cm in size and utilized natural bedrock in some sections. The U-shape opens down-slope to the NW. Vegetation in the area consists of grass and kiawe.

Feature Details

Site: 50-50-14-8710
Temporary Site: TS-1
Feature: 1
Type: U-shape
Function: Military
Age: Historic
Condition: Good
Significance: None
UTM: 767001 E 2291389 N

Based on its structure, location, and type, Feature 1 is assumed to have functioned as a military-related training feature.

TU-1 was placed to explore any subsurface architecture of Feature 1. The unit was placed in the interior adjacent to the northwest wall of the feature. In the field an exploratory 1 x .5 m test unit size was determined prior to excavation with the possibility of increasing the size after an initial assessment. A small handpick was used do the rocky nature of the soil. All soil was screened through 1/8in mesh. One layer consisting of 2 levels was excavated. Soils were 7.5 YR 3/3 Dark Brown, Granular, Weak, Fine, Loose, Non-plastic, Silty Loam. No subsurface architecture or cultural material was found. The test unit was terminated at Layer I/Level 2 (20 30 cmbs) due to the presence of rock and bedrock.

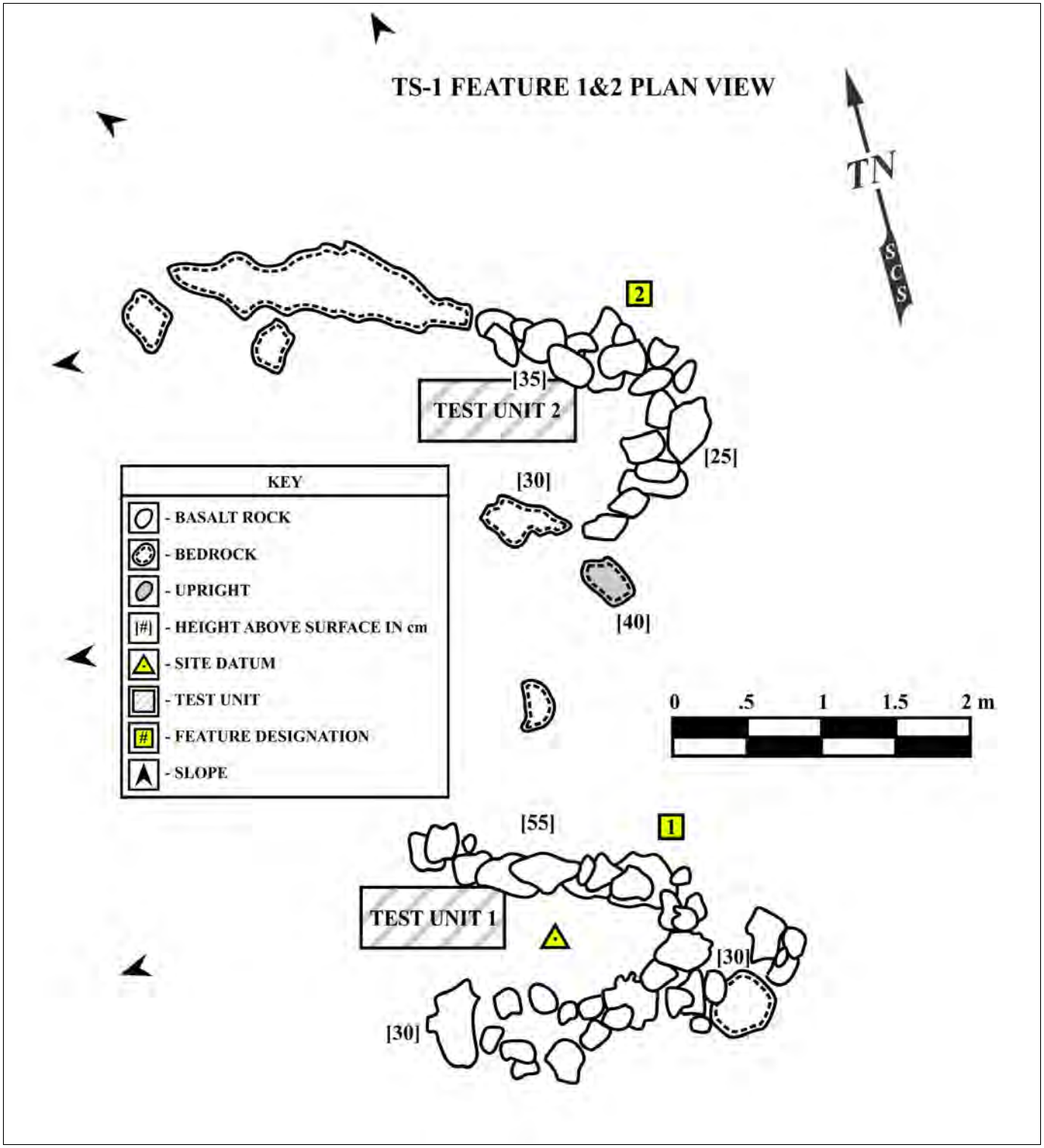


Figure 1: SIHP 50-50-14-8710 TS-1 Feature 1 plan view.

Figure 2: SIHP 50-50-14-8710 TS-1 Feature 1 interior (view to SE).

Figure 3: SIHP 50-50-14-8710 TS-1 Feature 1 (view to N).

Figure 4: SIHP 50-50-14-8710 TS-1 Feature 1 (view to SE).

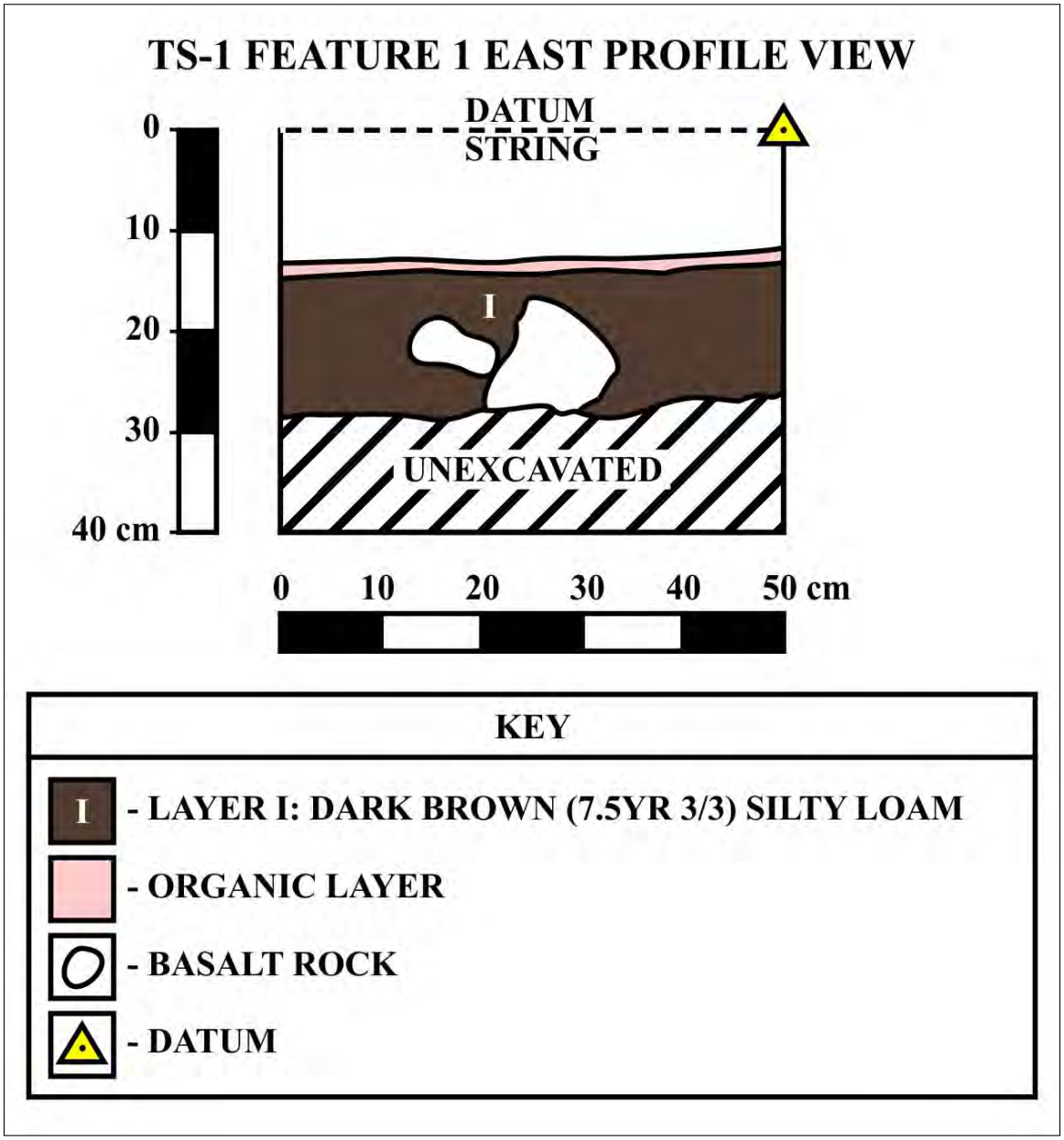


Figure 5: TS-1 Feature 1 TU-1 east profile.

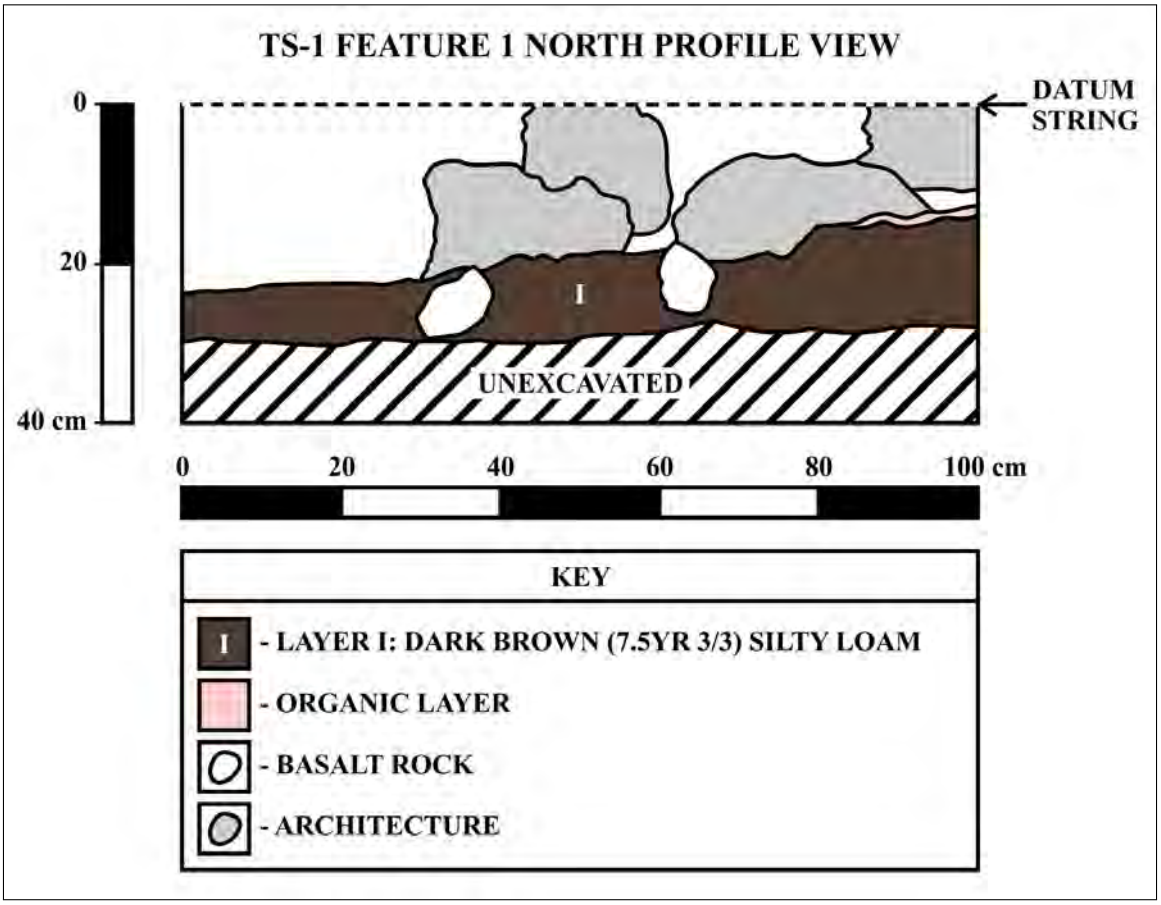


Figure 6: TS-1 Feature 1 TU-1 north profile.

Figure 7: TS-1 Feature 1 TU-1 post excavation (view to ESE).

Figure 8: TS-1 Feature 1 TU-1 north wall profile.

TS-1 Feature 2 (SIHP 50-50-14-8710)

TS-1 Feature 2 is a one-course high C-shape open to the northwest. The walls are constructed of basalt boulders (maximum height of 35 cm.) placed on a natural outcrop. It is possible that the walls originally consisted of more courses as there is some tumble visible around the feature and it appears to have been mechanically altered.

Given its proximity to Feature 1 and similar construction style, Feature 2 is also judged to be a military-related feature.

TU-2 was placed inside of the interior of TS-1 Feature 2 adjacent to the north wall in order to determine if the feature architecture continued below the surface. The test unit was 1 m east/west and .5 m north/south. Excavation terminated at 16 cm (min) / 26 cm (max) due to the presence of rock and bedrock within Layer I/Level 2. Soils consisted of 7.5 YR 3/3 Dark Brown, Granular, Weak, Fine, Loose, Non-plastic, Silty Loam. No architecture was discerned below surface. The unit was culturally sterile. Soils

Feature Details

Site: 50-50-14-8710
Temporary Site: TS-1
Feature: 2
Type: C-shape
Function: Military
Age: Historic
Condition: Fair
Significance: None
UTM: 767001 E 2291393 N

Figure 9: SIHP 50-50-14-8710 TS-1 Feature 2 (view to S).

Figure 10: TS-1 Feature 2 TU-2 post excavation.

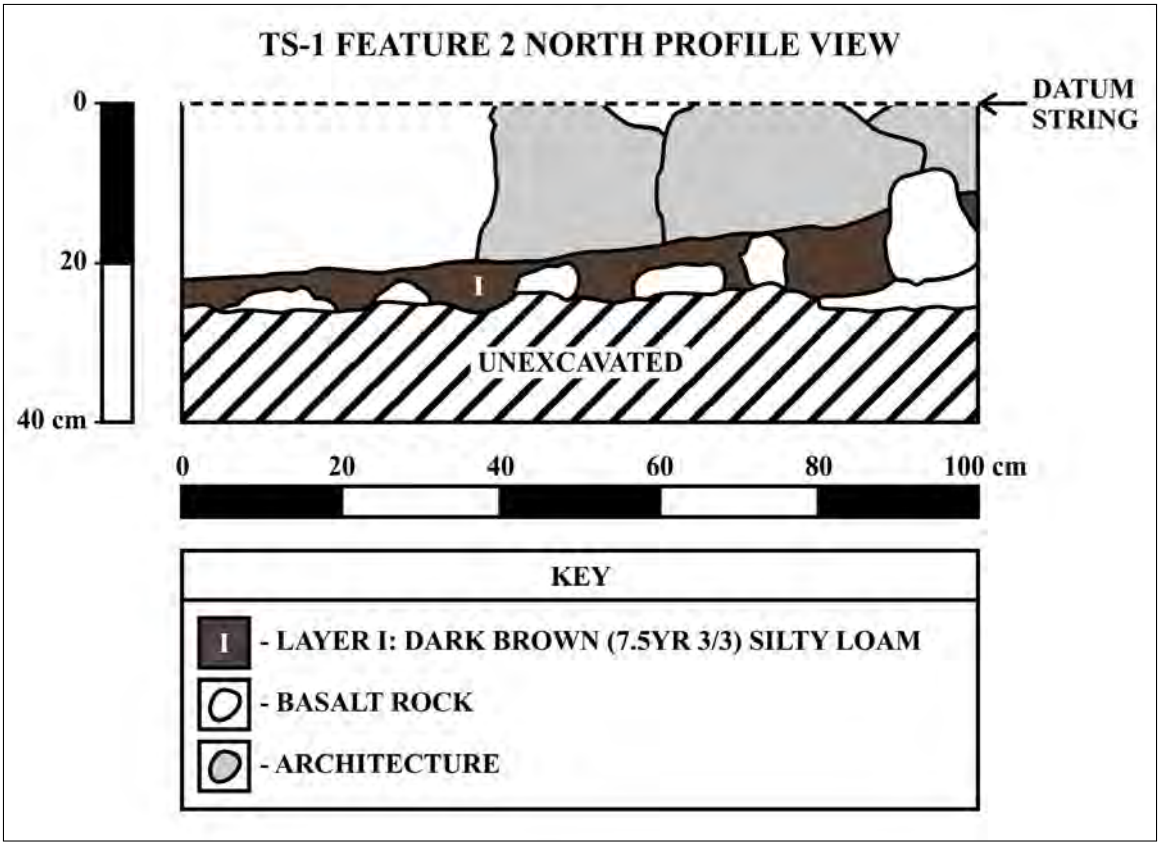


Figure 11: TS-1 Feature 2 TU-2 north profile.

Figure 12: TS-1 Feature 2 TU-2 north wall profile.

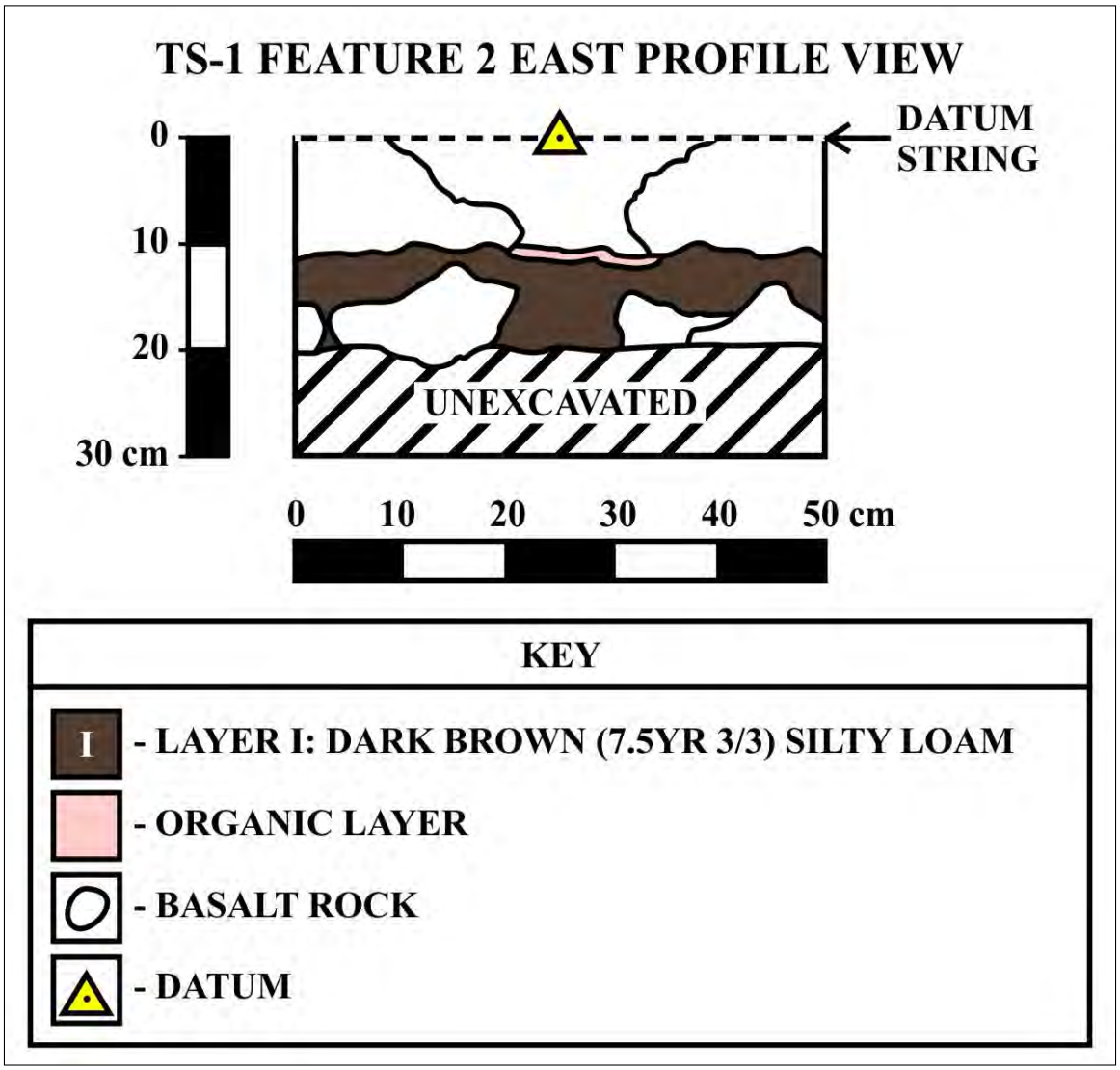


Figure 13: TS-1 Feature 2 TU-1 east profile.

TS-3 Feature 1 (SIHP 50-50-14-4791)

TS-3 Feature 1 is a circular formation of stacked lava rock with a hole in the center. Given its proximity to and alignment with SIHP -4791 wall it is probable that this feature contained a fence post.

Feature Details

Site: 50-50-14-4791
Temporary Site: TS-3
Feature: 1
Type: fence post mold
Function: Boundary
Age: Historic
Condition: Good
Significance: None
UTM: 766990 E 2291373 N

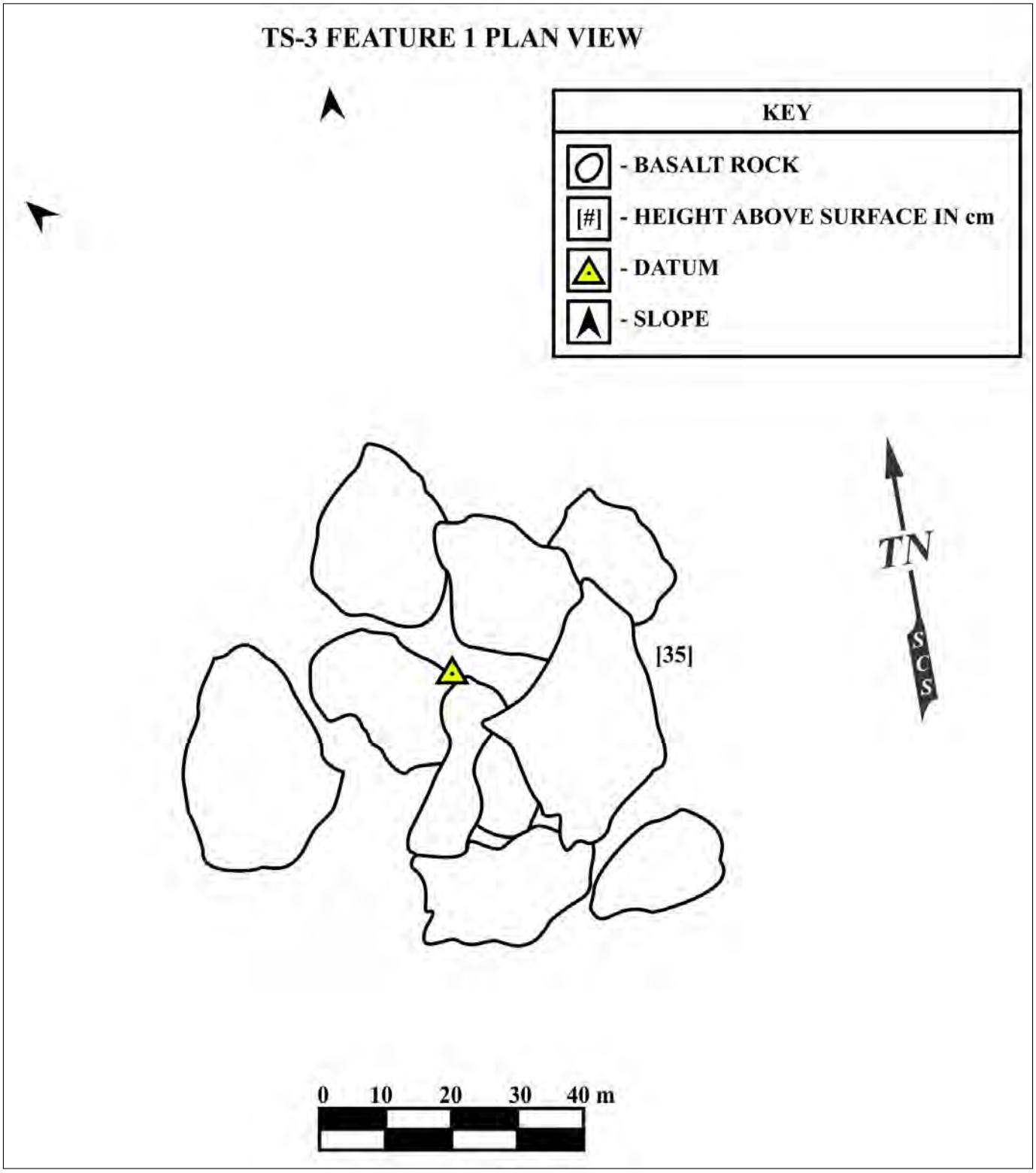


Figure 14: SIHP 50-50-14-4791 TS-3 Feature 1 plan view.

Figure 15: SIHP 50-50-14-4791 TS-3 Feature 1 fence post mold (oblique view to E).

TS-4 Feature 1 (SIHP 50-50-14-8709)

TS-4 Feature 1 is a modified outcrop/retaining wall located along the slope of a ridge. The feature consists of tumbled basalt boulders around a natural exposed bedrock outcrop which still retains soil. The feature is 7.5 m long by 2.5 m in width by 1 m high (max). Based on its structure and morphology, the feature most likely served an agricultural function.

Feature Details

Site: 50-50-14-8709
Temporary Site: TS-4
Feature: 1
Type: modified outcrop
Function: Agriculture
Age: Pre-Contact/Early Historic
Condition: Poor
UTM: 766990 E 2291328 N

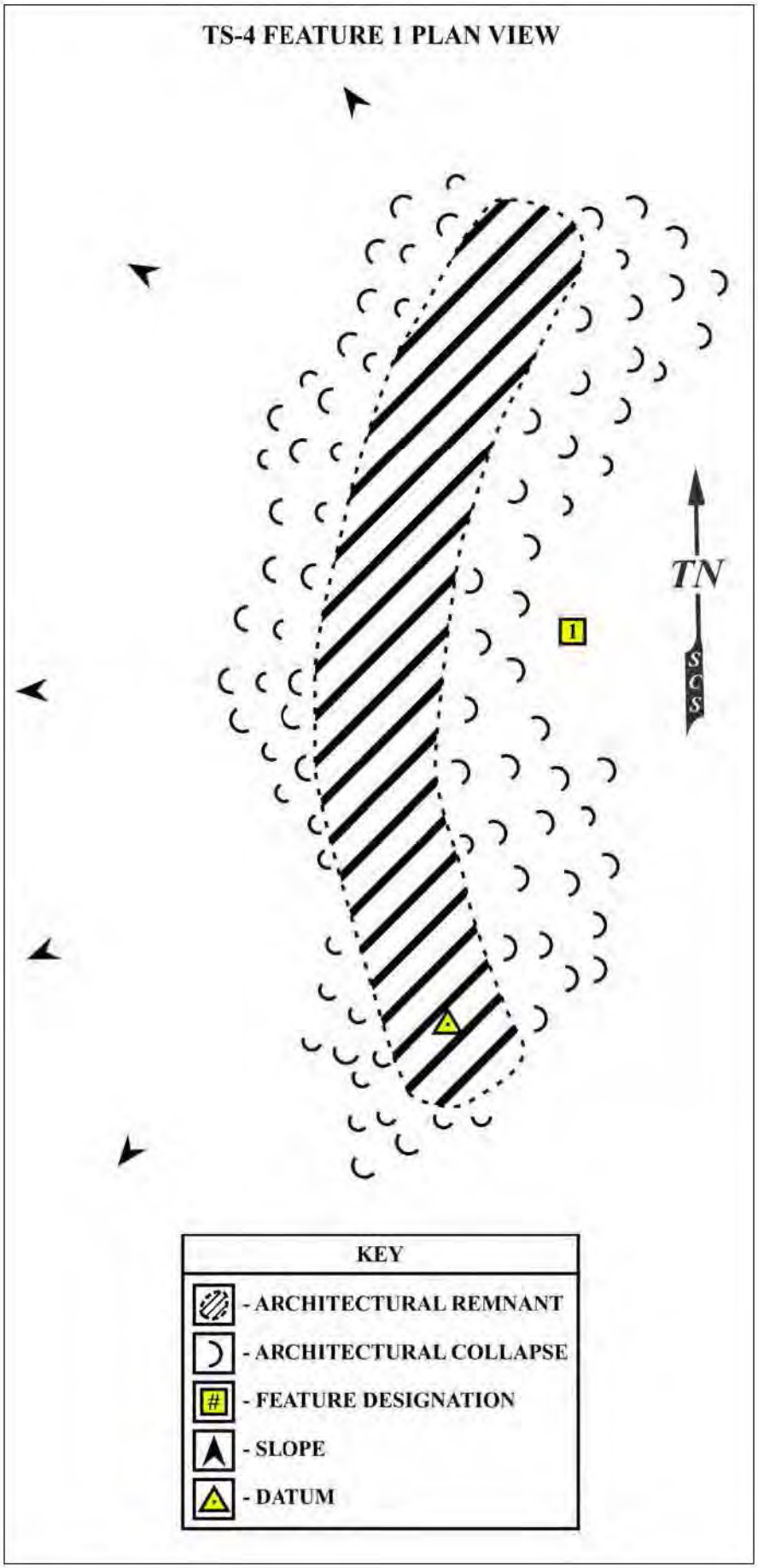


Figure 16: SIHP 50-50-14-8709 TS-4 Feature 1 plan view.

Figure 17: SIHP 50-50-14-8709 TS-4 Feature 1 (view to NNE).

Figure 18: SIHP 50-50-14-8709 TS-4 Feature 1 (view to E).

TS-4 Feature 2 (SIHP 50-50-14-4791)

TS-4 Feature 2 is a circular formation of stacked lava rock with a hole in the center. Based on its structural similarity to TS-3 Feature 1, this feature is also jusged to have functioned as a historic-period fence post.

Feature Details

Site: 50-50-14-4791
Temporary Site: TS-4
Feature: 2
Type: fence post mold
Function: Boundary
Age: Historic
Condition: Fair
UTM: 766991 E 2291324 N

Figure 19: SIHP 50-50-14-4791 TS-4 Feature 2 (view to E).

TS-5 Feature 1 (SIHP 50-50-14-8709)

TS-5 Feature 1 is a small L-shape located atop a natural exposed outcrop. The feature consists of large stacked basalt boulders (40-60 cm in size) from two to three courses forming a retaining wall 85 cm maximum height. The L-shape encloses a level soil interior. TS-5 was interpreted to have functioned as a pre-Contact/Early Historic agricultural feature.

Feature Details

Site: 50-50-14-8709
Temporary Site: TS-5
Feature: 1
Type: L-shape
Function: Agriculture
Age: Pre-Contact/Early Historic
Condition: Good
UTM: 767040 E 2291342 N

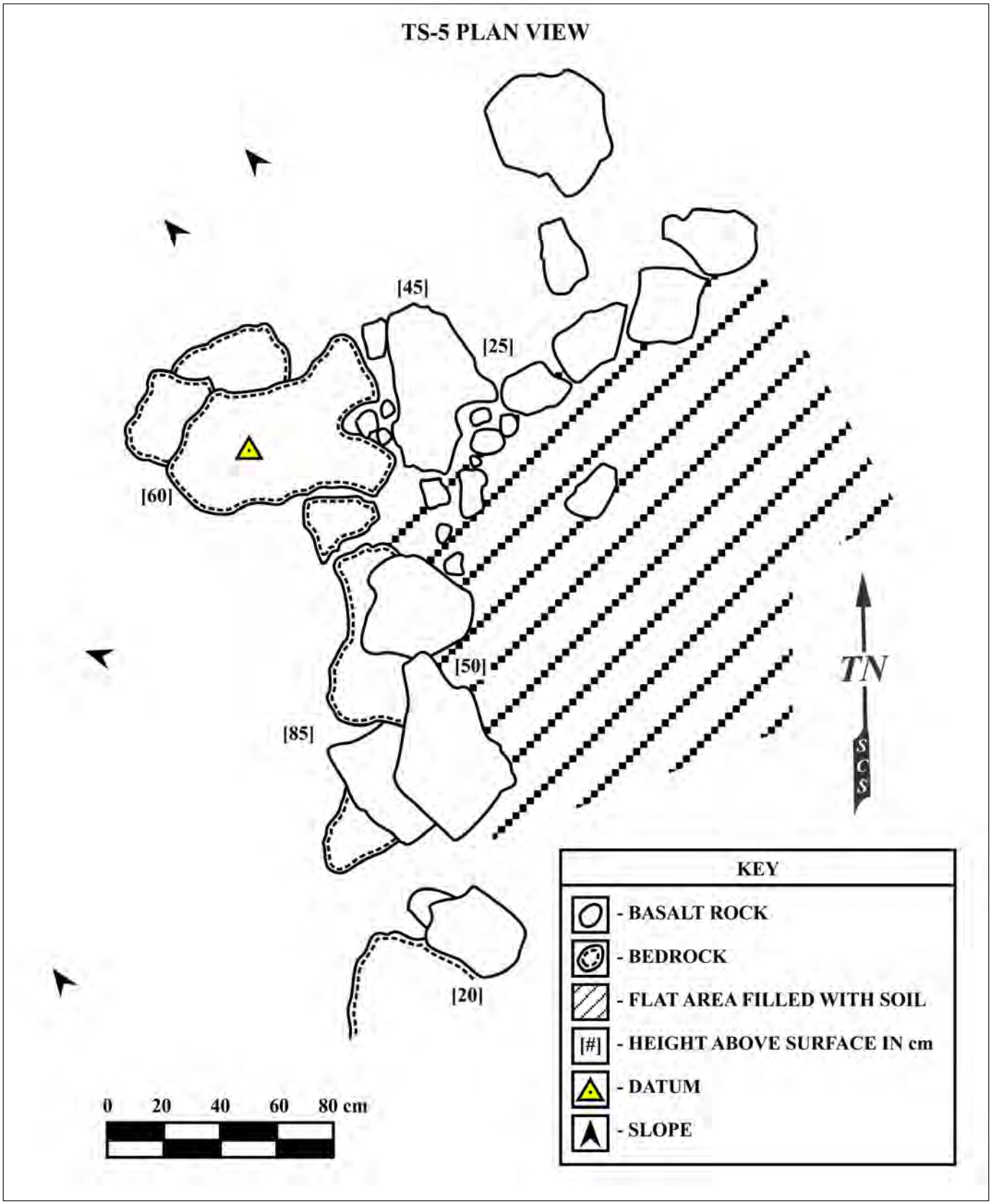


Figure 20: SIHP 50-50-14-8709 TS-5 Feature 1 plan view.

Figure 21: SIHP 50-50-14-8709 TS-5 Feature 1 (view to N).

Figure 22: SIHP 50-50-14-8709 TS-5 Feature 1 (view to SE).

TS-6 Feature 1 (SIHP 50-50-14-8709)

TS-6 Feature 1 is a modified outcrop augmented with stacking to form a small terrace. The stacking consists of basalt boulders from 30 to 50 cm in size forming two courses. The uplsope/interior of the feature still retains soil. Based on its location within the landscape and construction, TS-6 Feature 1 is interpreted to have served as an agricultural feature.

Feature Details

Site: 50-50-14-8709
Temporary Site: TS-6
Feature: 1
Type: modified outcrop
Function: Agriculture
Age: Pre-Contact/Early Historic
Condition: Fair
UTM: 767042 E 2291319 N

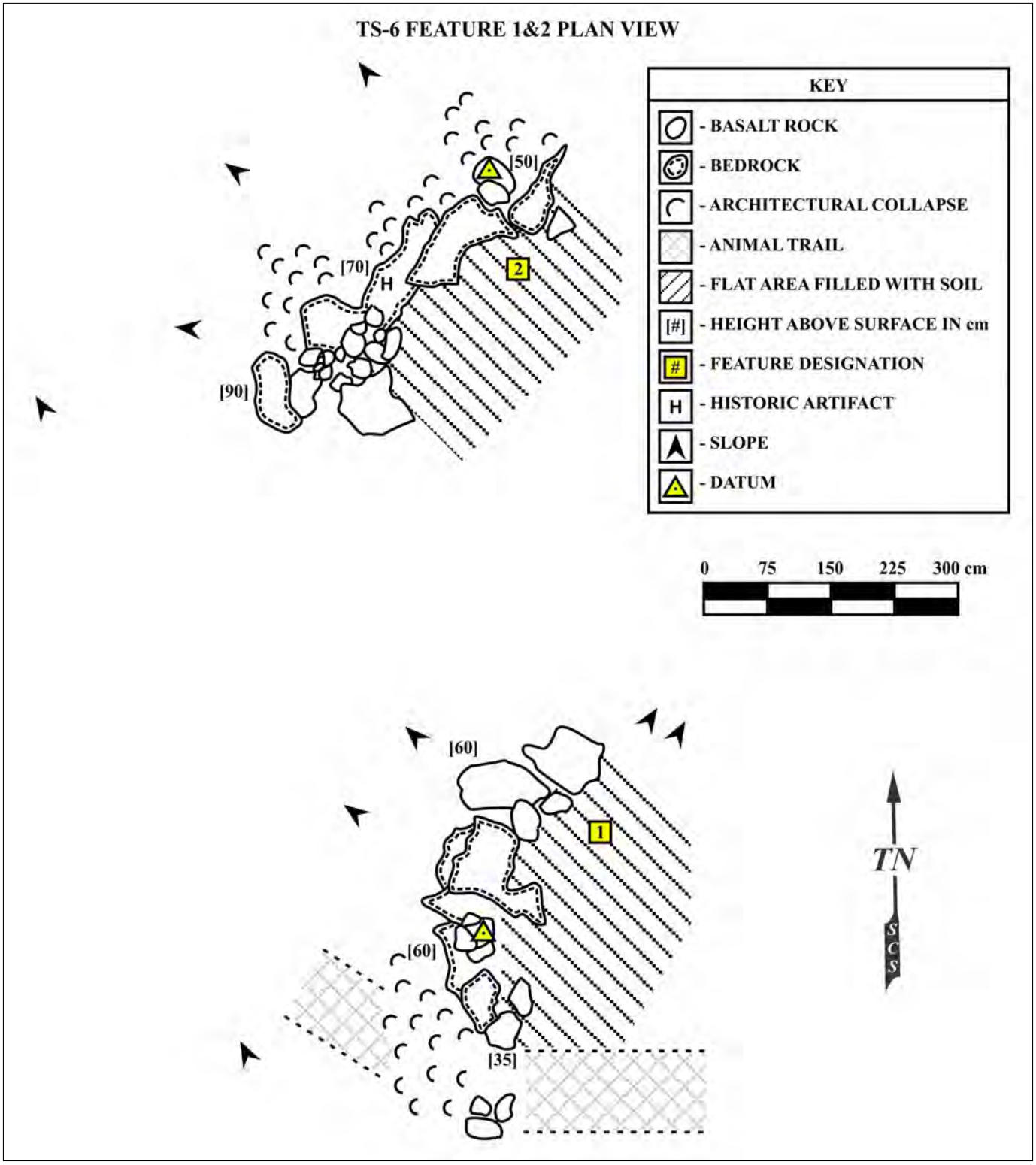


Figure 23: SIHP 50-50-14-8709 TS-6 Feature 1 plan view.

Figure 24: SIHP 50-50-14-8709 TS-6 Feature 1 (view to S).

Figure 25: SIHP 50-50-14-8709 TS-6 Feature 1 (view to NE).

TS-6 Feature 2 (SIHP 50-50-14-8709)

TS-6 Feature 2 is also a modified outcrop forming a short terrace/retaining wall. The feature is mostly natural exposed bedrock augmented in places by stacked basalt boulders. The feature forms a retaining wall that supports a level soil area upslope. Based on its location and similar construction style, TS-6 Feature 2 and Feature 1 were grouped in the same site and both were interpreted to have been pre-Contact/Early Historic agricultural features. Both features also appear to have been impacted by mechanical activity.

Feature Details

Site: 50-50-14-8709
Temporary Site: TS-6
Feature: 2
Type: modified outcrop
Function: Agriculture
Age: Pre-Contact/Early Historic
Condition: Poor
UTM: 767039 E 2291309 N

Figure 26: SIHP 50-50-14-8709 TS-6 Feature 2 (view to NE).

Figure 27: SIHP 50-50-14-8709 TS-6 Feature 2 (view to NNE).

TS-7 Feature 1 (SIHP 50-50-14-8710)

TS-7 Feature 1 is a small C-shape consisting of one to two courses of stacked basalt boulders. Several modern glass bottles were found on the interior surface. The opening of the feature faces to the east. During excavation it was noted that the architecture did not extend below the surface. Based on its construction and location, TS-7 Feature 1 is interpreted to have served in an historic period military (defense) or military-training related function.

Feature Details

Site: 50-50-14-8710
Temporary Site: TS-7
Feature: 1
Type: C-shape
Function: Military
Age: Historic
Condition: Good
UTM: 767075 E 2291232 N

TU-1 was placed in the interior of the C-shape to maximize the chance to discover subsurface artifacts that could help in the determination of the feature function. The excavation consisted of two one layer/ 2 levels from 4 30 cmbs. The layer was roughly half rock and soil. Soils were 7.5 YR 3/3 Dark Brown, Granular, Weak, Fine, Loose, Non-plastic, Silty Loam. Decayed bedrock was encountered in the northwest corner. Due to the soil sterility and presence of rock, excavation was terminated at the bottom of Layer I/Level 3 (30 cmbs).

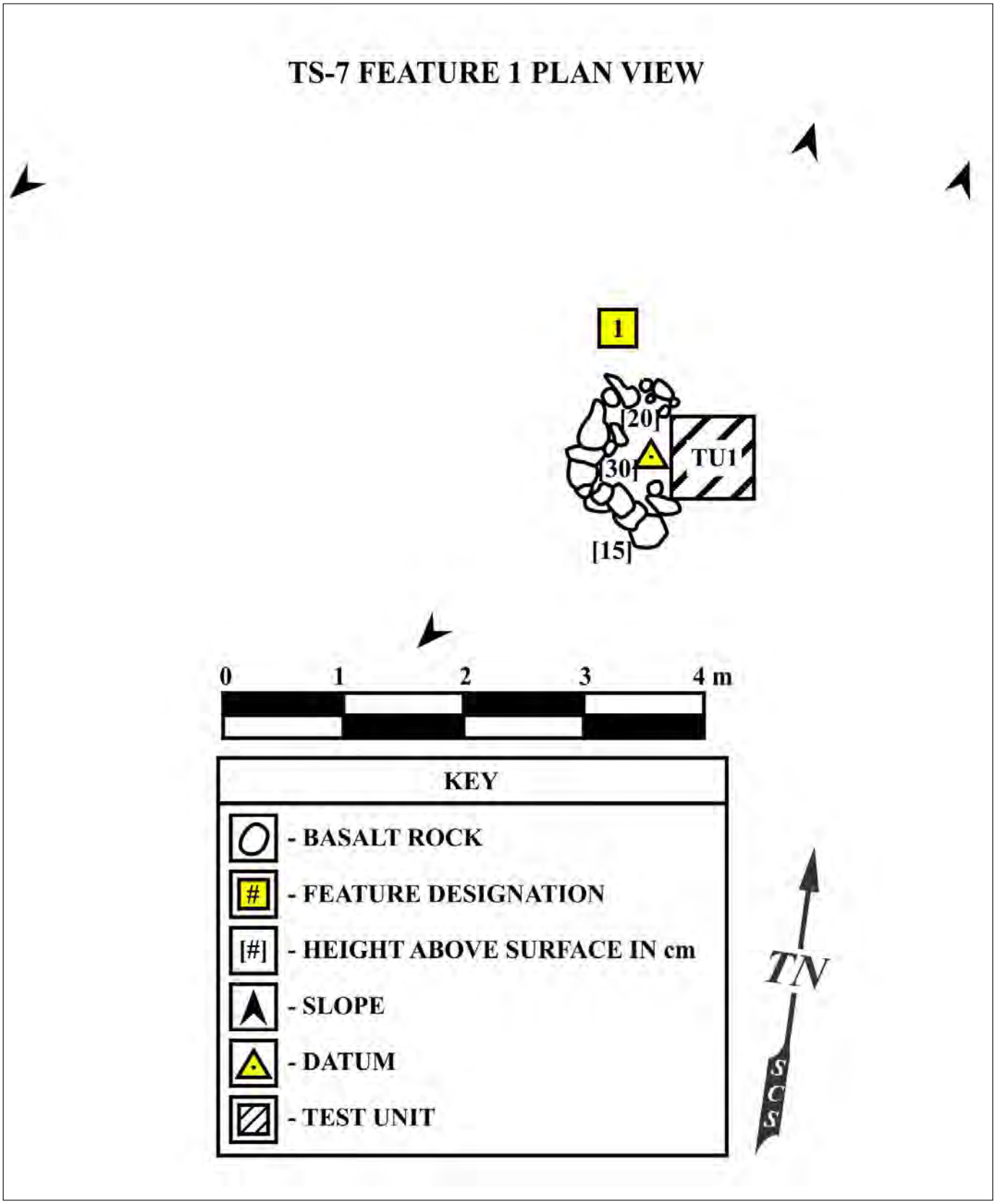


Figure 28: SIHP 50-50-14-8710 TS-7 Feature 1 plan view.

Figure 29: SIHP 50-50-14-8710 TS-7 Feature 1 (view to N).

Figure 30: TS-7 Feature 1 TU-1 post-excavation (view to N).

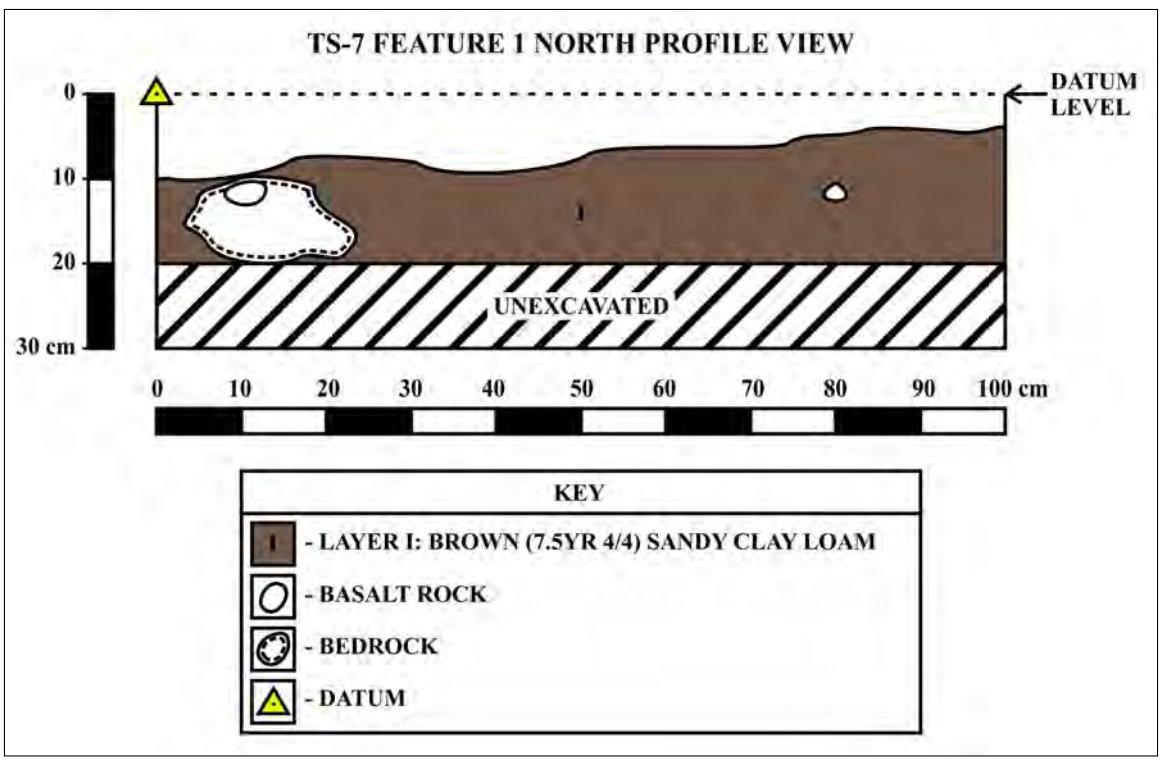


Figure 31: TS-7 Feature 1 TU-3 north profile (Layer I 7.5YR 4-4 sandy clay loam 5-20 cmbs).

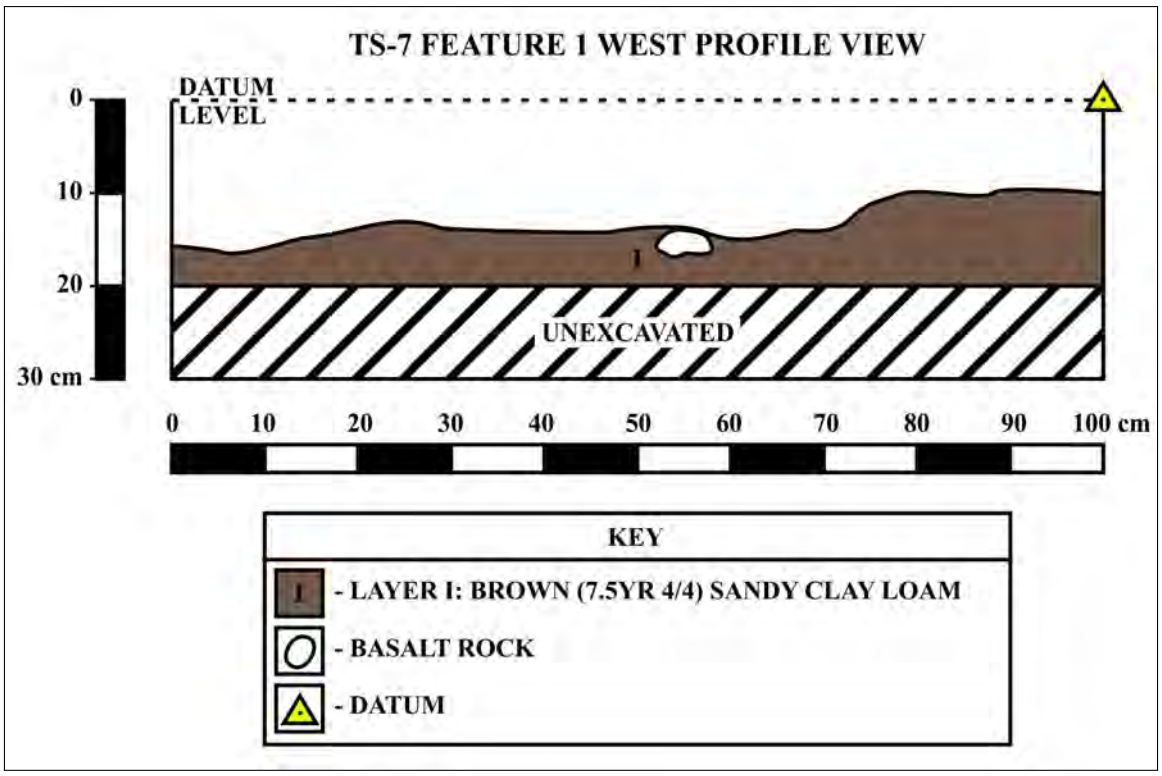


Figure 32: TS-7 Feature 1 TU-1 west profile.

TS-11 Feature 1 (SIHP 50-50-14-8709)

TS-11 Feature 1 is a linear mound located on the sloping edge of a ridge aligned roughly NNE/SSW. The feature is in fair condition and consists of stacked basalt boulders from 20 to 40 cm in size and to 30 cm in height. The feature is located on natural exposed bedrock. A basalt upright boulder 40 cm in height is located in the NE corner of the feature. Based on shape and construction, the feature may have served a pre-Contact/Early Historic agricultural function.

Feature Details

Site: 50-50-14-8709
Temporary Site: TS-11
Feature: 1
Type: mound
Function: Agriculture
Age: Pre-Contact/Early Historic
Condition: Fair
UTM: 766815 E 2291314 N

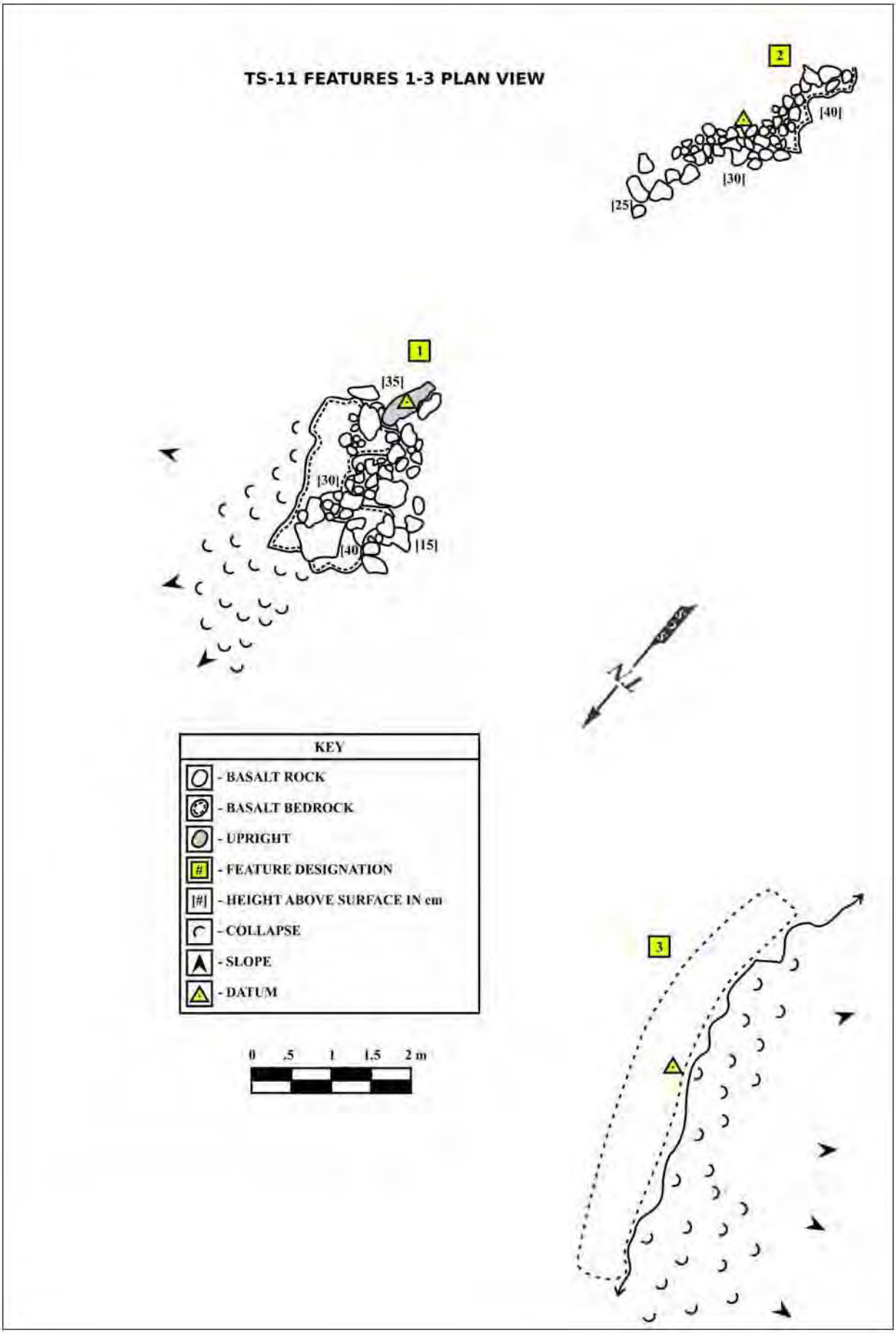


Figure 33: SIHP 50-50-14-8709 TS-11 Feature 1 plan view.

Figure 34: SIHP 50-50-14-8709 TS-11 Feature 1 (view to SSW).

Figure 35: SIHP 50-50-14-8709 TS-11 Feature 1 (view to NNE).

TS-11 Feature 2 (SIHP 50-50-14-8709)

TS-11 Feature 2 is a linear mound aligned NE/SW. The mound is in fair condition and composed of basalt boulders atop natural exposed bedrock. The boulders are from 30-50 cm in size and stacked to two courses. The feature is located on a sloping ridge and it appears that it has been previously altered by mechanical disturbance. Similar to Feature 1, the feature may have served in a pre-Contact/Early Historic agricultural function.

Feature Details

Site: 50-50-14-8709
Temporary Site: TS-11
Feature: 2
Type: mound
Function: Agriculture
Age: Pre-Contact/Early Historic
Condition: Fair
UTM: 766815 E 2291308 N

Figure 36: SIHP 50-50-14-8709 TS-11 Feature 2 (view to NE).

TS-11 Feature 3 (SIHP 50-50-14-8709)

TS-11 Feature 3 is the remnant of a retaining wall/alignment along the base of a slope. The feature consists of one course of basalt boulders running perpinduclar (N/S) to a slope. The feature is in poor condition and appears to have been mechanically altered. Based on its structure and location the feature is interpreted to have served an agricultural function.

Feature Details

Site: 50-50-14-8709
Temporary Site: TS-11
Feature: 3
Type: modified outcrop
Function: Agriculture
Age: Pre-Contact/Early Historic
Condition: Poor
UTM: 766806 E 2291320 N

Figure 37: SIHP 50-50-14-8709 TS-11 Feature 3 (view to SSW).

APPENDIX B: TEST UNIT DETAILS

Table 2. Test unit details and layer descriptions.

Site	Feature	Test Unit	Size	Layer	# Levels (10 cm)	Depth	Munsell	Description	Cultural Material
TS-1	1	TU-1	1 x .5 m	I	2	12 – 30 cmbs	7.5 YR 3/3 Dark Brown, Granular, Weak, Fine, Loose, Non-plastic, Silty Loam.	TU-1 was placed to explore any subsurface architecture of Feature 1. The unit was placed in the interior adjacent to the northwest wall of the feature. In the field an exploratory 1 x .5 m test unit size was determined prior to excavation with the possibility of increasing the size after an initial assessment. A small handpick was used due to the rocky nature of the soil. All soil was screened through 1/8in mesh. No subsurface architecture or cultural material was found. The test unit was terminated at Layer I/Level 2 (20 – 30 cmbs) due to the presence of rock and bedrock.	None
TS-1	2	TU-2	1 x .5 m	I	2	11 – 26 cmbs	7.5 YR 3/3 Dark Brown, Granular, Weak, Fine, Loose, Non-plastic, Silty Loam.	TU-2 was placed inside of the interior of TS-1 Feature 2 adjacent to the north wall in order to determine if the feature architecture continued below the surface. The test unit was 1 m east/west and .5 m north/south. Excavation terminated at 16 cm (min) / 26 cm (max) due to the presence of rock and bedrock. No architecture was discerned below surface. The unit was culturally sterile.	None
TS-7	1	TU-1	1 x 1 m	I	3	30 cmbs	7.5 YR 3/3 Dark Brown, Granular, Weak, Fine, Loose, Non-plastic, Silty Loam.	TU-1 was placed in the interior of the C-shape to maximize the chance to discover subsurface artifacts that could help in the determination of the feature function. The excavation consisted of two layers from 4 – 30 cmbs. The layer was roughly half rock and soil. Decayed bedrock was encountered in the northwest corner. Due to the soil sterility and presence of rock, excavation was terminated at the bottom of Layer I/Level 3 (30 cmbs).	None

CULTURAL IMPACT ASSESSMENT

APPENDIX

F

AA PROJECT NO. 1915

FINAL

Cultural Impact Assessment for the Proposed Single-Family Residences at Paeahu

Paeahu Ahupuaʻa, Honuaʻula Moku, Makawao Modern Tax District, Island of Maui TMK: (2) 2-1-008:145

ʻĀINA ARCHAEOLOGY

AA PROJECT NO. 1915

CULTURAL IMPACT ASSESSMENT FOR THE PROPOSED SINGLE-FAMILY RESIDENCES AT PAEAHU

Paeahu Ahupuaʻa, Honuaʻula Moku, Makawao Modern Tax District, Island of Maui TMK: (2) 2-1-008:145

4/24/2020
Final

Prepared For:
Wailea Resort SF-S Partners LP
590 Līpoa Parkway, Suite 259
Kīhei, HI 96753

Prepared By:
Kim-Hee Wong, M.A
Tanya L. Lee-Greig, M.A
and
Angela Petersons, B.A

ʻĀina Archaeology
Oʻahu: 725 Kapiʻolani Blvd, C400 Honolulu, HI 96813
Maui: 590 Līpoa Parkway, Suite 106 Kīhei, HI 96753

Executive Summary

Date	March 31, 2020 --Draft
Project	Single Family Residences at Paeahu
Project Proponent	Wailea Resort SF-S Partners LP
Proposed Action	Wailea Resort SF-S Partners LP proposes to construct 57 single-family homes, which would range in size from 2500 to 3500 sq. ft. each. In addition to the dwellings, the project would also include the development of residential amenities consisting of a pool, fitness center, washrooms, and a manager's office. The low-density nature of the project would also allow for significant green space and preservation of the existing topography of the hillside, which is a key feature of the project site. The use of bioswales have also been incorporated into the storm water management plan, as well as other sustainable features such as drip irrigation, drought tolerant plants, water conserving plumbing fixtures, and solar PV systems. Estimates for the build-out of the proposed the Project is expected to be over a 3-4 year period, see Section 1.0 for an overview description of the conceptual plans for various aspects of the project.
Project Area and Region of Influence	The potential area of direct effect, or project area, is considered to be 23.1-acre development footprint located in Paeahu Ahupuaʻa, Honuaʻula Moku, Makawao Modern Tax District, Maui Island. When assessing the presence or absence of direct and indirect effects of the proposed project on the traditional cultural practices of a region, traditional use and access to resources from the mountains to ocean, or *mauka* (mountain region) to *makai* (coastal region), must be taken into consideration. As such, the region of influence, or study area for the proposed project is defined as the geographic area encompassed by the known traditional boundaries of Paeahu Ahupuaʻa.
Results	Based on testimony for *kuleana* claims presented before the Land Commission during the Mahele ʻĀina; and in addition to the stories and information gathered during the background research and consultation completed for this study, it is apparent that settlement and land use within Paeahu Ahupuaʻa functioned in the typical traditional sense, with a focus on marine resource gathering within the off-shore waters and along the coastline; as well as cultivation of *kula ʻuala* (potato land), *maia* (banana), and *kalo* (taro) in the *mauka* reaches. While resources such as *ʻilima* (*Sida fallax*) and traditional Hawaiian archaeological sites and features associated with traditional and potentially historically agriculture were noted within the current project area (see Sections 2.1.3, 2.2.3.1.1, 3.2, and 4.1), there were no currently active or extant traditional and customary practices identified in association with these resources as a result of this study (see Section 5.0.)

Results (Continued)	The most common traditional and customary practices that are either currently undertaken or have relatively recently been discontinued due to declining resource availability revolves around fishing and gathering practices along the Paeahu shoreline (see Section 2.1.3.2, 3.2, and 4.2). Though outside of the current project footprint, concerns about runoff adding to the cumulative impacts on the ocean resources from the surrounding build environment were voiced (see Section 3.2).
Recommendations	**Hiʻohiʻona ʻĀina No Nā Kūpuna Mai-- Honoring the Traditional Cultural Landscape of the Current Project Area (Section 5.2.1)** • Consultation with those who participated in this study, as well as some of those who may have declined at this time, to understand how the moʻolelo of this *wahi* might be preserved and shared, either through physical preservation of the identified historic properties and incorporated into the design of the project, or through interpretation to retain and return a sense of place that opens up access to the area for the local native Hawaiian families and generations to come. • Consult with Aha Moku O Maui and those who participated in this study, on traditional place names that could be incorporated into project design, street naming, signage, and other project related materials, as well as the overall project name as a means to honor Hawaiian space and restore the knowledge of place that is inherent in *wahi ʻinoa*. • Incorporate native plants suitable to the leeward environment of Paeahu into the landscaping palette to foster and support *lāʻau lāʻau* practices and provide resources for *hana noʻeau* practices. • Cut light pollution by exceeding the lighting standards of the area currently referred to as Wailea Resort to assist with reducing sea bird fallout due to disorientation related to artificial lighting and maintain the visibility of the night sky. **Malama i ke Kai, a Malama ke Kai Ia ʻOe – Taking Care of Ocean Resources through Land and Stormwater Management (Section 5.1.2)** • Identify potential runoff and flooding zones within the project area to ensure proper maintenance of water channels in order to help minimize coastal resource degradation that may result from flooding. • Reduce stormwater runoff by using low impact development and green infrastructure methods to capture, collect, and retain stormwater, as well as potentially remove pollutants in any stormwater runoff that might eventually enter the ocean through the project area.

Acknowledgments

Many thanks go out to the various individuals who shared their personal life experiences and traditional knowledge for this study. Information shared helps tremendously in reconstructing the traditional way of life at different times in history and shows how lifestyles, particularly relating to Hawaiian traditions and cultural practices, have evolved.

Most important it is with sincerest gratitude and fondest aloha that I thank the following *kūpuna* and individuals who have contributed greatly to our understanding of traditional cultural practices related to the lands and waters of Paeahu Ahupuaʻa: Ms. Leinaʻala Teruya Drummond, Mr. Vernon Kalanikau, Mr. Daniel Kanahele, Ms. Carol-Marie Lee, Mr. Cody Tuivaiti, and Mr. Johnny and Mrs. Leona Medeiros. Mahalo a nui for taking time out of your day to share your *manaʻo* (input) and concerns.

Table of Contents

1.0 Introduction 1

2.0 Cultural Historical Background 5

2.1 He mau Moʻolelo o na Ahupuaʻa ʻo Paeahu i ka Wā Kahiko – Traditions of the Paeahu Region Prior to Western Arrival 7

2.1.1 Wahi ʻInoa 7

2.1.2 The Mythical Era 13

2.1.3 Nā Poʻe Kahiko o ka Ahupuaʻa o Paeahu – Traditional Hawaiian Settlement of the Paeahu Ahupuaʻa 16

2.2 Arrival of Western Vessels and 19th Century Culture Change 29

2.2.1 Transitions in Population and Land Use 29

2.2.2 1845-1851 – The Mahele 32

2.2.3 Land in Support of Commercial Interests 43

2.3 Paeahu In the 20th Century 48

2.3.1 The ʻUlupalakua Ranch 48

2.3.2 World War II Military Exercises 49

2.4 Resort Development and the Modern Era 50

3.0 Scoping Methods and Results 52

3.1 Scoping Methods 52

3.2 Community Outreach Results and Interviews 55

3.2.1 Interview with Carol-Marie Kaʻonohiokalā Lee 55

3.2.2 Interview with Mr. Vernon Kalanikau 56

3.2.3 Interview with Leinaʻala Teruya Drummond 57

3.2.4 Interview with Daniel Kanahele 58

4.0 Traditional Cultural Practices of Paeahu Ahupuaʻa 63

4.1 Traditional Hawaiian Agriculture and Plant Resource Gathering Practices 63

4.2 Makai Resources and the Traditional Cultural Practices of the Shoreline and Offshore Area 67

4.3 Na Ala Hele -- Traditional Access and Trails 71

4.4 Traditional Hawaiian Burial Practices 75

4.5 The Cultural Landscape and Practices as Reflected in the Archaeological Record 76

5.0 Analysis and Recommendations 78

5.1 Analysis of Effect to Traditional and Customary Practices and Proposed Project Recommendations 82

5.1.1 Traditional Cultural Resources and Customary Practices Specific to the Proposed Project Area 82

5.1.2 Traditional Cultural Resources and Customary Practices Identified within Paeahu Ahupuaʻa and adjacent to the Proposed Project 83

5.2 Recommendations for the Proposed Project 84

5.2.1 Hiʻohiʻona ʻĀina No Nā Kūpuna Mai-- Honoring the Traditional Cultural Landscape of the Current Project Area 84

5.2.2 Malama i ke Kai, a Malama ke Kai Ia ʻOe – Taking Care of Ocean Resources through Land and Stormwater Management 85

6.0 References Cited 86

List of Figures

Figure 1-1. Preliminary site plan for the proposed single-family residences at Paeahu Ahupuaʻa (figure courtesy of Ledcor Development and Munekiyo Hiraga). 2
Figure 1-2. A portion of the USGS 7.5' topographic map, Puu o Kali Quadrangle (1992), showing the location of the proposed project (outlined in blue) in relation to Paeahu Ahupuaʻa (shaded in green). 3
Figure 1-3. TMK Map (2) 2-1-08 showing the location of the current project area cross-hatched in red. 4
Figure 2-1. A portion of the F.S. Dodge (1885) Hawaiian Government Survey map of Maui showing the current project area (outlined in blue) in relation to the ahupuaʻa of Paeahu and moku of Honuaʻula. 6
Figure 2-2. Aerial photo (Esri et al. 2018) showing currently known place names of Paeahu Ahupuaʻa. 11
Figure 2-3. Land Grant 548 to John Y. Kanehoa highlighting boundary sections regarding resources of particular interest. 19
Figure 2-4. Native tenant claim by Ohule for pahulu and pahulu ʻuala lands in Paeahu (Helu 10580) (Office of Hawaiian Affairs 2011). 20
Figure 2-5. Native tenant claim by Kuhilani for moku lauhala in Paeahu (Helu 5281) (Office of Hawaiian Affairs 2011) 25
Figure 2-6. A portion of the USGS 7.5' topographic map, Puu o Kali Quadrangle (1992), showing the location of the proposed project (outlined in blue) in relation to Land Commission Awards with location information and Land Grants. 42
Figure 2-7. A portion of the revised Government Survey Map of Maui (F. S. Dodge 1903 (1885)) with a portion of an undated tracing of Honuaʻula by Monsarrat showing Land Grants issued in Paeahu in relation to the potato lands outlined in Kula Moku. 44
Figure 4-1. ʻIlima (Sida fallax) flowers. 66
Figure 4-2. Patches of ʻIlima (Sida fallax) within the current project area. 66
Figure 4-3. A portion of the 1922 USGS topographic map, Kihei Quadrangle overlain on the ESRI World Imagery map (Esri et al. 2018) highlighting the historic stream routes and muliwai locations in relation to the current project area and modern built environment. 70
Figure 4-4. Boundary Descriptions for Mahele Award 5281 to Kuhilani (Office of Hawaiian Affairs 2011)highlighting the notation of Apana 2 being bound by the ala and alanui. 73
Figure 4-5. Boundary Descriptions for Mahele Award 5329 to Pahu (Office of Hawaiian Affairs 2014) highlighting the notation of Apana 1 being bound by the ala and alanui. 73
Figure 4-6. A portion of the F.S. Dodge (1885) Hawaiian Government Survey map of Maui showing the current project area in relation to coastal trail and mauka cart trail. 74
Figure 4-7. A portion of the 1922 USGS topographic map, Kihei Quadrangle overlain on the ESRI World Imagery map (Esri et al. 2018) highlighting the coastal trail and mauka cart trail in relation to the current project area and modern built environment. 74

Figure 4-8. . A portion of the USGS 7.5' topographic map, Puu o Kali Quadrangle (1992), showing the location of the proposed project (outlined in blue) in relation to the underlying soil units of Paeahu Ahupuaʻa (U.S. Department of Agriculture 2001). 76

List of Tables

Table 2-1. Summary of Land Commission Awards for Paeahu Ahupuaʻa (Office of Hawaiian Affairs 2011, 2014) 36
Table 3-1. Outreach Summary 52

1.0 INTRODUCTION

Wailea Resort SF-S Partners LP proposes to develop 57 single-family residential units situated across approximately 23.1-acres within the Wailea Resort Planned Development area. The lands of the proposed Wailea Single Family Residences Project (Project) is situated on a currently vacant hillside within Paeahu Ahupuaʻa, Honuaʻula Moku (Makawao Modern Tax District, TMK [2] 2-1-008:145), Maui Island and is bounded by Wailea Alanui Drive, Kapili St., the undeveloped County property and Kilohana Park to the north, and the Wailea Kialoa neighborhood to the south.

Because the proposed project is located within the Wailea Resort Planned Development area, there is a specific single-family residential zoning that limits the on-site density to 2.5 homes per acre (57 units). In addition to the proposed 57 single-family homes, which would range in size from 2500 to 3500 sq. ft. each, the Project would also include the development of residential amenities consisting of a pool, fitness center, washrooms, and a manager's office. The low density nature of the Project also allows for significant green space and preservation of the existing topography of the hillside, which is a key feature of the site (Figure 1-1). The use of bioswales have also been incorporated into the storm water management plan, as well as other sustainable features such as drip irrigation, drought tolerant plants, water conserving plumbing fixtures, and solar PV systems. Estimates for the build-out of the proposed the Project is expected to be over a 3-4 year period.

As a part of the Environmental Assessment (EA) process for the proposed project, at the request of Wailea Resort SF-S Partners LP, ʻĀina Archaeology conducted a study of traditional cultural practices within and adjacent to the proposed project. The Guidelines for Assessing Cultural Impacts adopted on November 19, 1997 by the Environmental Council, State of Hawaiʻi states:

> (For) the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place (proposed project area). This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment…. An ahupuaʻa is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. (State of Hawaii Office of Environmental Quality Control 2012:11)

For this cultural impact assessment, the *ahupuaʻa* of Paeahu is considered the overall "study area" while the development footprint of the Project is identified as the area of potential direct effect (project area) (Figure 1-2 and Figure 1-3). The purpose of this document is to gain an understanding of traditional cultural practices within the study area and identify any potential effects on these practices that may occur during, or as a result of, the implementation of the proposed project.

Figure 1-1. Preliminary site plan for the proposed single-family residences at Paeahu Ahupua'a (figure courtesy of Ledcor Development and Munekiyo Hiraga).

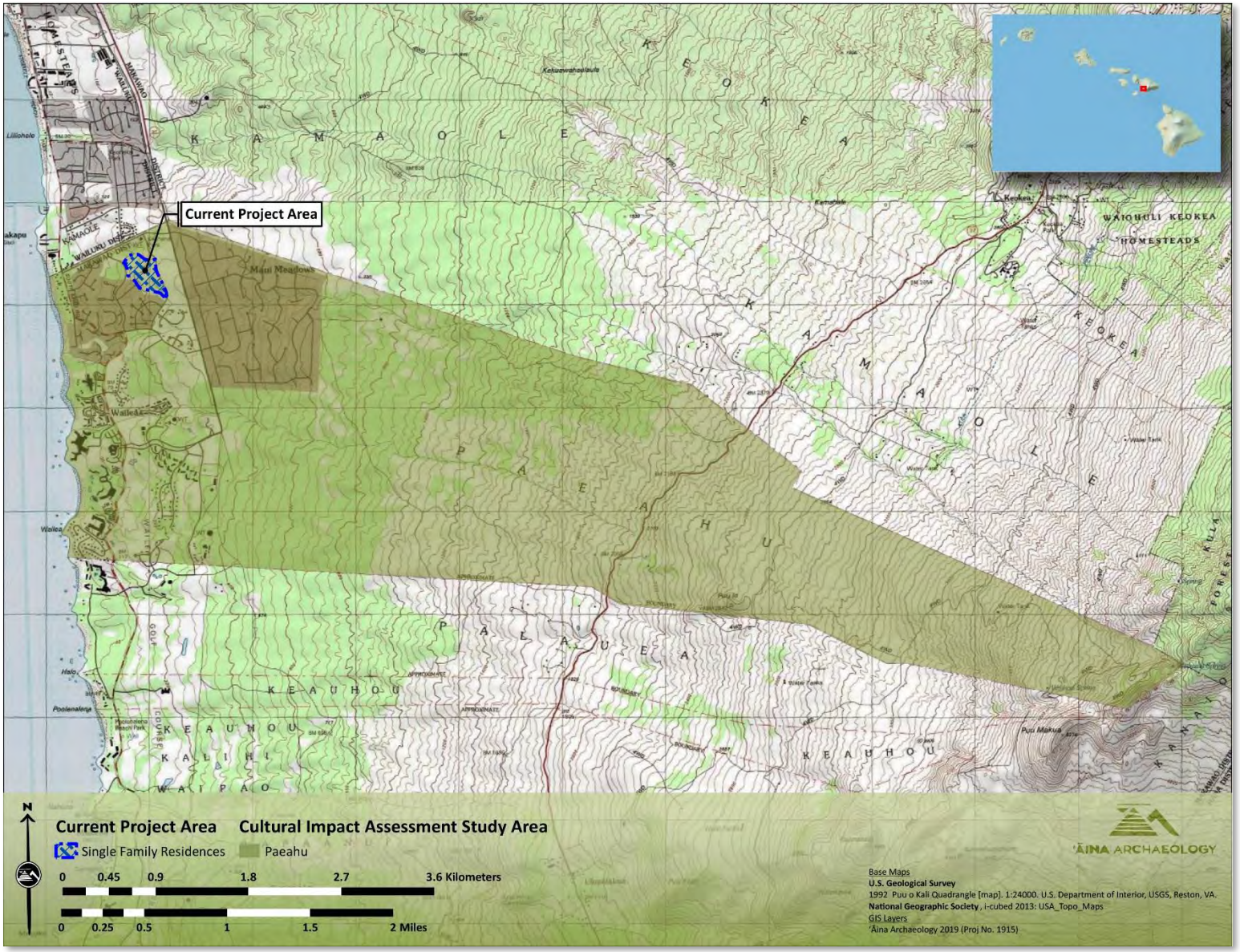


Figure 1-2. A portion of the USGS 7.5' topographic map, Puu o Kali Quadrangle (1992), showing the location of the proposed project (outlined in blue) in relation to Paeahu Ahupua'a (shaded in green).

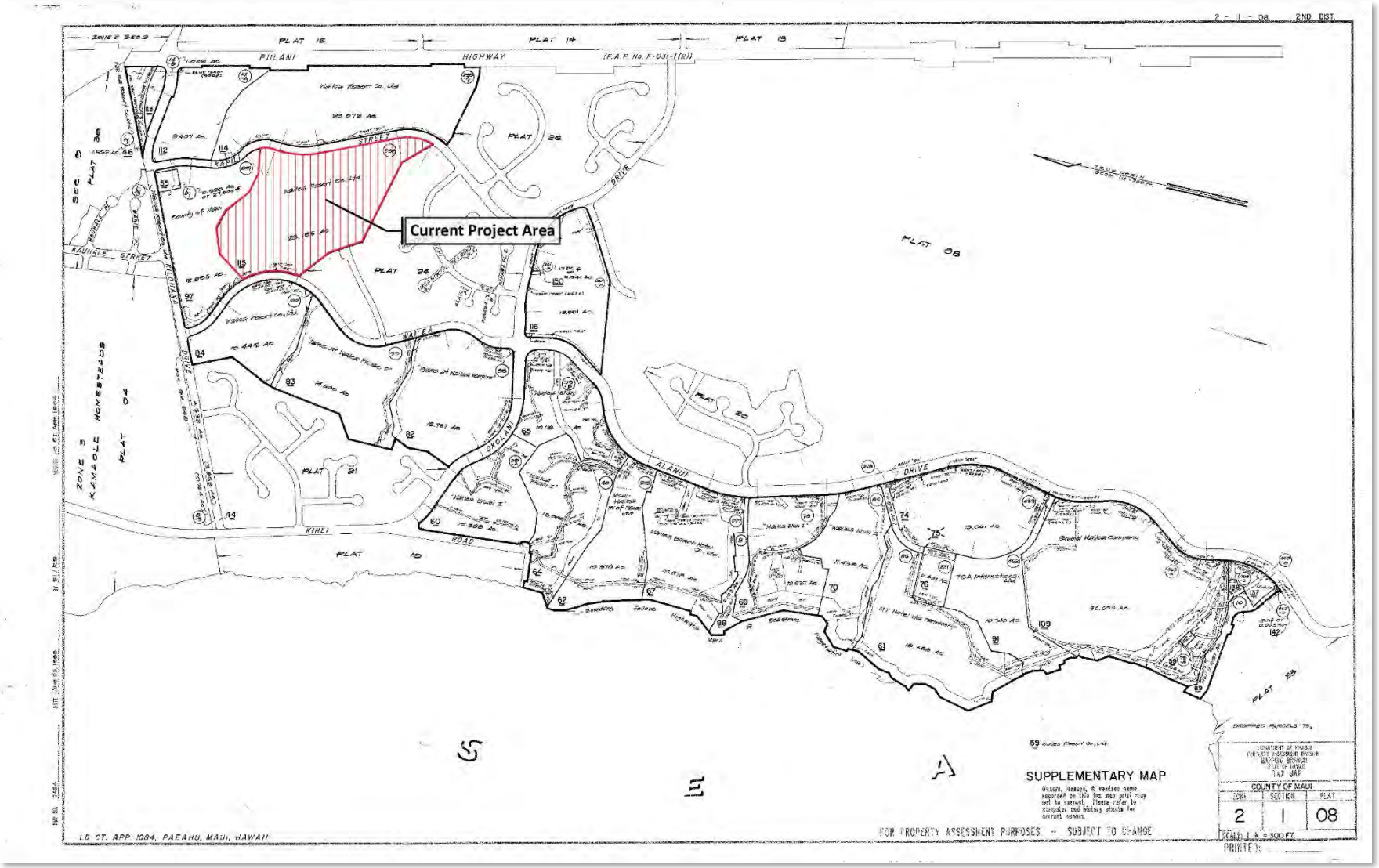


Figure 1-3. TMK Map (2) 2-1-08 showing the location of the current project area cross-hatched in red.

2.0 CULTURAL HISTORICAL BACKGROUND

The division of Maui's lands into political districts occurred during the rule of Kakaʻalaneo, under the direction of his *kahuna*, Kalaihaʻōhiʻa (Beckwith 1970:383). This division resulted in the creation of twelve districts or *moku* during traditional times: *Kula*, Honuaʻula, Kahikinui, Kaupō, Kīpahulu, Hāna, Koʻolau, Hāmākua Loa, Hāmākua Poko, Na Poko or Na Wai Eha (Wailuku), Kāʻanapali, and Lāhainā (Alexander 1882; Sterling 1998:3). The *moku o loko*, or *moku* as it is most commonly called, literally means "to cut across, divide, separate" (Lucas 1995:77). When used as a term of traditional land tenure, a *moku* is similar to a modern political district.

Within these *moku* are smaller units of land called *ahupuaʻa,* the name of which is derived from the Hawaiian term *ahu* (altar), which were erected at the points where the land boundary intersected the *alaloa* (main road encircling the island), upon which a carved *puaʻa* (hog) image made of *kukui* wood and stained with red ochre was placed along with the tax of food items from that particular land unit as payment to the *aliʻi* (chief) during the annual progression of the *akua makahiki* (Alexander 1882:4).

The typical configuration of the *ahupuaʻa* extends from the sea to the mountain so that the *aliʻi* (chiefs) and *makaʻāinana* (native tenants) could have access to resources of the *wao lāʻau* or *wao nahele* (forested region), the *wao ʻamaʻu* and *wao kanaka* (cultivated land), and the *kula uka* and *kula kai* (the lower grasslands and shoreline) (Alexander 1882:4; Mueller-Dombois 2007). While the boundaries of an *ahupuaʻa* generally followed prominent landforms (i.e. ridge lines, the bottom of a ravine, a depression in the earth), there were times where a stone or rock that was notable from a tradition or sacred use would mark a corner or determine a line (Alexander 1890:105-106). Along similar lines, the growth of a certain kind of tree, herb or grass, or the habitat of a certain kind of bird would sometimes define a division (Alexander 1890:105-106).

Honuaʻula is comprised of some twenty *ahupuaʻa*, which, from north to south, include: Paeahu, Palauea, Keauhou, Kalihi, Waipao, Pāpaʻanui, Kāʻeo, Maluaka, Moʻoiki (fronting the islet of Molokini), Mohopilo (which does not reach the shoreline), Moʻoloa, Moʻomoku, Onau, Kanahena, Kualapa, Kalihi, Papaka Kai, Kaunuahane, Kaloi, and Kanaio. The current project area is situated within the the *ahupuaʻa* of Paeahu which traditionally included the offshore fishery, which began in the sea, and encompassed the shoreline and bays from Keawekapu to Halo. The *kula* lands (open plain lands), where much of the agricultural activities occurred and the region in which the proposed project is situated, stretched *mauka* behind a once active sand dune system that swept across the shoreline.

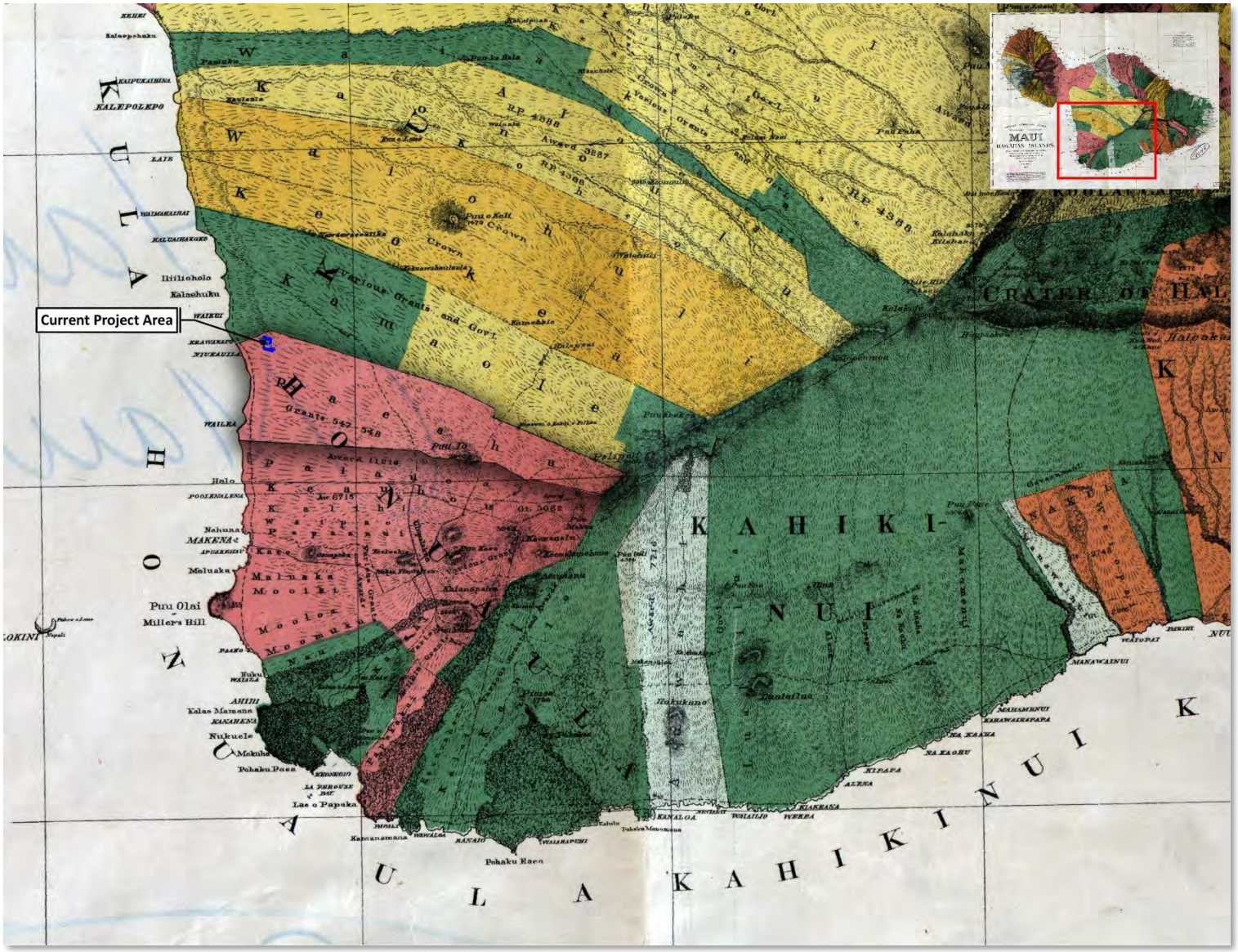


Figure 2-1. A portion of the F.S. Dodge (1885) Hawaiian Government Survey map of Maui showing the current project area (outlined in blue) in relation to the ahupuaʻa of Paeahu and moku of Honuaʻula.

2.1 He mau Moʻolelo o na Ahupuaʻa ʻo Paeahu i ka Wā Kahiko – Traditions of the Paeahu Region Prior to Western Arrival

The island of Maui has been known by several names throughout history and across the *pae ʻāina*. The ancient name of Ihikapalaumaewa, after the child of Wakea and Papa who is the ancestral origin of the people of Maui, was once attributed to the island of Maui. Maui has also been referred to Kulua for the two prominent volcanoes that comprise the island, Nā Hono-a-Piʻilani for Piʻilani, the great 16th Century chief of Maui, and Maui Nui a Kama for Kamalalawalu the grandson of Piʻilani (Kapiikauinamoku 1956; Sterling 1998:1). An origin story of the Hawaiian people speaks to the creation of their islands as being born to the gods Papa and Wakea. In the ancient *oli* (chant) that tells this origin story, Hawaiʻi Island is first to be born, followed by Maui, and then the rest:

Hanau o Maui he moku, he aina, *Na kama o Kamalawalu e noho.*	Maui was born an island, a land, A dwelling place for the children of Kamalalawalu. (Fornander 1916b:2-3)

In this chant, Maui is called "a dwelling place for the children of Kamalalawalu," who was the grandson of Piʻilani, a 16th century Mōʻī (paramount ruler) of Maui and founder of one of its greatest dynasties (Barrere 1975:1). Thus, the traditional poetic name for Maui as Maui-a-Kama, named after Kamalalawalu, whose children are the people of Maui. It's because of them that we have the ability to know the historical names, *moʻolelo*, cultural sites and practices of the area in and around Paeahu.

2.1.1 Wahi ʻInoa

In Hawaiʻi, names were given to virtually everything. In the preface of *Place Names of Hawaii*, Samuel Elbert states that:

> Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and heiau, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place.
>
> Place names are far from static … names are constantly being given to new houses and buildings, land holdings, airstrips, streets, and towns and old names are replaced by new ones … it is all the more essential, then to record the names and the lore associated with them (the ancient names) now. (Pukui et al. 1974:x)

Lyons also notes that as a consequence of the long tenancy of the people on land, "every piece of land had its name, as individual and characteristic as that of its cultivation" (Lyons 1903:23). Intrinsic to our knowledge of place names is their ability to tell the story or keep record of an area's resources or characteristics prior to European contact. Consideration of the place name meanings for the study area may yield some insight into the stories, patterns of life, and land use within the *ahupuaʻa* of Paeahu. The place names noted on Figure 2-2 and listed below are for areas, divisions, and features of the land and sea that comprise this *ahupuaʻa*, as identified through research of the historic and modern maps of Paeahu and Honuaʻula, Mahele ʻĀina

documents, Hawaiian language newspapers, and other available historic literary resources. Unless indicated otherwise, the spelling and orthography presented below are taken from Pukui and others (1974).

Haleolono (*ʻili*)	Literal Translation: House where prayers to Lono were offered, as for rain and good crops (Pukui and Elbert 1986:53).
Hale Pala	Descriptive: House thatched by Lā (the sun); Literally: a house thatched with sunlight or with the *pala* fern (*Marattia douglasii*) (Ashdown 1971:64)
Hālō (*lae*)	Literal Translation: To peer; " to peer, as with the hands shading the eyes", a peering cloud (Pukui and Elbert 1986:13); Descriptive: reference to the goddess of the rainbow, particularly the circular rainbow that contains the shadow of the person seeing it at the center (Ashdown 1971:66)
Hauola (*ʻili*)	Literal Translation: Dew of life.
Kahamaninii	Literal Translation: place [of the] surgeon fish (*manini*); possibly a reference to the outgoing, or overflowing waters (Ashdown 1971:64)
Kanekokala	Descriptive: a confessor, a *kahuna* (priest) who forgives transgressions (Ashdown 1971:64); also a form of Kane, one of the four principle gods of Hawaiian religion, Kanekokala – Kane of the coral (Beckwith 1970:54); a god form, like Kuʻula, that also watches over fishermen and to whom *koʻa* (fishing shrines) are consecrated (Gutmanis 1983:69; Thrum 1909b); also the name of an *manō* that resided at Kahikinui and traveled around Maui with his sister, Kane-wahine (Sterling 1998:10).
Ka Ulu Uoa Kaulaʻuo (Ke One Ulua – Ulua beach)	Older name of stretch of beach currently known as Ulua Beach (Clark 1989:42); Descriptive: mankind's obsession for the growth of material things, earthly blessing without much regard for the spiritual (Ashdown 1971:64); Possibly "Kauluoa", literally: the split breadfruit tree
Ke One o ka Wahine	Descriptive: sands or lands of the goddess or ancestral spirits (Ashdown 1971:64)
Ke One o Polo	According to Ashdown (1971:64) Ke-o-ne-o-po-lo is a reference to sands of time and *huakaʻi pō* (night marchers) which begins in Kula where the gulch and stream originates and flows to the *muliwai* (river mouth) at Ke One o Polo during certain nights in March; According to Clark (1989:41) this is an introduced name given to the stretch of beach known today as "Polo Beach" during the development of Wailea as a resort area
Kuhulu (*ʻili*)	Kaona (hidden meaning): overpopulated, Literally: reference to Ku-hulu, a feathered god (Ashdown 1971:64); the *kuleana* (responsibility) of Ku-hulu was to carry *ka Wai a Kane* (Water of Kane) and serve the life-giving water according to the needs of man (Emerson 1915:139)

Keahuaao (*ʻili*)	No definition available
Kumukahi (*ʻili*)	Literal Translation: Origin, beginning (Pukui and Elbert 1986:182)
Maahi	Ma-ahi: emotions running like fire or an emotions that cannot be quenched like love or anger, Literally: running schools of *ahi* (yellow-fin tuna) (Ashdown 1971:64)
Mokapu (Mōkapu)	Literal Translation: Taboo district (*mō*-is short for *moku*); Form of *moku kapu* (sacred island): a small rock island heavily populated with *kōlea* (*Pluvialis fulva*) and other sea birds that gathered after feeding in the *mauka* reaches , this offshore islet was destroyed during WWII combat demolition exercises (Clark 1989:42-43)
Nupawai o Kukuiopiikea (boundary point, cave)	Literal Translation: Deep water cave of Kukui-o-Piʻikea
Paeahu (*ahupuaʻa*)	Literal Translation: Row [of] heaps; when broken down, *pae* means a cluster, row, group, margin or bank like a taro patch, or level like a platform leading to the interpretation while *ahu* translates as a heap, pile, collection, mound, mass, altar, shrine, or cairn. Pukui and Elbert (1986:298) also note that *pae* was a type of sweet potato.
Palauea (*ahupuaʻa* and stream)	Literal Translation: "lazy"; an alternative pronunciation and translation was provided by Mr. Nathan Napoka (personal communication) where an *okina* or glottal stop is added and the name changed to Palauʻea which refers to a traditionalsweet potato variety.
Pauaua (*ʻili*)	No definition available
Piliwale (*ʻili*)	Literal Translation: To cling, etc., for no reason or cause; often used in unfavorable sense of living off other people (Pukui and Elbert 1986:331)
Punakea (*ʻili*)	Literal Translation: A barely visible rainbow or white coral, as cast ashore by the sea (Pukui and Elbert 1986:355)
Waihou (spring)	Literal Translation: New water
Waikaahi (spring)	Possibly Wai-ka-ahi and a potential reference to a hot spring given the location along the east rift zone of Haleakalā where wai=water and ahi=fire or heat
Wailea (*lae* or point)	Literal Translation: Water [of] Lea (the goddess of canoe makers). One of five calcareous sand beaches fronting the Wailea resort complex and the namesake of the complex. The surf site is a shore break that forms on the sandbar fronting the beach. The dive site is off Wailea Point. The beach is also known as Kahamanini.

Wai o Opihi	Literal Translation: waters of *opihi* (limpet-*Cellana spp.*), according to Ashdown (1971:64) a possible poetic reference to a place of medication where thoughts spawn and thrive to maturity (*Wai-io-pihi*)
Puʻu ʻIo (hill)	Literal Translation: Hawk hill

Handy et al. (1991) summarize the relationship between Hawaiians and the natural environment best in the following passage:

> The sky, sea, and earth, and all in and on them are alive with meaning indelibly impressed upon every fiber of the unconscious as well as the conscious psyche. Hawaiian poetry and folklore reveal this intimate rapport with the elements, (Handy et al. 1991:23-24)
>
> (T)he relationship which existed from very early times between the Hawaiian people … is abundantly exemplified in traditional mele (songs), in pule (prayer chants), and in genealogical records which associate the ancestors, primordial and more recent, with their individual homelands, celebrating always the outstanding qualities and features of those lands. (Handy et al. 1991:42)

This relationship of Hawaiians to the natural environment is especially prevalent in the *moʻolelo* (traditional knowledge) of the wider *moku* of Honuaʻula, a large part of which revolves around the lyrical descriptions of the elemental characteristics of the *ʻāina* (land) where the names of the *ahupuaʻa* are noted in name chants and the winds and rains of the region are recounted in legends and poems. One of the most valuable repositories of Hawaiian wind names is a book called *The Wind Gourd of Laʻamaomao*, which is a translation of a traditional legend, compiled by Moses Kuaea Nakuina and published in 1902. The titular wind gourd was believed to contain all the winds of Hawaiʻi, which could be summoned by chanting their names. Papa, a name for a Honuaʻula wind, is included in a chant that names the winds of Maui and Molokaʻi, and the excerpt below contains the names of some neighboring winds:

> ʻAi-loli is of Kaupō,
> Moaʻe is of Kahikinui,
> Papa is of Honuaʻula
> Nāulu is at Kanaloa,
> Hau descends from the uplands of Kula,
> It's the wind of that place,
> Searching the pili,
> Nau is the wind of Kula,
> *(Nakuina 1990:55, emphasis added)*

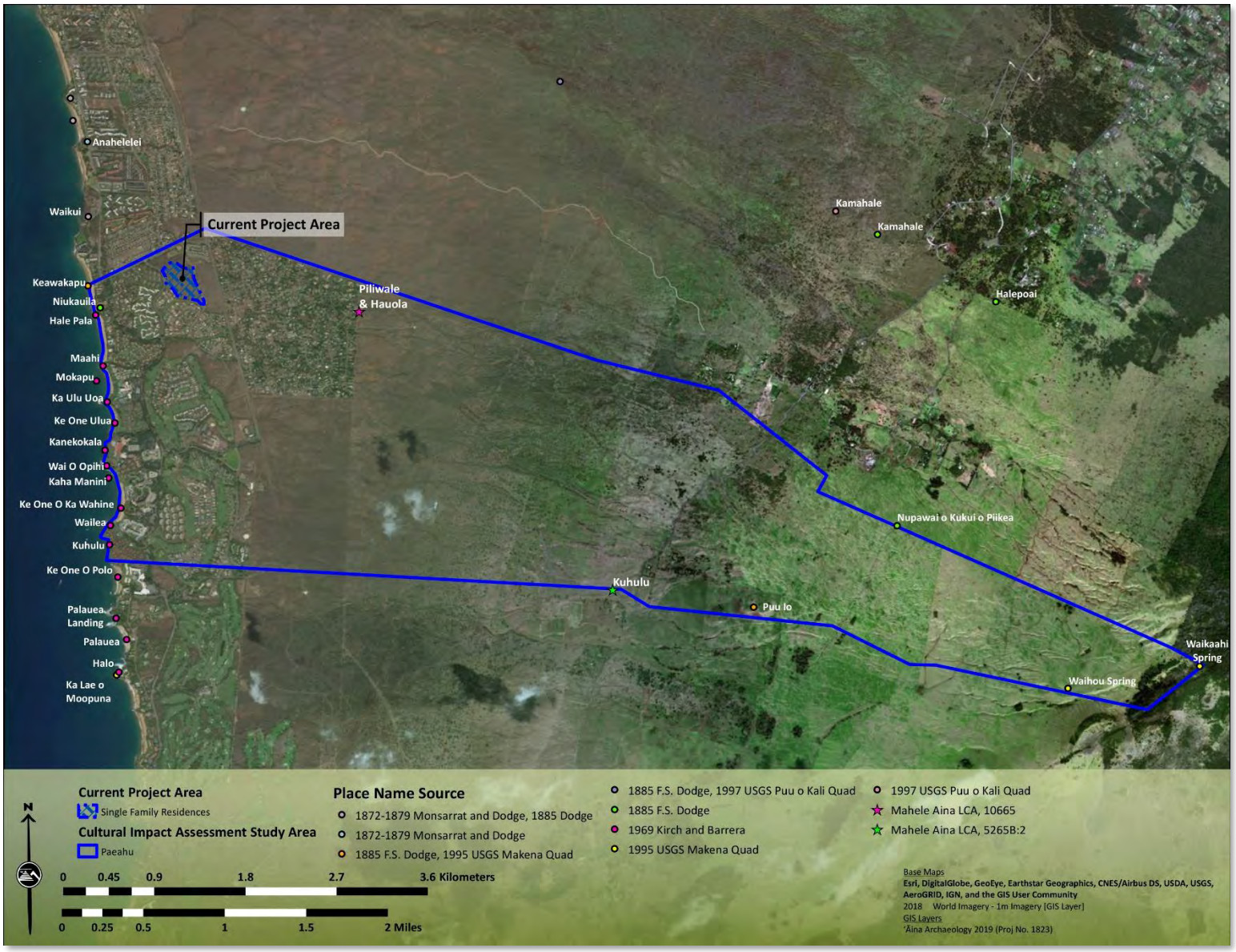


Figure 2-2. Aerial photo (Esri et al. 2018) showing currently known place names of Paeahu Ahupua'a.

The various rains of Hawaiʻi were also given names. Some were named after people, others after their particular traits or the way they interacted with the area and local vegetation. Different rains from different parts of the islands often share the same name. The book *Hānau Ka Ua Hawaiian Rain Names* (Akana and Gonzalez 2015) contains many of the rain names that were recorded in newspapers from the 1800s and other primary source materials. There are at least two rains associated with the *moku* of Honuaʻula: Lanipaʻina and Nāulu.

"*Ka ua Lanipaʻina o ʻUlupalakua*" is "[t]he Sky-crackling [Lanipaʻina] rain of ʻUlupalakua" (Pukui 1983:170), which is *mauka* of the subject property in the *ahupuaʻa* of Kāʻeo to the south. The Lanipaʻina rain features prominently in a lengthy letter written by someone named Makaikai and published in the newspaper *Ka Lahui Hawaii*, which describes the events one Fourth of July at James Makee's Rose Ranch in ʻUlupalakua (discussed below):

> *E ʻoluʻolu ʻoe a me kou kāpena e hoʻokomo iho i nā mea ʻano hou i hana ʻia ma ʻUlupalakua i ka lā 4 iho nei o Iulai, ʻoiai hoʻi ka ua Lani Paʻina e kilihune ana i luna o "Prospect Hill." . . .*
> *Aia hoʻi i ka hiki ʻana aku i ka hora 12 awakea, i ka wā hoʻi a nā pua e luhe mālie mai ana i ka nani, a e kilihune kili hau ana ka ua Lanipaʻina i ka liko o ka pua, pēlā i ʻike ʻia aku ai ka pūʻali koa, "Ka Ua Lanipaʻina Military Company" e paikau hoʻokahakaha mai ana ma lalo o ke alakaʻi maiau ʻana a ko lākou Kāpena R. W. Wilcox. . . .*

> You and your captain, please add the new events that took place at ʻUlupalakua this past Fourth of July while the Lanipaʻina rain was drizzling over "Prospect Hill." . . .
> When 12 noon came, indeed the period when flowers gently droop in their beauty, and the Lanipaʻina rain was coming down in a cold drizzle over the buds of the flowers, that was when the group of soldiers, "Ka Ua Lanipaʻina Military Company," could be seen parading back and forth under the expert leadership of their captain, R. W. Wilcox. . . .
> (Akana and Gonzalez 2015:136-137)

A second rain of the area is called Nāulu and is usually associated with Makawao. One reference to it, in relation to Honuaʻula, comes to us indirectly by way of a wind name from a 1910 report by Ralph S. Hosmer, who was the Territory of Hawaiʻi's first forester. In the report he says:

> There is much verbal testimony that in former days, say 25 years ago and before, there were many light drifting showers at the south end of East Maui, at ʻUlupalakua, which originated over Kahoʻolawe and drifted across the channel with the Nāulu breeze. (Akana and Gonzalez 2015:127)

Hawaiian proverbs, or *ʻōlelo noʻeau*, have been passed down through oral traditions. Many *ʻōlelo noʻeau* have been collected and published in Hawaiian language newspapers and other primary

and secondary sources. They often have both a literal and metaphorical meaning (called *kaona*), which is given where applicable. *ʻŌlelo noʻeau* about geography can help us to understand natural phenomenon, land use, and the history of a place. There aren't any *ʻōlelo noʻeau* that refer specifically to Paeahu, but there are two for Honuaʻula and one for ʻUlupalakua.

The two *ʻōlelo noʻeau* about Honuaʻula speak to the strength of its people:

> Honuaʻula, e pāluku ʻia ana na kihi poʻohiwi e na ʻale o ka Moaʻe.
>
> Honuaʻula whose shoulders are pummelled by the Moa'e wind. A poetical expression for a person being buffeted by the wind. Honuaʻula, Maui, is a windy place.
>
> . . . .
> *Honuaʻula kua laʻolaʻo.*
>
> Callous-backed Honuaʻula. Said of the people of Honuaʻula, Maui, who were hard workers. The loads they carried often caused callouses on their backs.
>
> (Pukui 1983:79)

The one *ʻōlelo noʻeau* for ʻUlupalakua is noted above and refers to the name and quality of its rain:

> *Ka ua Lanipaʻina o ʻUlupalakua.*
>
> the Sky-crackling rain of ʻUlupalakua. Refers to ʻUlupalakua, Maui.
>
> (Pukui 1983:170)

2.1.2 The Mythical Era

Preserved in *moʻolelo* (traditional stories) are tales about a period in Hawaiʻi before *kānaka* (humans), when gods and deities inhabited the islands, often bringing about the creation of lands and resources. Below are excerpts of *moʻolelo* set more generally in the larger *moku* of Honuaʻula, as well as, passages that speak specifically of Paeahu and places within Paeahu.

2.1.2.1 Moʻikeha and His Traveling Companion Honuaʻula

Place names are often inspired by the physical characteristics of the area being named. Honuaʻula translates to mean "red land" (Pukui et al. 1974:51). It's possible that the origin of the name lies elsewhere, because reddish soils are not common in Honuaʻula, where black lava fields and brown soils cover the landscape.

One theory is that the name Honuaʻula comes from the *moʻolelo* of Moʻikeha, a chief from Tahiti who resettled in Hawaiʻi and eventually became the king of Kauaʻi. Among those who joined Moʻikeha on his voyage from Tahiti was a man named Honuaʻula. In the story, as recounted by Fornander, when the canoe reached Maui, Honuaʻula elected to stay behind, perhaps settling in the district that now shares his name:

> One early morning at dawn, just at the rise of the star Sinus, Moikeha boarded his double canoe, taking with him all his attendants and followers, and set out from Tahiti. From that morn until sunrise when they first beheld Hilo all went well, whereupon Kamahualele stood up and prayed by way of a mele their voyage hither. Upon their

> arrival at Hilo, Kumukahi and Haehae became charmed with Hilo, and so expressed to Moikeha their desire to remain there, whereupon Moikeha allowed them to take up their residence at Hilo.
>
> Moikeha soon after set sail from Hilo, sailing along the north coast of Hawaii until they arrived at Kohala, when Mookini and Kaluawilinau expressed their desire to take up their residence at Kohala. Moikeha therefore landed them there. On leaving Kohala they sailed along the eastern coast of Maui until they reached Hana, when one of his men, Honuaula, expressed his desire of making this his place of residence, so he too was allowed to remain behind. (Fornander 1916a:114-116)

2.1.2.2 Molokini

The crescent-shaped islet of Molokini, noted landform, located in ʻAlalākeiki Channel between Kahoʻolawe and Maui, off the coast of Honuaʻula. Molokini's origin story ties the tiny islet to Puʻu Ōlaʻi, the prominent shoreline cinder cone within Honuaʻula. According to *moʻolelo*, Molokini was a *moʻo* (large mythological lizard) who was known as Puuoinaina prior to her death. She lived most of her life on Kahoʻolawe, which was then called Kohemalamalama. She took two brothers as her husbands before falling for Pele's lover Lohiau and becoming the target of the fire goddess' wrath. Pele's retaliation for Puuoinaina's interest in Lohiau is what led to the creation of Molokini and Puʻu Ōlaʻi, as recounted by Fornander:

> But when Pele heard what Puuoinaina had done she became angry, she then cursed Puuoinaina. When Puuoinaina heard this cursing from Pele she felt so ashamed that she ran into the sea. She left her home, Kohemalamalama, now called Kahoolawe. Pele, residing at Kahikinui, thought so much of her husband, Lohiau, who was living at Kealia, Kamaalaea, that she started out to meet him; but she found her way blocked by Puuhele, so she went from there and waded through the sea. She saw her lizard rival, Puuoinaina, stretching from Kahoolawe to Makena, so she came along and cut the lizard in two, right in the middle, separating the tail from the head. The tail became Puuolai at Makena, and the head became Molokini. When the husbands heard that their wife was dead, they looked and beheld the head of their beloved standing in the sea, so they called the name of the islet Molokini. That is the story of how it was born of its parents and how it obtained this new name Molokini. (Fornander 1918:518)

2.1.2.3 A Riddle for Ka-Miki

The following passage comes from a *moʻolelo* called *"Kaao Hooniua Puuwai no Ka-Miki"* (The Heart-Stirring Story of Ka-Miki). Published between 1914 and 1917 in the Hawaiian language newspaper *Ka Hoku o Hawaii*, the story features two brothers, descendants of the goddess Haumea, who possessed magical powers. In the following excerpt, Ka-Miki is asked by a chief named Kahuku to solve a riddle relating to Maui, and in his answer, Ka-Miki describes Maui's various lands, including Honuaʻula:

O ka ua hoelo a ka Ukui i ka ulawena, o Honuaula ia, ilaila i make ai ka makani. *A make i ke kula; o Makena ia he okana aina a me Kula, o kauwahi moe kokolo alualu hele a ke kula hoi mai, he aina ua kaulana mai na lii kahiki loa mai*	And where the cold 'Ūkiu wind bears down, glowing red [driving the dust], is Honua'ula where the winds begin to die. Where the wind dies upon the kula (plains), is the sub-region of Makena and Kula, where the mists are seen creeping low, traveling to and fro along the plain. This is a land famous with the chiefs from the distant past. (Maly and Maly 2005:29) (Translation: Kepā Maly)

2.1.2.4 The Work of Pele at Honua'ula and Her Time at Paeahu

In Moses Manu's version of Pele's story, *Ke Kaua Nui Weliweli Mawaena o Pele-Keahialoa ame Waka-Keakaikawai* (1899), Manu provides a description of her work at Honua'ula and specifically notes Paeahu as a temporary residence before moving on to her current home on Hawai'i Island:

Nu keia Pele no I hana, na puu mahoe ma Ulupalakua I kapaia ka inoa o Hanaleloulu e ku nei; a ua nee aku la ka Pele ma Paeahu, a oia hoi ka palena o ka pele ma Honuaula; a – hiki i keia wa ma Maui. A ma ia ano – E IKE NO KE KAMAHELE, ke nana ma keia maui wahi a ka mea - kakau-moolelo e hoike nei; nolaila, a haalele iho a na kakou ia "Maui no ka oi." *Haalele ka Pele ia Maui no Hawaii.* *. . . .*	This is what Pele formed, the twin hills in 'Ulupalakua, which bear the name Nāhaleloulu and stands; and Pele had moved to Paeahu, and this is the end of the lavaflow at Honuaula; -- up until now on Maui. And in the same way — THE TRAVELER KNOWS, look at these places that the writer is describing; therefore, let us leave with "Maui is the best." Pele leaves Maui for Hawaii. . . . . (Translation: Kaiani Kiaha)

2.1.2.5 Ka Pule a Kane – A Prayer of Kane

Of the four principal gods of Hawaiian beliefs and religious systems, Kane is the leading god who represent procreation and is worshiped as an ancestor of both *ali'i* and *maka'āinana.* One of the place names found along the shoreline of Paeahu holds the name Kanekokola (see Figure 2-2), a coral form of Kane that can be found in the following excerpt of a *pule* (prayer) that was given by Kane at the *heiau* of Kuikahi at Hanapēpē, Kaua'i:

. . . .	. . . .
Kane-kokala,	**Kane-of-the-coral**,
Kane-kokala-loa,	Kane-of-the-long-coral,
Kane-kokala-lu-honua,	Kane-of-the-quaking-coral,
Kane-kokala-ku-honua,	Kane-of-the-steadfast-coral,
Kane-kokala-i-ke-kiu,	Kane-of-the-sharp-pointed-coral,
Kane-kokala-i-ke-ahe	Kane-of-wafted-coral
. . . .	. . . .
	(Beckwith 1970:54, emphasis added)

We also see *Kane-kokola* invoked in fishing ritual and ceremony. According to Titcomb and Pukui (1977:91), fisherman who prayed to *Kane ko kola* and caught the *kukala* (*kokola*) fish, which is of the same family as puffer fish, would throw them back into the sea while sending a prayer to Kane with the following words:

E Kane-kokola	O Kane-kokola
E Kane-kokola	O Kane-kokola
E hoʻi, e hoʻi	Return, return
I Kane huna-moku	To Kane-huna-moku

2.1.3 Nā Poʻe Kahiko o ka Ahupuaʻa o Paeahu – Traditional Hawaiian Settlement of the Paeahu Ahupuaʻa

Maui's southeastern region is dry and water is scarce, and the settlement of Honuaʻula likely occurred as populations expanded in the more hospitable windward areas (Matsuoka et al. 1996:72) and seemingly following a general pattern of initial *makai* settlement and expansion into the *mauka* elevations. de Naie and Donham (2007:42) speculate that canoe landing sites evolved into coastal settlements, with footpaths and trails connecting coastal *kauhale* (villages), like Kahimanini (Figure 2-3) as noted in the survey boundaries of Land Grant 548, to fishponds, agricultural plots, the upland forests, heiau and other sacred sites. In this pattern, it is probable that the open, sandy beaches of Paeahu have served as safe and reliable canoe landings since the earliest days of Honuaʻula's settlement with a network of trails likely branching up toward the higher elevations (de Naie and Donham 2007:42).

The seasonality of water availability in this *kona* environment also likely dictated where and when people resided in the area and how they cultivated the staples needed during the year. Matsuoka describes a seasonal pattern of moving between *mauka* and *makai* in accordance with the planting cycle, as documented by a *kamaʻāina* named Sam Po:

> According to [Sam Po], even up through the latter half of the 19th century, the Hawaiians in the district (Honuaʻula) continued to live mauka or makai and plant in accordance with the annual rains. About once month before the rainy season began, they would carry dirt down from the mountains to the coast in lauhala baskets and fill holes in the lava in preparation for planting. . . . While on the coast, the Hawaiians

> would subsist on fishing and various vegetable foods that they cultivated in soil placed in the pockets of lava and nurtured by the rain. When the vegetables matured (Hawaiian watermelon, Ipu oloolo, Ipu nuhou-lani, pumpkin, and poha or Ipu ʻala) they were consumed. After a period of about six months, just when the climate became dry, the families would make the return journey to their upland habitation sites. (Matsuoka et al. 1996:73)

In the June 8, 1836 issue of the newspaper *Ke Kumu Hawaiʻi*, someone named Naleipuleho provided one of the earliest first-hand accounts of life in Honuaʻula on record. It also speaks to how the availability of water and other resources dictated patterns of residency and travel. Translated by Kepā Maly, the following excerpt gives a glimpse of life in Honuaʻula as it may have been since the earliest days of settlement:

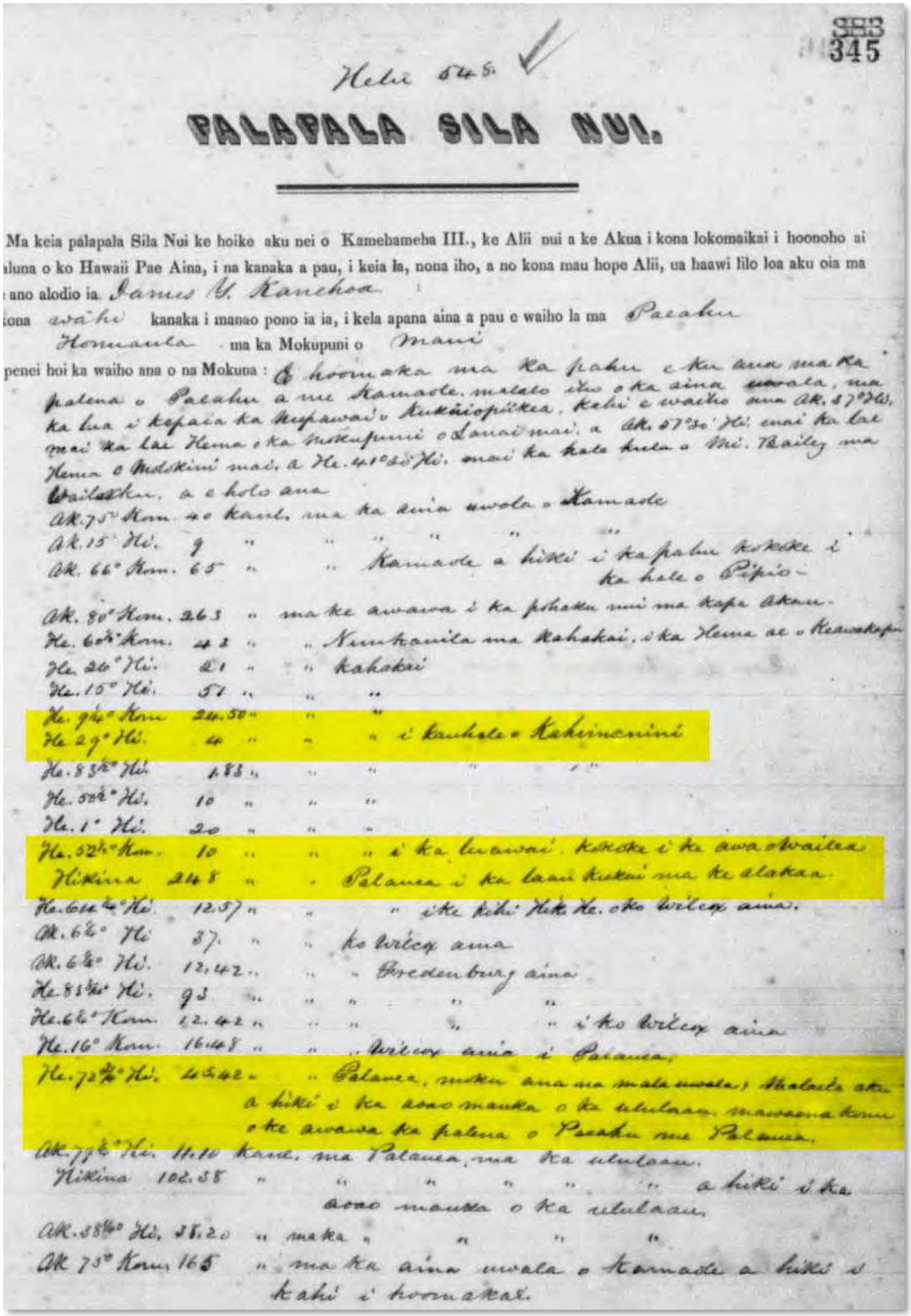
Ke hai aku nei au ia oe i ke ano o keia aina, i ka noho ana o na kanaka	I hereby tell you about the nature of this land and the residency of the people.
Eia ke ano. He aina wi, o Honuaula. O ka uwala ko laila ai, a me ka kalo, he ai pau wale no ia. Eia ka ai mau loa, heko, heki lau o ke aa, o ke ki lau a me ka muo, o na ai mau loa ia.	Here are the characteristics. Honuaula is a land of famines. The sweet potato is the food there, and the taro, but they are foods which do not last. Here are the foods which are always available, sugar cane, ti leaf roots, and the budding leaves of the ti are the steady foods.
Eia ke ano o ka noho ana o na kanaka; elua wahi noho. Ma kahakai, mauka ma waena o ka aina. O ke kii ana o ka ai a na kanaka ma kahakai he loihi loa. He kokoke ka wai o lakou. Pomaikai lakou i ke kokoke o ka wai a me ka ia. Poino ko lakou mau ai i ka loihi o ka ai.	Here is how the people live; there are two places of residency. Along the shore, and in the mid uplands of the land. The people who live on the shore, must travel a great distance to get vegetable foods. But the fresh water is close to them. They are blessed to be near the drinking water and fish. Though they are greatly burdened in having to travel far for their other foods.
O na kanaka i noho ma waena o ka aina,— pomaikai lakou i ka ai i ke kokoke o ka ai. Poino lakou i ka wai i ka loihi o ke ana o ka wai. Aia no i kahakai kawai e kii ai. Ina e kii i uka i ka wai, he loihi ke pii aku i luna, he naenae ka pii ana,—aia no i ka lae laau ka wai, i hoi mai he lole ke kuli i ka loihi o ka hoi ana mai, i ke kii ana o ka wai elua ipu nui e ukuhi ai i ka wai, a piha, hoi mai. Hooheehee i	The people who reside in the middle of the land, are fortunate that their foods are close to them. But they are unfortunate because the fresh water is a great distance from them in the

na huewai, liilii, a piha, a koe ke koena he wai auau, he wai hoopulu hana wauke, i mea kapa. *Na I. Naleipuleho*	caves. There is water which they can get from the shore. If they travel to the uplands to get water, it is a great ascent, and fatiguing — the water is there in the forest groves; returning causes pain in the knees, for the great distance of the trip, and for only two large water containers in which to pour the water and return. The water gourds hang down, and there is a little that remains for bathing, and moistening the wauke, made into kapa. (Maly and Maly 2005:14) (Translation: Kepā Maly)

Finally, while the well-known springs of the uplands are recorded in place names (see also Section 2.1.1), the locations of water sources *makai* have been generally known anecdotally with the exception of survey description for a portion of the boundary of John Y Kanehoa's Land Grant 548 that notes the presence of a well or water source near Wailea cove or harbor (*ka luawai kokoke i ke awa o Wailea*) (Figure 2-3).

2.1.3.1 Ka ʻOihana Mahi ʻAi i Loko o ka Ahupuaʻa o Paeahu – Traditional Agriculture within Paeahu

Farming in Honuaʻula occurred along the lower uplands where rain fell almost daily. Despite the shortage of water, Handy states that "the eastern and coastal portion of Honuaʻula was thickly populated by Hawaiian planters until recent years" (Handy and Handy 1972:508). It's possible that cultivated fields occupied large parts of Honuaʻula, prior to the introduction of cattle when the uplands were still heavily forested and rain fell more frequently (Handy and Handy 1972:508). *ʻUala* (sweet potatoes) grew reliably well, and dryland *kalo* was also grown further upland and in the forests when they were more prevalant (Handy and Handy 1972:272, 508). When lava flows buried some agricultural lands, holes were dug into the rock, filled with soil, and used to grow sweet potatoes and a variety of gourd and melon cultivars (Matsuoka et al. 1996:74). Evidence of these unique cultivation practices can still be found among the lava fields of Honuaʻula, Lualaʻilua, and at Puʻu-o-kali (Matsuoka et al. 1996:74).



Helu 548.

345

PALAPALA SILA NUI.

Ma keia palapala Sila Nui ke hoike aku nei o Kamehameha III., ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai luna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ano alodio ia James Y. Kanehoa

kona waiho kanaka i manao pono ia ia, i kela apana aina a pau e waiho la ma Paeahu Homaula ma ka Mokupuni o Maui

penei hoi ka waiho ana o na Mokuna : & hoomaka ma ka pahu e ku ana ma ka palena o Paeahu a me Kamaole, malalo iho o ka aina uwala, ma ka lua i kapaia ka Kupawai o Kukaiopilkea, kahi e waiho ana Ak. 87° Hi. mai ka lae Hema o ka Mokupuni o Lanai mai, a Ak. 57°30' Hi. mai ka lae Hema o Molokini mai, a He. 41°30' Hi. mai ka hale kula o Mr. Bailey ma Waiohuli, a e holo ana

Ak. 75° Kom. 40 kaul. ma ka aina uwola o Kamaole

Ak. 15° Hi. 9 " " " " "

Ak. 66° Kom. 65 " " Kamaole a hiki i ka pahu kokoke i ka hale o Pipio

Ak. 80° Kom. 263 " ma ke awawa i ka pohaku nui ma kapa akau.

He. 60½° Kom. 43 " " Nuukanila ma Kahakai, i ka Hema ae o Keawakapu

He. 20° Hi. 21 " " Kahakai

He. 15° Hi. 51 " " "

He. 9½° Kom. 24.50 " " "

He. 29° Hi. 40 " " " i kauhale o Kahinonini

He. 83½° Hi. 1.83 " " " " "

He. 50½° Hi. 10 " " "

He. 1° Hi. 20 " " "

He. 52½° Kom. 10 " " " i ka luawai. kokoke i ke awa o Waikea

Hikina 248 " " Palauea i ka laau kukui ma ke alakaa.

He. 61½° Hi. 12.57 " " " i ke kihi Hiki He. o ko Wilcox aina.

Ak. 6½° Hi 37. " " ko Wilcox aina

Ak. 6½° Hi. 12,42 " " " Bredenburg aina

He. 88½° Hi. 93 " " " " "

He. 6½° Kom. 12.42 " " " " " i ko Wilcox aina

He. 16° Kom. 16.48 " " " Wilcox aina i Palauea.

He. 72½° Hi. 45.42 " " Palauea, moku ana ma mala uwala, Malaila aku a hiki i ka aoao manka o ka ululaau, mawaena Kom o ke awawa ka palena o Paeahu me Palauea.

Ak. 77½° Hi. 11.10 kaul. ma Palauea, ma ka ululaau.

Hikina 102.58 " " " " " " a hiki i ka aoao manka o ka ululaau.

Ak. 88½° Hi. 38.20 " ma ka " " " "

Ak 75° Kom. 165 " ma ka aina uwala o Kamaole a hiki i kahi i hoomaka.

Figure 2-3. Land Grant 548 to John Y. Kanehoa highlighting boundary sections regarding resources of particular interest.

Testimony gathered for claims of the Mahele 'Āina (see also Section 2.2.2) may lend further insight into the traditional crops and agricultural practices of Paeahu Ahupua'a with all of the land claims sharing two features in common: grasslands (*moku mauu*) and potato fields (*mala 'uala*). It should be noted that many of the native tenant claims stated that these potato fields were planted with white (or Irish) potatoes (*'uala haole*). Intensive cultivation of *'uala haole* by native tenants in the mid-19th Century was a response to a shift from a subsistence based economy to a monetary economy to fulfill the initial needs of the whaling ships that would come to port followed by the Irish Potato Boom (see Section 2.2.3.1.1) that was fueled by the California Gold Rush. While this type of potato was a historically introduced crop and not a part of the traditional Hawaiian diet, it is likely that those same fields were *'uala maoli* (native potato), as seen in the award to Anahe (LCA 5370 Apana 3), and subsequently supplanted by *'uala haole*. Additionally, the survey description of the earliest Land Grant to John Y Kanehoa also provides insight as to the abundance of *'uala* fields in Paeahu where his boundary crossed through the potato fields toward the upper portion of forest and center of ravine which is the boundary Paeahu and Palauea Ahupua'a (see also Figure 2-3).

Other types of traditional crops can be found in the testimony provided by Ainua (LCA 5369) such as *kalo* (taro) and bananas (*mala maia*). Of interest is also an unawarded claim by Ohule for a section of *pahulu 'uala* and a section of *pahulu* (Helu 10580,Figure 2-4).

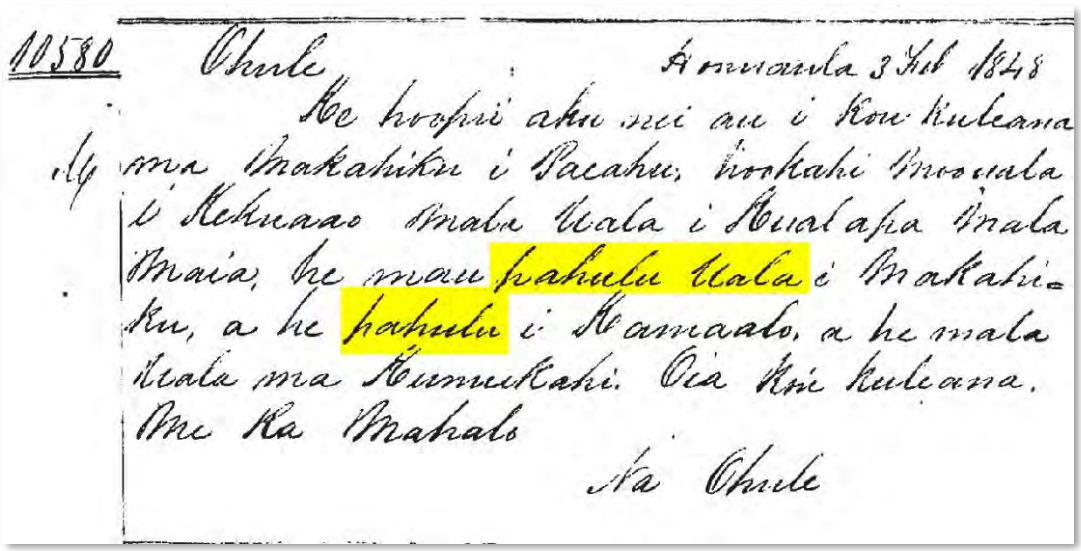

10580 Ohule Honolulu 3 Feb 1848
He hoopii aku nei au i Kou Kuleana
ma Makahiki i Paeahu, hookahi Moo'uala
i Kekuaao Mala Uala i Kualapa Mala
Maia, he mau pahulu Uala i Makahi-
ki, a he pahulu i Hamaalo, a he mala
Uala ma Kumukahi. Oia Koi kuleana.
Me Ka Mahalo
Na Ohule

Figure 2-4. Native tenant claim by Ohule for pahulu and pahulu 'uala lands in Paeahu (Helu 10580) (Office of Hawaiian Affairs 2011).

The term *pahulu* has two meanings in the context of traditional agriculture: 1. Exhausted, worn-out, of over-farmed soil; such soil. *ho'o.pahulu* To exhaust the soil; to let the land rest and lie fallow; and 2. volunteer sweet potatoes, sweet potatoes of the second growth (Pukui and Elbert 1986:301). Kahikāhealani Wight's *Illustrated Hawaiian Dictionary* (2005) offered the phrase "*hiki ke mahi 'ia ka 'uala I ka lepo pahulu"* (Sweet potatoes can be farmed on the worn-out soil) in the definition of *pahulu* as "worn-out" soil. Second growth in potatoes is likely induced by a period

of high soil temperatures, as well as drought to some extent, followed by heavy rainfall (Bodlaender et al. 1964). The specific claim for *pahulu ʻuala* and *pahulu* may speak to the environmental conditions and challenge of farming the lands of Paeahu, as well as an agricultural reliance on and traditional importance of *pahulu ʻuala* of those that settled the area.

2.1.3.2 Ka ʻOihana Lawaiʻa o ka Ahupuaʻa o Paeahu – Aquaculture and the Fishing Traditions of Paeahu

Honuaʻula is mentioned in the historical record in ways which suggest that its coastline has long been a point of arrival and departure for canoes traveling to and from Maui. Channel waters between the islands can be notoriously rough, and parties must occasionally wait for better weather, as indicated in the following exerpt from the story of Lāʻieikawai, a chiefess from Hawaiian mythology, recorded and published in the newspaper *Kuokoa* in 1862 by S. N. Haleʻole. In this part of the story, Lāʻieikawai and her lover ʻAiwohi are making their way from Maui to Hawaiʻi Island, and they end up spending a month in Honuaʻula as they wait for the ocean conditions to improve:

[P]ae i Mala, ma Lahaina, e haalele lakou ia wahi, hiki lakou i Keoneoio, ma Honuaula, a malaila i noho loihi ai ekolu anahulu. No ka mea, ua nui ka ino ma ka moana, a pau na la ino, alaila, ua ike ia mai ka maikai o ka moana. Ia manawa ko lakou haalele ana ia Honuaula, a holo aku la a hiki ma Kaelehuluhulu, ma Kona, Hawaii.	Having landed at Māla, at Lāhaina, they then departed from that place and arrived at Keoneʻōʻio, in Honuaʻula. There, they resided for a period of three anahulu [a total of thirty days]. They did this because the sea was extremely rough. When the stormy days ended, they saw the ocean was good. (Maly and Maly 2005:23)

The story of Laukaʻieʻie adds some visual detail to the picture of Honuaʻula as an ancient canoe landing site. Published as a series of articles in the newspaper *Nupepa Ka Oiaio* between January 5, 1894 and September 13, 1895, it tells the tale of Laukaʻieʻie, her brother Makanikeo, and their traveling companions as they visit various parts of Hawaiʻi. The following exerpts are set in Honuaʻula:

Ia Makanikeoe, malaila e nanea nei, aia na manowaa mawaho ae o Keoneioio ma Honuaula, ke pii pono ala i ke alo makani. A eia no ka maka hope mawaho ae o Puuolai a ua hoomalu aku ka holo ana o	[Passing between Maui and Kahoʻolawe]: Makanikeoe had the fleet of canoes rest at Keoneʻōʻio, in Honuaʻula, which rises up in the face of the wind. It is marked by Puʻu Ōlaʻi, where on the side the canoes find shelter, before entering the famous sea

na waa no ka moana kaulana o Alenuihaha me ka pii wahi ale ole o ua moana huhu ala o ale ahiu. Aia ke kiei iho la ke kuahiwi kamehai o Haleakala, a ke oni mai la o Maunakea me Maunaloa a me Hualalai, mamua pono me ko lakou kulana kilakila o ka nani.

of ʻAlenuihāhā, where there is no place that the angry and wild waves of the sea do not rise. From here [Honuaʻula], one may gaze upon the wondrous mountain of Haleakalā, as Mauna Kea, Mauna Loa and Hualālai appear to move before you, in their outstanding beauty.

(Maly and Maly 2005:24)

2.1.3.2.1 Fisheries and Fishponds

The Hawaiian worldview and organization of nature and space not only applied to the skies above and natural phenomena, as noted previously, but also to the natural divisions of the oceans and lands. With regard to the ocean, the named sections began at *ae-kai*, or the strip of beach where the waves ran after breaking and extended to the deep ocean, or *moana*, which reached Kahiki-moe the extreme boundary of the ocean (Malo 1951:25-26). In 1839, definition of the fishing grounds and fishing rights of the *makaʻāinana* (common people), as well as that of the *konohiki* (landlord) and *aliʻi*, were recorded as a part of the earliest Constitution of the Kingdom, a structure that may have been an extension of the traditional management system.

Of the free and prohibited fishing grounds, the sections of the water were defined as follows – for the *makaʻāinana* the fishing grounds were all those grounds without coral reef such as the *kiloheʻe* (sea for spearing squid), the *luheʻe* (sea for squid fishing), the *malolo* (sea of the flying fishing), and *moana* (Malo 1951:26; *Translation of the Constitution and Laws of the Hawaiian Island, Established in the Reign of Kamehamaha III* 1842:36). The fishing grounds from the coral reefs to the sea beach were reserved for the *konohiki* (landlords) and tenants of their lands (*ahupuaʻa*) but not for others. At Honuaʻula, the grounds of the kuleku were the fishing grounds that during the proper season for fishing would be placed under the protective *kapu* of the tax officers for the King (*Translation of the Constitution and Laws of the Hawaiian Island, Established in the Reign of Kamehamaha III* 1842:38).

The people of Honuaʻula were strongly connected to the ocean. Its waters were noted by 19th century historians and writers for its well-stocked fisheries. According to Handy, the coastline of Moʻoloa and Moʻoiki, and their neighboring *ahupuaʻa*, supported continuous populations of people who relied on the ocean for food and trade:

> Between Makena and the lava-covered terrain of Keoneoio (another famous fishing locality) the coastal region includes the small ahupuaʻa of Onau, Moomuku, Mooloa, Mooiki, Maluaka, Kaeo. According to an old Kamaaina, these ahupuaʻa had in former times a continuous population of fisher folk who cultivated potatoes and exchanged their fish for taro, bananas, and sweet potatoes grown by the upland residents of the Ulupalakua section. A few Hawaiians still live here. One living near Puu Olai has a sizable sweet potato patch in the dusty soil near the shore; another raises fine potatoes

> in a low flatland of white sand near the abandoned schoolhouse of Makena. (Sterling 1998:229)

The following traditional names and locations of Honuaʻula's fishing grounds were gathered from the Hawaiian Ethnological Notes archived at the Bishop Museum and published in Elspeth Sterling's book *Sites of Maui*, and they reveal an intimate knowledge of the sea. Some of the descriptions have been abbreviated:

> Pahua is the first and is located at Kanaio. Laeloa is (one of the) landmarks; when it appears directly over Holu Point, that is the upper mark. Puwai is the lower mark and it is called Ka-hope-o-ka-waa. It is a cave on the beach at Kanaio. The stone within the cave resembles a man standing there and when it appears slightly toward the windward side, the canoe is over the spot. It is 40 or more fathoms deep.
>
> Hiu is another fishing ground . . .
>
> Keahua is another . . .
>
> Kalawa is another fishing ground . . .
>
> Pohaku-ula is another fishing ground . . .
>
> Kiele is another, it is situated at Lualailua . . .
>
> Papuaa is another fishing ground . . .
>
> Koa-hau is another. When the hill of Keoneoio appears above Puu-olai that is its upper landmark. When the hill of Kaka on Kahoolawe appears above (in line with) Pahee-o-lono Point on Molokini, that is the lower mark.
>
> Na-ia-a-Kamahalu is another one. When Hoaka, which is in the upland of Kahoolawe on the western side appear to be in line with the cape of Ke-ala-i-kahiki that is the upper land mark. When the hill of Keoneoio appears to be in line of the seaward side of Puu-olai, that is the lower land mark.
>
> Na-iʻa-a-Kamaliʻi is another. When the cave on Makena appears to be close to the point of Paopao at Puu-olai, that is the upper landmark. The cave at Pali ku in Keonioio is the other landmark. When it appears between the two stone at Mokuha and Kanahena, that is the low landmark. (Sterling 1998:215-216)

2.1.3.2.2 Fishing Methods and Practices

Drying fish was a regular practice in Honuaʻula, where it could be traded and stored for times when food ran short, which occurred with some regularity. Drying fish went hand-in-hand with the production of salt, which was gathered from basins along the shoreline of Oneuli (Sterling 1998:5, 213).

A traditional fishing method of Honuaʻula has been preserved by Daniel Kahāʻulelio, who recalled how his parents would fish for *kala* and *kole* (two species of surgeonfish) using a special blend of *palu* (bait). His parents were from Keoneʻōʻio and would have been alive during the early-to-mid-1800s:

> They used coconut milk with the ink sac that had been well-broiled over a charcoal fire. It was rubbed fine with an ʻalā stone, then the coconut milk was added. That was the

> palu they used at Keoneʻōʻio, Honuaʻula, their birthplace. Their lauhala bags were filled to the brim with kala and kole. (Kahāʻulelio 2006:116)

Jarves (1843:77) notes that when it came to fishing, Hawaiians were "very expert; catching their prey either by hooks made from pearl-shells, or in nets, some of which were of great size and fine workmanship." Use of large nets and such hooks would have been important for carrying out *akule* (Big-Eyed Scad) surrounds or fishing for *ulua* (Giant Trevally) within the waters of Honuaʻula. With regard to *akule*, Daniel Kahāʻulelio writes that the saying "*akule* fish seek the deep" is one that describes the nature of *akule*, which are a migratory species that only stop whenever they find a place that they like. *Akule* fishing required a *kilo iʻa*, or skilled fish spotter, that could identify the cloud of *akule* from the shore. When the fishermen were supplied with bags to collect the fish and large surround nets, they would call for two canoes to carry the nets to that spot, as guided by the *kilo iʻa* from shore, and surround the fish that had come to rest at their favored places. At Mākena, *hukilau* was the method fishermen and their families used to gather *akule* (big eyed scad). In a 2003 oral history interview with Samuel Ponopake Chang, conducted by Kepā Maly and Nanea Armstrong, Chang, who was born in Mākena in 1911, describes how his tūtū would be the *kilo iʻa* and watch for the school of *akule* from the shore then direct the fishermen in their canoes as they surrounded the fish with a net that would then be pulled in from the beach (Maly and Maly 2003:962).

Elspeth P. Sterling writes of meeting with a *kamaʻāina* of Paeahu in 1968 who was sixty-five years old at the time. His name was Bill Kaiaoka-mailie, and his recollections of his childhood, as relayed by Sterling, offer a rare first-hand account of this region of Honuaʻula around the turn of the 20th century:

> He admits he doesn't know much but he was born in Paeahu mauka and went fishing with his father. In his time no one lived at the shore but they all had their campsites directly below their mauka homes and went constantly to fish. Within Sam Po's knowledge, in Kanaio, the people spent several months at the shore. They knew when the rains were about to begin and would head for the beach, plant their sweet potatoes and stay until time to harvest–about five months.
>
> Irish potatoes were a big crop all through that mauka area, supplying gold rush and whalers. Quite a few of the LCA's note apana for potatoes. Bill showed me graves at the shore, as well as the landing place at Palauea where potatoes were shipped from. Pointed out to him by his father. There was plenty of water (brackish) at the shore and plenty of fish. As far as Bill knows there were no inhabitants between the shore and mauka homes. No water. Walker lists no heiaus in this area. Either he missed them (more than likely), they were long destroyed or there was no great population.
>
> Perkins in Na Motu 1854 mentions "Among the sand hills of Palauea, five miles distant (from Kalepolepo) I have seen children erecting pyramids of skulls and enclosing them with ancestral bones." (Sterling 1998:234)

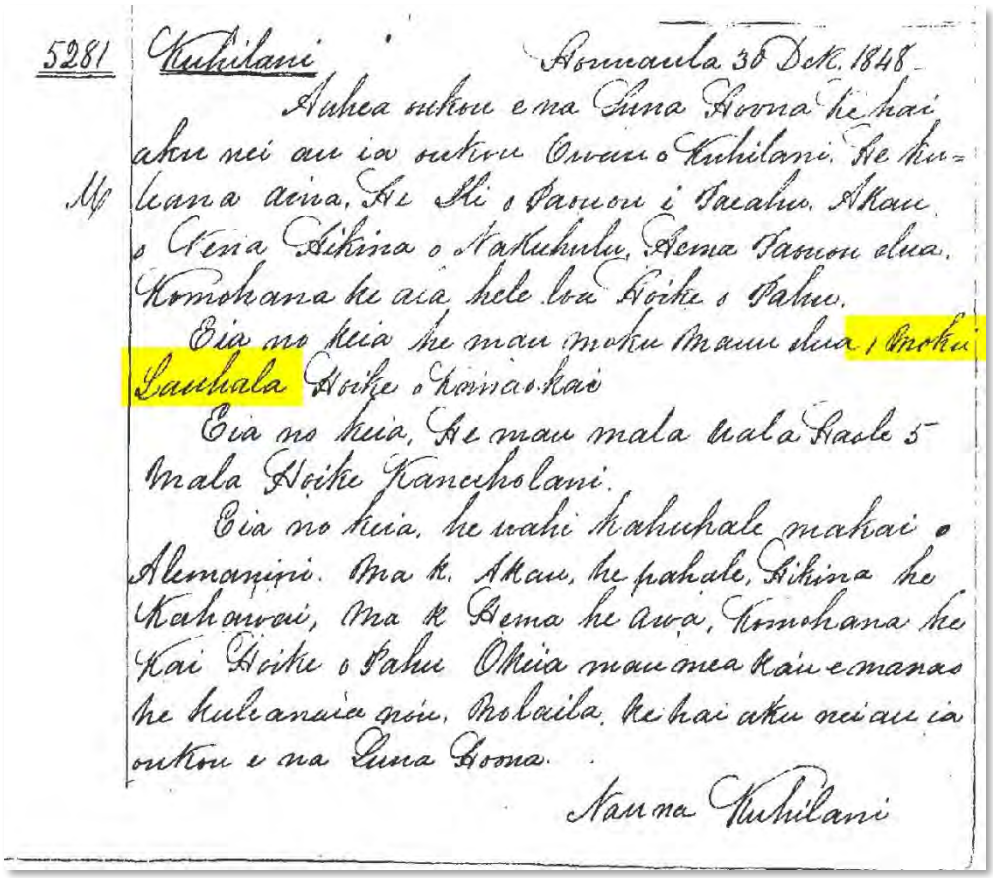
2.1.3.3 Ka Hana Noʻeau o Nā Poʻe o Paeahu – Traditional Crafts of the People of Paeahu

In addition to descriptions of areas that were either under cultivation (see Section 2.1.3.1) or necessary for gathering of aquatic food resources (see Section 2.1.3.2), at least one of the native

tenant claims of Paeahu made a specific claim for resources necessary to carry-out the daily tasks of life. Kamehameha Schools offers the following *mana'o* regarding *hana no'eau* as a part of their Hui Mālama Ulu Series:

> Hana no'eau is often translated as "art", but in Hawaiian thinking there is some debate as to what art is. Most of the crafts considered to be Hawaiian art are actually significant pieces to daily life.
> (https://blogs.ksbe.edu/aahirano/2009/02/17/hana-nono'eau)

In this sense, *hana no'eau* represents the craftsmanship (stone working, weaving, and carving) needed to create and manufacture the tools, vessels, and clothing that was necessary for everyday life, along with the ability to procure the resources necessary to carry-out these tasks. Of particular interest, with regard to *hana no'eau*, is one claim made for an area of *lauhala* (Screwpine) or "1 *moku Lauhala*" (Kuhilani Helu 5281; see also 2.2.2.1.1) which is a primary resource for weaving of mats and basketry (Matsuoka et al. 1996:73).


5281 Kuhilani Honolulu 30 Dek. 1848.

Aloha oukou e na Luna Hoona he hai aku nei au ia oukou Owau o Kuhilani. He kuleana aina, He Ili o Paeahu. Akau o Kenia Aikina o Nakuhulu, Hema Pauoa elua. Komohana he aia hele loa Koike o Pahu.

Eia no keia he mau moku Mauu elua, 1 Moku Lauhala Koike o Koinaokai

Eia no keia, He mau mala uala Paale 5 Mala Koike Kaneeholani.

Eia no keia, he wahi kahuhale makai o Alemanini. Ma k. Akau, he pahale, Aikina he Kahouwai, Ma k Hema he awa, Komohana he Kai Koike o Pahu Oheia mau mea Kau e manao he kuleanaia oiu, Noloaila. He hai aku nei au ia oukou e na Luna Hoona.

Nau na Kuhilani

Figure 2-5. Native tenant claim by Kuhilani for moku lauhala in Paeahu (Helu 5281) (Office of Hawaiian Affairs 2011)

2.1.3.4 Nā Moʻolelo o nā Aliʻi ma Honuaʻula – The Stories of Chiefs at Honuaʻula

The *moʻolelo* of Maui's *aliʻi* document the famous battles, journeys, alliances, romances, and accomplishments that occurred throughout history and often reveal a little bit about the places where these events occurred. The excerpts below come from some of these *moʻolelo*, where certain events are said to have occurred in Honuaʻula.

2.1.3.4.1 Kauholanuimahu, the Aliʻi from Hawaiʻi Island

Kauholanuimahu was a Hawaiʻi Island chief who ruled in the mid-1400s and spent considerable time in, and exercised influence over, Honuaʻula. Kauholanuimahu was the son of Laʻakapu, who came from Honuaʻula, and a Hawaiʻi Island chief named Kahoukapu (Matsuoka et al. 1996:76). When his father died, his mother returned to Honuaʻula and her lands became his. Fornander states that he "resided a great portion of his time at Honuaula, Maui where he exercised royal authority, and, among other useful works, built the fishpond at Keoneoio" (Fornander 1880:8). He is also credited with buidling a *heiau* in Kāʻeo, *mauka* of Keawalaʻi Church (Matsuoka et al. 1996:76).

2.1.3.4.2 Kiha-a-Piʻilani and Ke Alaloa

Kiha-a-Piʻilani was the son of Piʻilani and ruled as King of Maui during the late-1500s. For a short while prior to his reign, Kiha-a-Piʻilani resided in Honuaʻula. He lived in secret among the *makaʻāinana* to avoid execution by his brother (Kamakau 1992:22).

Kiha-a-Piʻilani's older brother Lono-a-Piʻilani became King upon the death of their father Piʻilani, despite Piʻilani's stated wish that his sons share Maui's rule. For a short time, the two had a harmonious relationship. Kiha-a-Piʻilani was a kind *aliʻi*. He was attentive to well-being of the *makaʻāinana*, offering them food in times of shortage. His older brother saw his generosity as an attempt to curry favor and undermine his rule, and so a rift developed. One day, the two got into a fight, and Lono-a-Piʻilani became so certain of his brother's disloyalty, that he resolved to have him killed.

Kiha-a-Piʻilani fled first to Molokaʻi and then to Lanaʻi before returning in secret to Maui. He and his wife managed to reach the uplands of Honuaʻula without being discovered by Lono-a-Piʻilani's men, and there they were welcomed by the *makaʻāinana*. According to Kamakau, they first lived at a place called Keʻekeʻe (Kamakau 1992:23), which De Naie suggests likely refers Puʻu Keʻekeʻehia (de Naie and Donham 2007:105). Eventually, they relocated to the vicinity of Kula and Makawao before Kiha-a-Piʻilani's sought to wrest Maui from his brother's control, which he accomplished with the help of his brother-in-law ʻUmi-a-Liloa, the Hawaiʻi Island chief.

During his reign, he managed to finish the construction of Ke Alaloa (The Long Road), a paved footpath that encircled both Maui's east and west ends, a length of approximately 138 miles (de Naie and Donham 2007:75). The project, which would improve travel, trade, communication, and the collection of *hoʻokupu* (taxes), was started under his father, the chief Piʻilani around the year 1516. In Honuaʻula, Ke Alaloa travelled along the coastline, crossing the beaches from Wailea

heading south to Poʻolenalena and Maluaka and then over the lava fields to Keoneʻoʻio. Large sections were paved with stone, about which Martha Fleming provides some insight:

> The Alii had a line of men stand from the sea and hand stones along the line till they reached the required place. Here the stones were artfully put into position. The trail was paved with flat, hard beach stones Those on the steeper grades were very flat, while those in less sloping country were more rounded. In open country, each side of the trail was flanked with large field boulders solidly sunk into the ground and standing above the center from one to five feet. . . . On the steep gulches, only one side of the trail had this guard. The stones, or flags, on the floor of the trail were placed horizontally to abutments in quite regular lines. It took four or five stones to make a line across. The second row of horizontal stones was placed parallel to the other in a checker-board fashion to prevent wash. The width of the trail between the balustrades was from four to five feet, giving a regular appearance as it stretched over the country. There were few turns in the trail, even where the grade was steepest. (Fleming 1933:5)

2.1.3.4.3 The Invasion of Kalaniʻōpuʻu

Just prior to the reign of Kamehameha, Maui was controlled by Kahekili and Hawaiʻi Island by Kalaniʻōpuʻu. Kamakau writes that in 1776, war broke out in Honuaʻula when Kalaniʻōpuʻu and his army invaded the district and terrorized its people, prompting Kahekili to come their defense and defend his rule over the island:

> In the year 1776 Ka-lani-ʻopuʻu and the chiefs returned to war on Maui, and in the battle with Ka-hekili's forces at Wailuku were completely overthrown. The army landed at Keoneʻoʻio, their double canoes extending to Makena at Honuaʻula. There they ravaged the countryside, and many of the people of Honuaʻula fled to the bush. When Ka-hekili heard of the fighting at Honuaʻula he got his forces together–chiefs, fighting men, and left-handed warriors whose sling-shots missed not a hair of the head or a blade of grass. Ka-lani-ʻopuʻu landed his forces before noon, a great multitude filling the land from Kiheipukoʻa at Kealia to Kapaʻahu, all eager with the thought that the Alapa were to drink the waters of Wailuku. (Kamakau 1992:85)

2.1.3.4.4 Kalola and the Olowalu Massacre of 1790

The chiefess Kalola was the daughter of Kekaulike, Mōʻī of Maui during the 1700s. Her brother was Kahekili, the famous warrior king mentioned above who came to control seven of the eight Hawaiian islands and paved the way for Kamehameha's eventual unification. There are accounts documented by Fornander and Kamakau of Kalola residing or spending time in Honuaʻula (Kamakau 1992:145) (Fornander 1880:214, 228).

Kalola and her husband Kaʻopuiki were involved in one of Maui's most infamous attacks, the Olowalu Massacre of 1790. The massacre itself resulted in the brutal murder of more than a hundred Hawaiians at a village located in what is now known as Olowalu. This event was precipitated by a series of incidents involving the British-American captain Simon Metcalf and the crew of a fur trading ship called Eleanora (also called the Eleanor), which anchored at Honuaʻula in 1790. Barrere suggests that this was Mākena Bay (Barrere 1975:21). An anonymous officer's account of the event was published in 1792 in a London journal called *Gentleman's Magazine*.

Kalola and Kaʻopuiki were present when the Eleanora first docked at Honuaʻula. They went out to greet the foreigners and offer goods to trade, at which point Kaʻopoiki took notice of a smaller boat, called a cutter, tied to the Eleanora's stern. The boat was constructed with highly coveted metal parts. That night, Kaʻopuiki and some others snuck out to the ship and cut the smaller boat loose. Sleeping inside was one of Metcalf's crewmen, who was killed during the raid. Realizing that the boat was missing, Metcalf sent out a search party but found nothing.

The next day, several more canoes came out to the Eleanora with pigs and fruit to offer. They were told to go away but didn't obey, and so, Metcalf fired on them, killing and wounding several Hawaiians. The following day, according to an officer's account, "four or five thousand people" gathered at the shoreline, "all armed with slings, spears, and arrows" ("Americans at Otaheite" 1792:318). A battle ensued, with the boat firing its cannons at the beach and likely killing and wounding many. A crew went to shore and set fire to the village and *heiau*, and any survivors eventually fled *mauka* to avoid being shot at.

After that, the Eleanora left Honuaʻula and headed north. The officer wrote, "We had been under way about an hour and a half, with a light breeze, when the natives in canoe alongside, informed us that the chief of the people that had stolen the boat, lived behind a point, to the northward, we then hauled our wind, went round the point and came to anchor" ("Americans at Otaheite" 1792:319).

The next day, Kaʻopuiki came aboard the ship and offered to return the boat, which had been stripped for its metal parts, and the boat's keeper, who was dead, in exchange for a reward. Kaʻopuiki later returned with just the boat's keel, angering Metcalf.

Sensing danger, Kalola had declared a kapu forbidding anyone from making conact with the ship. It lasted three days, and when it was over, hundreds of villagers paddled out to the Eleanora in the hopes of trading with the crew. Presenting a friendly demeanor, Metcalf managed to corral the canoes along one side of his ship, and once they were packed tightly together, he ordered his crew to fire the guns. It was a scene of carnage, with at least a hundred dead and a hundred wounded. Kamakau describes the aftermath:

> Even those who swam away were shot down. John Young was an eyewitness on board the ship and has testified to the great number who were killed at this time. At noon that day the "Eleanor" sailed, and the people went out and brought the dead ashore, some diving down into the sea with ropes and others using hooks; and the dead were heaped on the sands at Olowalu. Because the brains of many were oozing out where they had been shot in the head, this battle with the ship "Eleanor" and her captain was called "The spilled brains" (Kalolo-pahu). It was a sickening sight, as Mahulu and others have reported it; the slaughtered dead were heaped upon the sand; wives, children, parents, and friends came to view and mourn over their dead; and the sound of loud wailing arose. (Kamakau 1992:146)

2.2 ARRIVAL OF WESTERN VESSELS AND 19TH CENTURY CULTURE CHANGE

In 1778, Captain James Cook made Hawaiʻi known to the West, and the flow of seamen, merchants, missionaries, and plantation owners that followed forever altered the land, people, and culture of Hawaiʻi. The sections below explain how these changes impacted the people and lands of of Honuaʻula.

2.2.1 Transitions in Population and Land Use

In May of 1786, the French explorer Jean-François de La Pérouse sailed past Maui and landed briefly to the south of Mākena State Park at Keoneʻoʻio, anchoring in the bay that now bears his name. It was his belief that he was the first European to set foot on Maui and spent one day ashore engaging in trade and exploring the area (Dunmore 1985:227). Accounts from this expedition suggest a relatively large and well-established community with ready access to resources:

> More than one hundred and twenty of them, men, women, and children had been out in their canoes since the crack of dawn and immediately offered to begin trading. Two of them, who seemed to be the men of authority, approached. They made a long, serious speech to La Pérouse, who did not understand a single word, and presented him with a pig, which he accepted. In return he gave them some medals, hatchets, and pieces of iron, which they valued very highly. By this generosity, the French succeeded in winning the friendship of the islanders.
>
> During his reconnaissance, La Pérouse saw four small villages of ten or twelve houses. These are made of grass and are covered with the same material. They have the same shape as the thatched cottages found in certain parts of France. The roofs are pitched on two sides, and the door, which is located on the gable end, is only three feet high, so that it is necessary to stoop when entering. The furnishings consist of mats, which like our carpets make a very neat flooring on which the islanders sleep. The only cooking utensils they have are gourds painted in various colors. Their cloth is made from the paper mulberry tree, but, although painted in a great variety of colors, it appears less skillfully made than the cloth of other South Sea islanders.
>
> When he returned aboard, the commander learned that Captain Clonard, his executive officer, had received a chief and had bought a cape and a fine red helmet from him; he had also acquired more than one hundred pigs, some bananas, yams, taro, mats, and various small objects made of feathers and shells. (Jean-François de Galaup 1969:24-25)

Another early description that we have of Honuaʻula comes from the account of Archibald Menzies, a Scottish naturalist who was on Captain George Vancouver's 1793 voyage through Hawaiʻi. The impression the Menzies got was of a "barren" and "thinly inhabited" place:

> [E]arly in the morning of 10th, when we bore away along the southern shore, with a steady breeze, till we came to Molokini, and ther it became light and fluctuating in its direction, by the high land of Maui intercepting the regular trade wind. We had some canoes off from the latter island, but they brought no refreshments: indeed this part of the island appeared to be very barren and thinly inhabited. (Thrum 1909a:92-93)

The century that followed is characterized by immense change. Contact with the foreigners from the U.S. and Europe brought new customs and practices, new ways of organzing land and labor, new technologies, as well as new threats and, for a few, new opportunities. Honuaʻula, as elsewhere throughout Hawaiʻi, felt the effects of these changes in large and small ways.

2.2.1.1.1 A Declining Population

One of the more consequential aspects of this period was a steady decline in population beginning in the 1830s. The first formal population counts were conducted by the missionaries in 1831-1832 (Schmitt 1973:5), when 3,340 people were counted in Honuaʻula, which made it Maui's fourth most populated district behind Lahaina, Hamakualoa, and Hāna (de Naie and Donham 2007:113).This was likely near its peak before exposure to foreign epidemics and disease took its toll.

Contact with the wider world brought Hawaiʻi into a global market economy and transformed traditional Hawaiian society in complex ways. Whaling was one of the first industries to find a foothold in Hawaiʻi, and as it drew young Hawaiian men away from the land and their families and onto whaling ships, the communities of Honuaʻula felt the effects. In an 1846 letter to editor of *The Polynesian*, a missionary named Jonathan S. Green expressed his dismay at the threat such a loss posed:

> The fact that the number of young men who leave home, and engage their services on board whale ships, is rapidly increasing, is one of the facts, so far as my people are concerned, which fills me with painful apprehension. More or less of the Hawaiian youth, I am aware, have engaged in this business for many years, especially those living in the vicinity of Honolulu, Lahaina, Hilo and Kaawaloa. But of late the number of these has greatly increased—at least in our vicinity—so that the present season not a few of the most promising young men from Kula, Honuaula and Wailuku have gone to sea. During the three years past we have had an excellent native school at Makawao, taught by a graduate of Lahaina Seminary. Many of these young men had made good proficiency in their studies—had nearly completed their course of education, and some few of them had commenced teaching. Now that these youth were just ready to engage in labors for the good of the nation, they have nearly all gone on board whale ships, and thus our hopes of good to the nation through them is for the present, utterly blighted. (Maly and Maly 2005:18)

2.2.1.1.2 The Nuisance of Cattle

In places like Honuaʻula, the presence of cattle had profound impacts to the land and to people's livelihoods. Cattle were first given to Kamehameha by Captain George Vancouver in 1793, who hoped it would become "a convenient source of beef provisions for ships in the mid-Pacific, as well as a civilizing tool to transform the Hawaiian people" (Fischer 2015:31). Kamehameha placed a *kapu* (prohibition) on the animals, and while under protection, their numbers multiplied. It's not known when cattle were brought to Maui. The first reliable population count was taken in 1852 and tallied a total of 40,700 cattle on all islands (Fischer 2015:58).

The herds of wild cattle were a destructive force on the native enviroment. The ecologist Christopher Lever notes that in Hawaiʻi, "feral cattle have had a serious negative impact on the vegetation of dry, mesic, and wet forests at both high and low altitudes. Indeed, it has been claimed that they have been the single most destructive animal in the islands" (Lever 1994:44). Appreciating the scale of such impacts, Handy concludes that Honuaʻula was more hospitable before the cattle transformed it:

> In Honuaula, as in Kaupo and Kahikinui, the forest zone was much lower and rain more abundant before the introduction of cattle. The usual forest-zone plants were cultivated in the lower upland above the inhabited area. Despite two recent (geologically speaking) lava flows which erupted from fissures below the crater and only a few miles inland and which covered many square miles of land, the eastern and coastal portion of Honuaula was thickly populated by Hawaiian planters until recent years. (Handy et al. 1991:113-114)

In these conditions, and in an area already prone to drought, the deforestation of the land made Honuaʻula's residents even more vulnerable. On June 8, 1838, Jonathan S. Green submitted this report to the *Hawaiian Spectator*, describing a time when the conditions were so bad, it forced the people of Honuaʻula to seek food in other districts:

> Hoapilikane [Governor of Maui] is now ordering all the people from Honuaula, one of our out stations, away from home, 20 miles to dig fishponds. They have been here by fifties to request food. For they work for naught and board themselves. They have no food on their own land, it being a time of famine at that place, so they have to get food where they can find it. They carry their food to the place of their labor, leaving their families to seek sustenance as they can. (Maly and Maly 2005:61)

Not only did cattle cause deforestation, they threatend farmers' crops. There are numerous reports of cattle driving farmers off of their lands. In an 1846 article published in *The Polynesian*, the writer, while summarizing Kamehameha III's visit to Maui, notes that "the cattle have done much mischief by trespassing on the plantations, and driving the owners from their little farms. Two districts have in consequence been deserted" (Maly and Maly 2005:17).

One of the more tragic incidences resulted in the death of a man named Aki from Honuaʻula (Maly and Maly 2005:16-17). Linton Torbert, who owned much of ʻUlupalakua and the surrounding lands, owned some cattle that had allegedly trampled on Aki's farmland. Aki allegedly cut several of their legs, injuring Torbert's cattle. Torbert and his blacksmith Benjamin Furbush confronted Aki, they got into a scuffle, and while Aki was attempting to flee, he was shot in the back and killed. Torbert and Furbush were sentenced to four years in prison, which was commuted with the payment of a fine, $200 each.

Up until the early-1840s, land use, access, and subsistence activities in Honuaʻula remained as they had from ancient times. But by the mid-1840s, things began to change as the Māhele's new land ownership rules facilitated a shift in use from subsistence to commercial ranching and agriculture (Maly and Maly 2005:13).

2.2.2 1845-1851 – The Mahele

The Mahele reformed Hawai'i's traditional system of land tenure, from one where the chiefs and people held the land in common, to one of private ownership modeled off of Western land regimes. It was a multi-part process that began in 1845 with the establishment of a Board of Commissioners to Quiet Land Titles, also known as the Land Commission. Those who intended to secure rights or title to any lands would submit their claims to the five-member Land Commission Board. The Board would then determine the validity of those claims and issue a Land Commission Award (LCA) to successful claimants (Chinen 1958:8-9). Upon payment of a commutation fee to the government, a Royal Patent would be issued, perfecting title to the land (Chinen 1958:21).

The actual land division, or *mahele*, began 1848. It required an initial process of clarifying and separating out the respective property interests of the King, the chiefs and *konohiki* (*ahupua'a* managers), and the native tenants or *hoa 'āina* (Chinen 1958:15). The intent was for the King (Kamehameha III) to retain his own individual lands (known as the Crown Lands), and for the remaining lands to be divided into thirds and entitled to the government, the chiefs and konohiki, and the native tenants (Chinen 1958:15-16). These three land categories are known as Government Lands, Konohiki Lands, and Kuleana Lands. This *mahele* (division) between the King and more than 240 chiefs and *konohiki* occurred between January and March of 1848. In what's called the *Buke Mahele* (Mahale Book), the chiefs and *konohiki* surrendered all interests in any lands the King wanted to retain, and he did the same with any lands they wanted to retain. The *ali'i* and *konohiki* claims were typically for entire *ahupua'a* or smaller, whole subdivisions within *ahupua'a*. Commutation fees were often paid in land, at a rate of one-third of an awardee's total award, and placed into the inventory of Government Lands (Alexander 1890:114).

The distinction between Crown and Government Lands is an important one. From their inception, they were regarded as separate and distinct classifications of property. Crown Lands were defined as the:

> … private lands of His Majesty Kamehameha III., to have and to hold for himself, his heirs and successors forever; and said lands shall be regulated and disposed of according to his royal will and pleasure subject only to the rights of tenants. (Kingdom of Hawaii 1848)

At the death of Kamehameha III, the Crown Lands passed to Kamehameha IV. But at the death of Kamehameha IV, there was no immediate heir to the throne, which created some confusion as to the inheritance of Crown Lands and whether or not it followed the family line or the throne. It was decided by the Supreme Court that under the confirmatory Act of June 7th, 1848, "the inheritance is limited to the *successors* to the *throne*," "the wearers of the crown which the conqueror had won," and that at the same time "each successive possessor may regulate and dispose of the same according to his will and pleasure as private property, in the manner as was done by Kamehameha III" (Alexander 1890:121).

In contrast to the Crown Lands were the Government Lands, which were defined and set aside in a manner more typical of public lands. They were defined as:

> … those lands to be set apart as the lands of the Hawaiian Government, subject always to the rights of tenants. And we do hereby appoint the Minister of the Interior and his successors in office, to direct, superintend, and dispose of said lands, as provided in the Act … (p)rovided, however, that the Minister … shall have the power, upon the approval of the King in Privy Council, to dispose of the government lands to Hawaiian subject, upon such other terms and conditions as to him and the King in Privy Council, may seem best for the promotion of agriculture, and the best interests for the Hawaiian Kingdom … (Kingdom of Hawaii 1848:41)

As a part of the 1848 *Act Relating to the Lands of His Majesty the King and of the Government*, and as published in subsequent newspaper notifications, the lands of Paeahu Ahupuaʻa, noted as Paeahu 1 and Paeahu 2, were set apart and declared as lands of the Hawaiian Government (Kingdom of Hawaii 1848:34; "Na ke Aupuni: He Kanawai no na Aina Ponoi o ka Moi, a me na Aina o ke Aupuni" 1848).

As previously noted, in designations of lands as either Crown or Government, and through all awards of whole *ahupuaʻa, ʻili*, and later land sales to foreigners, the rights of the native tenants were expressly reserved, "*Koe na Kuleana o Kanaka"* (Reserving the Rights of Native Tenants) (Alexander 1890:114). For the native tenants, it took the passage of the Act of August 6, 1850, commonly known as the Kuleana Act, to facilitate the process of taking title to their own landholdings, which became known as Kuleana Lands. The Act waived the commutation fee, although a survey was still required. The tenants were permitted to make claims for any lands that they actually cultivated and were required to provide evidence of such through testimony, and claims often included multiple *ʻili*, or *apana*, located both *mauka* and *makai.* Kuleana Land claims were presented to and heard by the Land Commission.

Although the intent was for the land to be divided equally among the government, chiefs, and native tenants, the outcome was far from equitable, with the native tentants receiving less than one percent of all the land in Hawaiʻi, a total of 28,658 acres (Van Dyke 2008:48).

Over the course of the Māhele, the *ahupuaʻa* of Paeahu, which was classified as Paeahu 1 and Paeahu 2, ended up as Government Lands, with various parcels awarded as Kuleana Lands or sold to individuals via Land Grants, discussed below. In the Mahele, the *aliʻi* Moses Kekūāiwa first disclaimed any interest to the *ahupuaʻa* of Paeahu, and it thereafter became Government Lands.

2.2.2.1.1 Claims of Native Tenants

In Paeahu, 12 *kuleana* claims were presented and recorded in the Native Register (Table 2-1); however, only eight LCA claims were successfully awarded:

1. LCA 2435 to Kaakole for two *apana* in the *ʻili* of Kualapa for a total of 3.25 acres, which resulted in the issuance of Royal Patent 7751;
2. LCA 5265B to Kaneiholani for two *apana* in the *ʻili* of Kuhulu for a total of 7.5 acres, which resulted in the issuance of Royal Patent 6393;
3. LCA 5281 to Kuhilani for three *apana* in the *ʻili* of Kumukahi, Kuhulu, and Pauaua for a total of 10.307 acres, which resulted in the issuance of Royal Patent 6396;

4. LCA 5329 to Pahu for two *apana* in the *'ili* of Kapunakea and Haleolono for 7.9 acres, which resulted in the issuance of Royal Patent 6398;
5. LCA 5369 to Ainua for a one-acre *apana*, which resulted in the issuance of Royal Patent 6394;
6. LCA 5370 to Anahe for three *apana* in the *'ili* of Kuhulu, Haleolono, and Paukuehewa for a total of 6.87 acres, which resulted in the issuance of Royal Patent 6533;
7. LCA 7975 to Pepeiaonui for a 1.5-acre *apana* in the *'ili* of Haleolono, which resulted in the issuance of Royal Patent 6348; and
8. LCA 10665 to Pipio for an 11.68-acre *apana* in the *'ili* of Piliwale and Hauola, which resulted in the issuance of Royal Patent 7543.

Many of the land claim awards in Paeahu are linked to testimony provided by Pikanele, who is identified as a former *konohiki*. According to Pikanele, he allowed certain *hoa 'āina* to plant potatoes in the *mauka* lands of Paeahu, but he never granted the lands to them. Those whose land claims in Paeahu went unawarded, presumably for this reason, included Naale (LCA 5363), Ohule (LCA 10580), Wahie (LCA 10964), and Kouhaiwa (LCA 5200).

Of the claims that were awarded, the testimony suggests that at least six claimants held additional lands that were not ultimately included in their Land Commission Awards. For example, native testimony in support of Kaakole's claim (LCA 2435) identifies seven *apana*, but Kaakole was awarded only two *apana*. This is also the case for Kaneiholani (LCA 5265B for two *apana*, whereas testimony supports a claim for three *apana*); Kuhilani (LCA 5281 for three *apana*, whereas testimony supports a claim for six *apana*); Ainua (LCA 5369 for one *apana*, whereas testimony supports a claim for three *apana*); Anahe (LCA 5370 for three *apana*, whereas testimony supports a claim for five *apana*); and Pepeiaonui (LCA 7975 for one *apana*, whereas testimony supports a claim for two *apana*).

With regard to a few of the *kuleana* claims at Paeahu, there had been some dispute over the validity of the claims made by some for *mauka* lands in Paeahu that had been used to grow Irish potatoes. The confusion over the Irish potato-growing lands is apparent in the testimony of Pikanele, a *konohiki* of the area:

> Only one man received his land from me in Paeahu. He was an ancient dweller on the land, viz; Pahu, the father of Kameiholani[1] and Kuhilani. Pipio and Pepeiaonui and Anahe were also ancient dwellers on the land. But I only gave land to Pahu and Pipio, and I do not know whether they entered their claims for the land before the Board of Land Commissioners. They told me they did not. I did not give land to Kameiholani + Ainoa + Kuhilani + Kahoikaina, but they did occupy land under Ainua my agent. They had begun to plant a very few potatoes only before 1850, in which year Kanehoa the Governor forbade any person planting any land that they had not previously planted. I became Konohiki of Paeahu in 1836. In the year 1838, Hana Kaunahi and I sent off Pahu and Pipio from the land. When Kaumaea was Lunaauhau [tax collector] of Honuaula, and Kamakau and Kaauwai were waiting out claims, then for the first time these persons, viz; Kaneiholani, Kuhilani, Ainoa, Naale, Kahoikaina (Koukaina), Kaakole, an

[1] Possibly a variation or mis-spelling of Kaneiholani

> old settler, and Pepeiaonui, Ainua, Kalama or Lukua and Ohule entered claims for land in the Irish Potato region. But I never gave them their land there, only myself and wife (Hana Kaunahi) made Ainua our Agent there, and he continued in that capacity till W. Swinton bought it. Nobody cultivated above the clear land[2] till 1850, except the few above named who planted a little. (*Land Commission Book of Testimony*:91-92)

Most of the claims for lands under dispute were abandoned, with the claimants instead seeking to buy lands from Goodale, who had acquired his holding through the sale of Land Grant 548 (see Section 2.2.2.1.2). Unfortunately, not all who tried to purchase lands could secure financing.

2.2.2.1.2 Land Grants

While the Māhele was underway, it became clear that the process did not adequately meet the needs of native tenants, nor did it address the demands of foreign residents. Often, native tenant claims went unawarded, or the land that was awarded was insufficient to support a family's subsistence lifestyle. At the same time, foreigners were seeking larger and larger tracts of land to further their business interests. And so, a provision of the Kuleana Act provided a mechanism that enabled both groups to purchase land from the inventory of Government Lands (Maly and Maly 2005:152).

In March of 1851, James Young Kanehoa purchased most of the available land in Paeahu from the government under Land Grant 548. He paid $6,000 for 4,879 acres of land. Just a few months after the purchase, Kanehoa sold his Paeahu lands to Warren Goodale, the nephew of Lucy Goodale and Asa Thurston, some of the first Protestant missionaries to arrive in Hawai'i (Barrere 1975:32-37). Between August 1851 and September 1854, Goodale sold approximately 300 acres to 19 different individuals. In 1862, Goodale sold the remaining Paeahu lands to James W. Austin, who then sold it to Captain James Makee, founder of the famed Rose Ranch.

Other land grants issued at the time of the Mahele 'Āina included Land Grant 449 to William Fredenburg and Land Grant 547 to William Wilcox, both of which were situated within the prime potato agriculture lands (Figure 2-7).

[2] Possibly a reference to the mid-elevations above the shoreline settlement area and below the elevation of lands noted as good agricultural lands.

Table 2-1. Summary of Land Commission Awards for Paeahu Ahupua'a (Office of Hawaiian Affairs 2011, 2014)

Region	Helu	Claimant	'Ili	Land Claim	Acreage
Mauka	2435	Kaakole	Kualapa	NR Kaakole: *mala 'uala* (potato garden)*, ku'u hale* (my house) FT K Pikanele states in reference to certain claims in "Paeahu," the land of Mr. Goodale, that he never gave land to any of those while he was *Konohiki* of said land, that they were allowed to plant potatoes on some parts of the land under the *Konohiki*. Those referred to are Ainua (5369), Kuhilani (5281), Naale (5363), Kaneiholani (5265), Ohule (10580), Wahie (10964), Kouhaiwa (5200), Kaakole (2435), Pepeiaonui (7975). Witness says these people have no real *kuleanas* in the *mauka* part of the land, but he thinks they have claims to some of the *makai* part where they have occupied and cultivated going to the labor of the *Konohiki*.	Apana 1: 3.00 acres Apana 2 (*pahale*): 0.25 acre
Mauka	5265B	Kaneiholani	Kuhulu	FT Kaneiholani: *Ua kuai owau o Kaneiholani i ekolu Eka aina ma ka Apana 7, Moo* (garden section) *3, Paeahu, Maui, me W. Goodale no na Dala $16.25 i lilo loa ia'u. A ke haalele au i na apana a pau e ae malaila, me ka hoole, aole au kuleana ma loko.* FT [Kaneiholani] appeared in person and agreed to relinquish all his claim in Mr. Wilcox's land, but will be allowed to cultivate under Mr. Wilcox. NT Kuhilani *hoohikiia: Ua ike ua I kona aina. Ekolu mau apana. Apana 1: Kula* (pasture)*, ili o Kuhulu, Paeahu Ahupuaa. Apana 2: Kalo* (taro)*, ili o Kahulu, Paeahu Ahupuaa. Apana 3: Kula, ili o Kahulu, Paeahu Ahupuaa. Na Pikanele i haawi mai i ka* M.H. 1836.	Apana 1 (*'ili 'āina*): 5.00 acres Apana 2 (*'ili 'āina*): 2.50 acres

Table 2-1 (continued). Summary of Land Commission Awards for Paeahu Ahupuaʻa (Office of Hawaiian Affairs 2011, 2014)

Region	Helu	Claimant	ʻIli	Land Claim	Acreage
Kula	5268	Kaneioholani	Kukulu Haleolono Kapunakea Makahiku	NR Kaneioholani: *He mau moku mauu* (grassland area at Kukulu), *aia i Haleolono, hookahi* (there is one [*moku mauu*]), *aia i Kapunakea hookah, aia i Makahiku hookah. Eia no keia he mau mala uala haole* (Irish [white] potato garden) *ekolu* (3)	Not Awarded
Makai[3]	5270	Koukaina	Kumukahi	NR Kumukahi: *Hookahi moku mauu, elua mala uala Haole,*	Not Awarded
Kula Makai[4]	5281	Kuhilani	Kumukahi Kuhulu Paouou	FT K Pikanele states in reference to certain claims in "Paeahu," the land of Mr. Goodale, that he never gave land to any of those while he was *Konohiki* of said land, that they were allowed to plant potatoes on some parts of the land under the *Konohiki*. Those referred to are Ainua (5369), Kuhilani (5281), Naale (5363), Kaneiholani (5265), Ohule (19580), Wahie (10964), Kouhaiwa (5200), Kaakole (2435), Pepeiaonui (7975). Witness says these people have no real *kuleanas* in the *mauka* part of the land, but he thinks they have claims to some of the *makai* part where they have occupied and cultivated going to the labor of the *Konohiki*. FT Kuhilani: Ua kuai owau o Kuhilani me W. Goodale i 7 Eka aina i loko o ka Apana 7, Moo 3, Paeahu, Maui, i lilo loa iaʻu, no na Dala $38.- au i haawi ia ia, a no ka ae mai o W. Goodale i keia ke haalele au i na apana elua i koe aole au kuleana malaila. NR Kuhilani: *He mau moku mauu elua* (2)*, moku lauhala* (*hala* or pandanus [*Pandanus tectorius*] area) Mahele Award Notes: Apana 1 is bound by the sea (*kahakai*); Apana 2 is bound by a path (*ala*) on one side and a road (*alanui*) on another	Apana 1: 0.507 acre (*pahale*) Apana 2 (*ʻili ʻāina* _ Kuhulu): 1.70 acres Apana 3 (*ʻili ʻāina* - Pauaua): 8.10 acres

[3] In the boundary of the claim, Koukaina notes that the ocean is on the western boundary – *Komohana ke kai*
[4] The survey description and sketch map notes that the ocean is serves as a boundary of Apana 1 (*pahale*)

Table 2-1 (continued). Summary of Land Commission Awards for Paeahu Ahupua'a (Office of Hawaiian Affairs 2011, 2014)

Region	Helu	Claimant	'Ili	Land Claim	Acreage
Kula	5329	Pahu	Kapunakea (Punakea) Haleolono Kualapa Makahiku	FT K Pikanele states in reference to certain claims in "Paeahu," the land of Mr. Goodale, that he never gave land to any of those while he was *Konohiki* of said land, that they were allowed to plant potatoes on some parts of the land under the *Konohiki*. Those referred to are Ainua (5369), Kuhilani (5281), Naale (5363), Kaneiholani (5265), Ohule (19580), Wahie (10964), Kouhaiwa (5200), Kaakole (2435), Pepeiaonui (7975). Witness says these people have no real *kuleanas* in the *mauka* part of the land, but he thinks they have claims to some of the *makai* part where they have occupied and cultivated going to the labor of the *Konohiki*. Note 5329 Pahu is a claimant but not mentioned above. FT: Clt (Claimant) appeared in person and stated that his land in Paeahu had not been planted for several years. NT Kaneiholani: *He aina hooilina mai na makua mai i ka wa o Kamehameha.* NR: *He mau moku mauu 2, mala uala haole* Mahele Award Notes: Apana1 is bound on the west side by a path (*ala*) and a road (*alanui*) to the south (not located by surveyors)	Apana 1 (*kalo*): 3.80 acres Apana 2: 4.10 acres
Kula	5331	Paaluhi		NR Paaluhi: …*aia i Paeahu 1 mala* (*uala haole*)	Not Awarded

Table 2-1 (continued). Summary of Land Commission Awards for Paeahu Ahupua'a (Office of Hawaiian Affairs 2011, 2014)

Region	Helu	Claimant	'Ili	Land Claim	Acreage
Kula	5369	Ainua	Nena Hao	FT K Pikanele states in reference to certain claims in "Paeahu," the land of Mr. Goodale, that he never gave land to any of those while he was *Konohiki* of said land, that they were allowed to plant potatoes on some parts of the land under the *Konohiki*. Those referred to are Ainua (5369), Kuhilani (5281), Naale (5363), Kaneiholani (5265), Ohule (19580), Wahie (10964), Kouhaiwa (5200), Kaakole (2435), Pepeiaonui (7975). Witness (Pikanele) says these people have no real *kuleanas* in the *mauka* part of the land, but he thinks they have claims to some of the *makai* part where they have occupied and cultivated going to the labor of the *Konohiki*. Note 5329 Pahu is a claimant but not mentioned above. FT Bailey: This is all that remains of this Clt as he has comprimised his lot in Paeahu. NT Kaneiholani: *Na Pikanele i haawi mai i ka 1836 M.H.* NR Ainua: *Hookahi moku mauu, he kalo, he uala elua mala, he mala maia* (banana area) Mahele Award Notes: *Kihi o Fredenberg* – corner of Fredenberg (Land Grant 449 to Wm Fredenberg) noted in the survey description and approximate location on the survey sketch	Apana 1: 1.00 acre (*mala kalo*)
Kula and Makai	5370	Anahe	Kuhulu (Kukulu) Haleolono Paukuehewa	NR Anahe: *he mau moku mauu aia i Haleolono, eha* (4)*, aia i Kapunakea elua moku mauu ... hookahi mala uala haole ... he wahi pahale aia ma kai* NT Kaneiholani: *He aina hooilina mai na makua mai i ka wa o Kamehameha.*	Apana 1: 5.16 acres (*mala maia*) Apana 2: 0.36 acre (*mala kalo*) Apana 3: 1.35 acres (*mala uala [uwala] maoli* [native potato])

Table 2-1 (continued). Summary of Land Commission Awards for Paeahu Ahupuaʻa (Office of Hawaiian Affairs 2011, 2014)

Region	Helu	Claimant	ʻIli	Land Claim	Acreage
	7974	Kaehulawaia	Makahiku	NR Kaehulawaia: *ʻili ʻāina* claim ... *Eia no keia he mau moku mauu i ka aina o Kamaloa, ekolu moku mauu, ma Kumukahi hookahi moku mauu, i Kahielu hookahi moku mauu, ma Keahuao, hookahi moku mauu, i Kaopa, hookahi moku mauu...Eia no keia eluaj mala uala haole i Paehu.*	Not Awarded
Kula	7975	Pepeiaonui	Haleolono	FT K Pikanele states in reference to certain claims in "Paeahu," the land of Mr. Goodale, that he never gave land to any of those while he was *Konohiki* of said land, that they were allowed to plant potatoes on some parts of the land under the *Konohiki*. Those referred to are Ainua (5369), Kuhilani (5281), Naale (5363), Kaneiholani (5265), Ohule (19580), Wahie (10964), Kouhaiwa (5200), Kaakole (2435), Pepeiaonui (7975). Witness says these people have no real *kuleanas* in the *mauka* part of the land, but he thinks they have claims to some of the *makai* part where they have occupied and cultivated going to the labor of the *Konohiki*. NT Wahie: *He aina hooilina mai na makua mai i ka wa o Kamehameha.* NR Pepeiaonui: *he mau moku mauu ka ii i Kamaloa, ekolu moku mauu, Aia i Kumukahi, hookahi moku mauu, Aia i Haleolono, hookahi moku mauu, he mau mala uala haole ekolu ma Paeahu* Mahele Award Notes: bound to the east by a path (*ala*)	Apana 1 (*kula*): 1.50 acres
	8818	Kuahine	Makahiku Kualapa	NR Kuahine: *hookahi mala uala* (Makahiku), *i Kualapa moku mauu, i Kekuaao Ekolu moku mauu, i Pohopohoa 1 mala uala haole, Pahulu I Kumukahi, mala uala haole*	Not Awarded

Table 2-1 (continued). Summary of Land Commission Awards for Paeahu Ahupuaʻa (Office of Hawaiian Affairs 2011, 2014)

Region	Helu	Claimant	ʻIli	Land Claim	Acreage
	10580	Ohule		NR Ohule: *hookahi moo mala uala, I Kekuaao mala uala, I Kualapa mala maia, he mau pahulu uala* (second growth potato) *i Makahiku, a he pahulu i Kamaalo, a he mala uala ma Kumukahi.*	Not Awarded
Kula	10665	Pipio	Hauola Piliwale	NR Pipio: *He mau mala uala haole naʻu elua*. NT Kanakaloa: *He aina hooilina mai na makua mai i ka MH 1819.*	Apana 1 (*ʻili ʻāina*): 11.68 acres

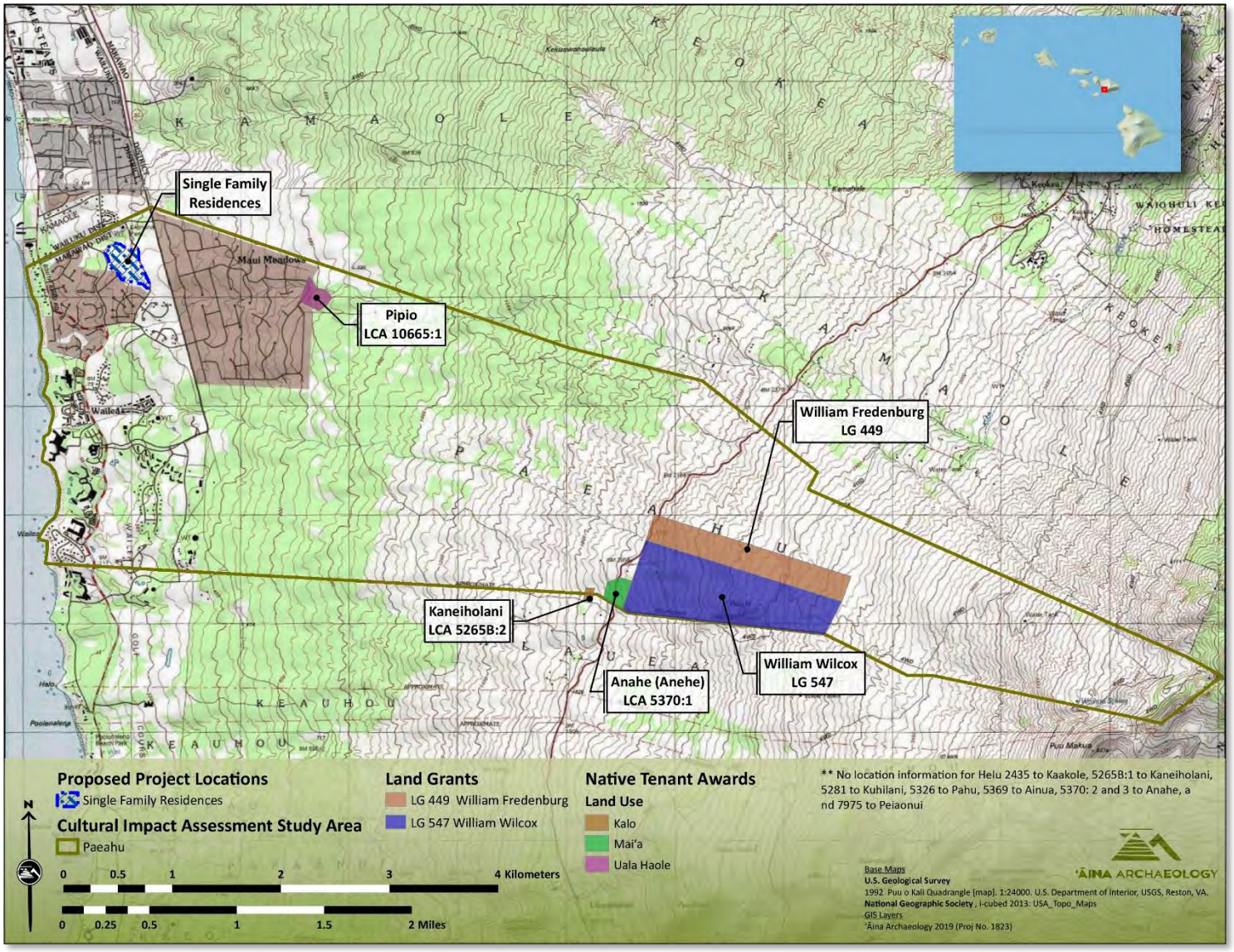


Figure 2-6. A portion of the USGS 7.5' topographic map, Puu o Kali Quadrangle (1992), showing the location of the proposed project (outlined in blue) in relation to Land Commission Awards with location information and Land Grants.

2.2.3 Land in Support of Commercial Interests

Even before the Māhele, lands in the Honua'ula district were being used to support commercial enterprises, namely sugar and cattle. In December of 1945 and January of 1946, King Kamehameha III traveled to Maui to speak to the issue of land privatization. A newspaper article published on February 14, 1846 in *The Polynesian* gave readers a recap of the visit, and the author tells of the agricultural developments in Honua'ula, giving us a glimpse at some of the developments and challenges to come:

> Agriculture on Maui is in a forward state, compared with Oahu. At Honuaula there are 178 acres under cultivation of sugar cane with a good sugar mill managed chiefly by natives. One farm, besides sugar, raises $5000 worth of Irish potatoes annually. There are 12 foreigners here, one of whom John White, arrived in 1799. On some parts of Maui the cattle have done much mischeif by trespassing on the plantations, and driving the owners from their little farms. Two districts have in consequence been deserted. (Maly and Maly 2005:16)

2.2.3.1.1 The Irish Potato Boom

In the early-to-mid-1800s, white potatoes were one of Maui's most important agricultural commodities, and Kula was regarded as having some of the finest potato-growing land (Figure 2-7). Demand for white potatoes, also known as Irish potatoes or *'uala haole*, came primarily from two sources: the local whaling industry and the California Gold Rush.

Hawai'i's whaling period began in 1819 and peaked in 1846. Whaling ships used Hawai'i as a stopover between the United States and Japan, where whales were hunted primarily for their blubber, which was then processed into whale oil and used for heating, lighting, and as an industrial lubricant. Each spring and summer, hundreds of whaling ships would arrive and spend months at a time in Lahaina and Honolulu, their crews resting and stocking up on food and other supplies.

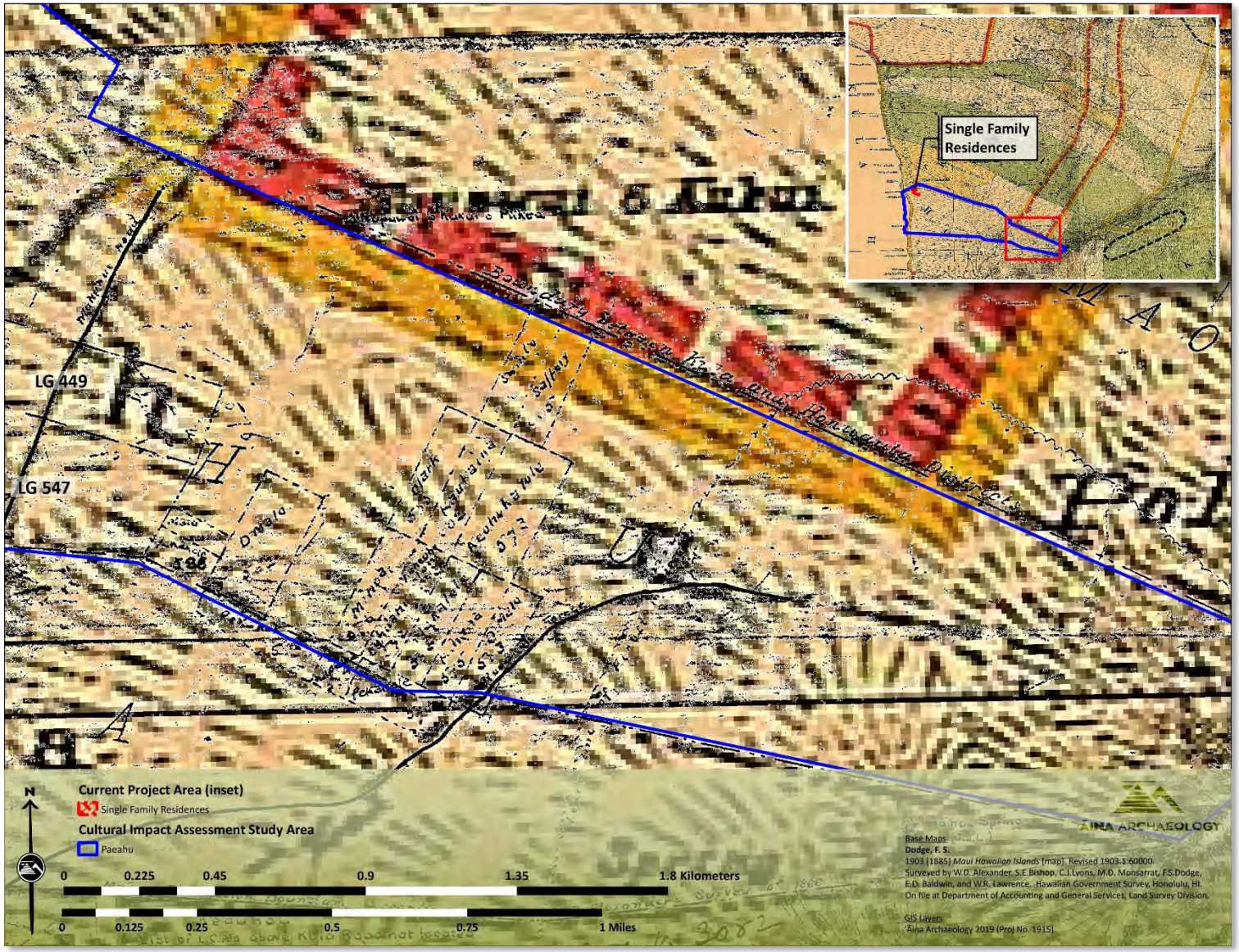


Figure 2-7. A portion of the revised Government Survey Map of Maui (F. S. Dodge 1903 (1885)) with a portion of an undated tracing of Honua'ula by Monsarrat showing Land Grants issued in Paeahu in relation to the potato lands outlined in Kula Moku.

Whaling ship crews hailed mostly from New England, and their desire to eat foods that were familiar influenced what some farmers planted on Maui and Oʻahu. Most notably, the American whalers' appetite for white potatoes led to its extensive cultivation in Kula, where it grew especially well. In fact, the availability of white potatoes on Maui is one reason why whaling ships preferred Lahaina over Honolulu. An 1854 report from the Committee on Irish Potatoes prepared for the Royal Hawaiian Agricultural Society gave the following account of Maui's potato trade when it was still near its peak:

> From 1840 the natives have been paying more attention to the cultivation of the Irish potato, and have found a ready market in the spring and fall visits of the whaling fleet, who were but too glad to avail themselves (from '40 to '48) to trade cotton cloth at 25cts per yard; that cost from 8 to 10cts, in exchange for potatoes at $3, and often at $1.50 per barrel.
>
> It seems almost incredible at the present time, and at so few years removed, that the natives would plant, (cultivate they did not–nature was generous) and when ripe, dig the potatoes, back a barrel at a time to the beach, a distance of 10 to 12 miles, and sell them at Fifty Cents, yet hundreds of barrels were thus brought in, for years up to 1847, when some few carts and pack bullocks were brought into use. (Gilman 1854:138-139)

Just as the whaling industry was on the wane, the California Gold Rush triggered a brief spike in demand for agricultural commodities of all types. Between 1849 and 1851, potatoes were Hawaiʻi's most valuable export. The 1854 report from the Committee on Irish Potatoes describes the frenzied atmosphere that characterized this brief boom in Maui's potato trade:

> The supplying of the fall fleet of whalers of '48, had taken most of the crop that had been prepared for the market, and when the sudden demand from California came on, and the call was loud, Potatoes! Potatoes! The natives gave "all they had, and more too," that is, they not only took all that were in the ground fit to dig, but the cry still being "give, give," they brought "seedlings and mother," and almost stript the fields; and for months there was scarce time given for a crop to arrive at maturity, before the active competition of the many purchasers urging the natives to bring in their potatoes, which, as they never raised them for their own use, were only valuable as they brought money, they were willing to sell green or ripe, at from $5 to $9 per barrel. (Gilman 1854:139)

In Honuaʻula, potato cultivation was concentrated in *mauka* regions near the old forest line, and as previously noted, the Māhele records indicate that the native tenants of Paeahu did in fact grow white potatoes across lands, presumably for trade and export at approximately the same elevation as those lands noted as "Good Agricultural Land Planted in Corn, Irish Potatoes, etc." (see also Figure 2-7).

One of the big players in Maui's potato trade was Linton L. Torbert, who began his farming operation on 2,300 acres of leased land in ʻUlupalakua. This land is presently located less than a mile upland of the proposed project. He grew potatoes and corn at first and then moved on to

sugar. Torbert sought to purchase, and was later awarded, several parcels of land in the nearby ahupuaʻa of Kāʻeo and Pāpaʻanui. In a letter to Keoni Ana, he shared his vision for these lands:

> If I get this land my intention is this. To manufacture sugar as extensively as possible. To accomplish this end I shall get 30 or 40 families of natives to come and live on the farm. I will find them houses and food, school their children & learn them to work. (Maly and Maly 2005:160)

2.2.3.1.2 Maui Sugar

Another crop that attracted new demand and early market potential was sugar. The first sugar operations on Maui were started in the 1820s in Wailuku and Waikapū. Many early ventures failed, but over time, the industry came to dominate the economic, physical, and social landscape of Maui. Between 1860 and 1880, Hawaiʻi's economy made a turn towards sugar, and growth was fastest on Maui, which counted twelve plantations in 1866, compared to eight on Hawaiʻi Island, six on Oʻahu, and four on Kauaʻi (MacLennan 1997:98).

Captain James Makee, a Massachusetts-born whaler, first made news in Hawai'i in 1843 while aboard the whaling ship "Maine" in the Lahaina harbor. It was reported that his cook attacked his face with a hatchett or cleaver, intending to leave Makee for dead (Nellist 1925:155). Makee was attended by a neighboring American warship and survived the attack which led to him abandoning the frontlines of the whaling industry and instead opened a local merchant and ship chandlery business. As whaling ships became less profitable in the 1850s, Makee set his sights further inland, with hopes of growing and milling sugar cane (Nellist 1925:155).

By 1856, Torbert began auctioning off his 'Ulupalakua and Honua'ula lands piece-meal between 1856 and 1858, eventually selling the entierty of his estate to Captain Makee (The Polynesian 1856:3). The land, still under an agreement to manufacture sugar and grind sugar cane for the King, was renamed "Rose Ranch" for Makee's wife. Makee enclosed some 40 acres of land with a stone and wire fence, and moved his family to the ranch (Cooke 1956).

By 1860, the Makee Sugar Plantation was one of the largest in East Maui (MacLennan 1997:101). During the American Civil War, Makee contributed huge shipments of sugar molasses to support the cause of the Union (Nellist 1925:157). One of Makee's signature improvements was in locating a reliable source of water, as reported on in an article from the July 7, 1866 issue of *Nupepa Kuokoa*:

Hunahuna mea hou o Hawaii Nei. *PAU KA PILIKIA. Ma keia pa hana, ua kukulu ae o J. Makee i na hale laau a me na punawai hohonu ma na hakala o na hale laau. Ua pau ka pilikia o na kanaka a me na*	Bits of News About Hawaiʻi. The trouble has ended. By this work, J. Makee has built a wooden house and deep reservoir on the side of the house. The troubles of the men and women are now ended by this work, they are now truly well supplied with water. This land, in ancient times, was a barren open

wahine ma keia pa hana, ua ulakolako maoli i ka wai. O keia aina i ka wa kahiko, he kula panoa wale no, he a-a, he haoa, aohe wai e loaa. O ka wai o keia aina i ka wa mamua, he pu-maia, he lau kakonakona; a i keia wa, limua ka wai, pau ka pilikia. Me ka mahalo. E wiki oe e ke Kuokoa. JOHN KELIIKANAKAOLE. Ulupalakua, Maui, Iune 12, 1866.

place, a rocky, scorched land, where water could not be gotten. The water of this land in times before, was from the stumps of the banana trees, and from the leaves of the kākonakona grass; but now there is water where moss can grow. The problem is resolved.
(Maly and Maly 2005:37)
(Translation: Kepā Maly)

Makee's plantation was renowned for its beauty, productivity, and the hospitality of its owners. King Kalākaua and his wife Queen Kapiʻolani were frequent guests. Makee's wife Catherine planted gardens decorated with roses, exotics plants, and other flowers that were unlike any that Maui had ever seen. It's here where the island's official flower, a deep pink rose variety called Lokelani, was first grown. Here's a typical visitor's report, published in the November 14, 1868 issue of Nupepa Kuokoa:

> The nature of this land is like that of a rose garden filled with blossoms. The beautiful home of J. Makee, Esq., has no equal. . . . The things grown there are like nothing else seen, there are beautiful flowers, and trees of all kinds. The road passes through the gardens, and to the large reservoir within the arboretum, it looks like a pond. When he finished showing us around the gardens, he took us to meet his lady (his wife), the one about whom visitors say, "She is the queen of the rose garden." (Maly and Maly 2005:38)

Makee managed the plantation and mill for just over 20 years. In 1876 and 1877, Makee began producing sugar bumper crops, leading to a highly profitable year in 1877. Makee and King Kalākaua began a professional partnership running the Makee Sugar Co. in Kauai. Makee also purchased the Waihe'e Plantation on Maui which was then managed by his son Parker Makee (Thrum 1925:86). Makee was appointed as a comissioner to aid in the development of the Kingdom of Hawaii, and soon constructed a breakwater project at Mākena to further develop the harbor and ease shipment of sugar (Nellist 1925:157). However, by 1878, the sugar fields of 'Ulupalakua were hit with a blighting drought causing sugar profits to dry up in Honuaʻula for good (Thrum 1926:38). Sugar production for Rose Ranch was fully moved to Waihe'e as a result of the drought and the era of 'Ulupalakua cattle ranching was on the rise.

Before his death, James Makee conveyed portions of Rose Ranch to his son, Parker Makee (Liber 55:1-9, Maly and Maly 2005:172). Following additional conveyances after James Makee's death (Libers 82:276, 61:1, and 232, Maly and Maly 2005:172) Parker Makee held the land during a

transitional period from sugar production to cattle ranching and in 1886, James Dowsett, father-in-law to James Makee's son Charles, purchased the Rose Ranch estate.

2.2.3.2 Cattle Ranching at the Raymond Ranch

Between 1886 and his death in 1898, James Dowsett, a preeminent businessman in Hawai'i, bought and leased additional lands, expanding the ranch's holdings (Nellist 1925:103). He aquired *kuleana* land, Helu 2401 in 1896 (Liber 159:34, Maly and Maly 2005:172), and Mākena Landing (Helu 2427 and Royal Patent No. 1289) and its accompanying lot and building in 1898 (Liber 176:343-344, Maly and Maly 2005:172). In the same time period, a navigation light was installed at Kanahena Point (Pu'u Ola'i) to aide in interisland sea commerce. The light, visible 11 miles out to sea, sat atop a 50-ft tall rough wooden structure (Craig 1899:17).

After James Dowsett's death in 1898, his daughter Pheobe, wife of Charles Makee, inherited the expansive estate upon his passing. When Charles died, Phoebe married Dr. James Raymond. Raymond bought the ranch in 1900, renaming the land "Raymond Ranch," and concentrated operations on raising and slaughtering cattle (de Naie and Donham 2007:103). From 1906 to 1907, the ranch had approximately 4,000 Shorthorn cattle (Henke 1929:60). The number slowly grew to nearly 6,000, requiring a slaughterhouse, refrigeration plant, and cold-storage technology on steamers to assure the delivery of fresh beef to Honolulu (Coffee 1920:78).

The ranch in 'Ulupalakua was the largest on the Maui. At any one time, the ranch ran more than 5,000 head of cattle and each year and sent 1,000 to market in Honolulu through the port at Mākena Landing. These vast ranchlands were the domain of Hawaiian paniolo (cowboys), and one of Hawai'i's most celebrated paniolo, Daniel Ikua Purdy, would eventually come to work at the Raymond Ranch. Purdy earned international fame when he won the World's Steer Roping Championship in 1908 at the Cheyenne Frontier Days Rodeo. In 1914, he came to 'Ulupalakua from the Parker Ranch on Hawai'i Island to work as Raymond's ranch foreman. He remained in 'Ulupalakua until his death in 1945. (Purdy 2006)

2.3 PAEAHU IN THE 20TH CENTURY

The legacy of ranching continued well into the 20th century, with a burst of wartime activity giving way to a search for new sources of industry. With vast stretches of undeveloped land, perfect weather, and sandy beaches, Honua'ula was primed for the boom in resort development that has characterized the modern era. The sections below provide an overview of the events that bring us to today.

2.3.1 The 'Ulupalakua Ranch

By the 1920s, it was recorded that the 'Ulupalakua ranchlands extended "along the sea for twenty-five miles and up the southwestern slope of Haleakala on Maui, [with] an area of approximately 63,000 acres, 28,000 of which are held in fee simple and the balance is government leased lands" (Henke 1929:60). The ranch employed many Native Hawaiians, some Portuguese-Hawaiians, Japanese stablemen and dairymen, and a Chinese cook and yardman, as

described by Inez McPhee Ashdown, daughter of Angus McPhee, ranch manager at the time (Mair 1979:13). Some people at 'Ulupalakua had *kuleana* land, and others lived in Kahikinui homesteads on the 23,000-acre property. Before 1920, no one had a car in 'Ulupalakua, so to get to Wailuku they would rent a Ford Jitney from the Kihei Store run by Ah Sue (Mair 1979:14). In 1910, Angus McPhee was fired from the Raymond Ranch for losing an arm in a hunting accident, and went instead to work for Henry Baldwin at the Hawaiian Commercial & Sugar Company, who also happened to be missing an arm (Mair 1979:3). A few years later, Raymond reemployed McPhee, and in the 1920s Inez Ashdown joined her father at 'Ulupalakua to teach at the school on the property (Mair 1979:4).

In 1923, Frank Fowler Baldwin, son of a prominent missionary family and President of the Hawaiian Commercial & Sugar Company, purchased the 23,000 acre ranch from James Raymond for the production of beef, hides, tallow, and fine polo ponies (Cooke 1956). At that time, Edward Baldwin, Frank's oldest son, took over management (Henke 1929:60) McPhee turned to other ventures, namely the purchase of Kaho'olawe in 1917, with the hopes of turning the island into a ranch of his own (Ashdown 1979:4). McPhee also reportedly purchased land to build a house and cattle feedlot near Pu'u Olai (de Naie and Donham 2007:163). While constructing the house, the McPhee family lived in the "Baldwin Beach Cottage", a house used by 'Ulupalakua ranchers, guests, and Baldwin family members (de Naie and Donham 2007:164). During this time, Mākena Bay to the south was one of the busiest ports on Maui. As the export of beef produced at 'Ulupalakua Ranch grew, so too did the traffic of interisland steamers at Mākena's landing. By the mid-1920s, there were over one hundred families living in the area (Clark 1989:38).

The population of Honua'ula began to wane in the years prior to WWII as the Kahului Harbor was slowly improved upon, drawing sugar trade to the north side of the island (Semi-Weekly Maui News 1922). With less industrial sea commerce, masses of *akule* gathered on the coastline from Pu'u'ōlai to Mākena Landing and residents in the area continued practicing traditional fishing and farming in the region once more (Lee-Greig et al. 2014:98).

2.3.2 World War II Military Exercises

During World War II, the U.S. military used Hawai'i as a major training, staging, and supply base for its Pacific command. During the war years, the military population on Maui outnumbered the local resident population by a factor of four (Maui General Plan 2030 2006:7). Dozens of training sites were located on the island. Up and down the coastline between Ma'alaea and Cape Kīna'u, including Molokini, the military ran combat training exercises involving amphibious equipment and tactics. In Wailea, Ulua Beach became known as Little Tarawa amongst the marines who used the area to stage amphibious landings in preparation for the Battle of Tarawa in the Gilbert Islands in 1943. Military exercises were also staged at Kaho'olawe, and the proximity of this stretch of coastline, made it useful for various training drills (Cottrell 2018:2). Over time the military made additional changes to the area, including the construction or widening of roads and the dismantling of the Mākena Landing pier.

Those families who lived near the Landing were forced to evacuate and had their homes razed. In an interview, Annie Leimomi Chang Wilmington, who was born in Mākena in 1907, shared her recollections of the wartime upheaval: "When the war started coming, they told everybody from the beach they had to move. [People] were selling their houses . . . but they [the military] took [bulldozed] all the homes so we didn't get anything but fifty dollars for it" (Lee-Greig 2002:C-8). After the war, little was left for former residents to return to, and many stayed away (Clark 1989:38).

2.4 RESORT DEVELOPMENT AND THE MODERN ERA

Following the war, Maui saw a steady decrease in population as the sugar and pineapple industries began to shrink and opportunities on Oʻahu and the U.S. mainland drew residents, younger ones in particular, away. In 1957 Frank F. Baldwin's estate sold 1,600 acres of ʻUlupalakua lands, consisting of the modern day Wailea coastline, to the Matson Navigation Company (Lee-Greig et al. 2014:100) which would eventually become a subsidiary of Alexander & Baldwin, Inc. (https://www.matson.com/corporate/about_us/history.html). Two years later, in 1959, the Hawaiian Islands became the Fiftieth State of the United States. The Hawaiian Islands, "not too far away to be accessible, yet just far enough away to be interesting," drew so many tourists that the number of yearly visitors soon outnumbered the permanent residents (Daws 1968:394). As the sugar and pineapple industries began to shrink and opportunities on Oʻahu and the U.S. mainland drew younger residents away, this rise in tourism gave residents a new source of industry (*Maui General Plan 2030* 2006:10). In a 1959 *Report of Land Use for the Island of Maui*, the Commission reported that,

> Maui is not fully utilizing its assets as a tourist attraction. As a result it is missing an opportunity to obtain a rich source of revenue necessary to provide additional income and employment as an aid in maintaining not only its present population, but to encourage future population growth. There are several fine sandy beaches in Maui [that] are on a par with the famous Waikiki Beach. (quoted in Maui General Plan 2030 2006:10 from [*Community Planning, Inc. and R.M. Towill Corporation. July 1959. Report of Land Use for the Island of Maui. Prepared for County of Maui, Planning and Traffic Commission. Wailuku, Maui.])*

One of the biggest barriers to capturing a greater share of the Hawaiʻi visitor market was Maui's lack of hotel accommodations. From this need arose the concept of the resort destination development, with a range of amenities to serve guests, including hotels, restaurants, shopping centers, and golf courses.

The report identified Wailea as having major resort community potential, and in 1970, the Wailea Development Company formed and quickly broke ground on the first of four golf courses in Wailea, which would provide an immediate source of cashflow. The original plan envisioned a densely populated mini-city for locals and visitors alike, and so residential condominium development came next, beginning in 1974. The Wailea ʻEkahi, ʻElua, and ʻEkolu condos opened between 1976 and 1978 to strong demand and high prices. Alongside the condominium

development came the 558-room Hotel Inter-Continental Maui in 1976 (now the Wailea Beach Resort) and the 350-room Wailea Beach Hotel in 1978.

Today, the shoreline area of Paeahu and Palauea that is collectively referred to as Wailea, consists of over 2,000 luxury homes and condominiums, six major resort hotels, three commercial/shopping centers, a tennis center, and three golf courses (https://wailearesortassociation.com/about-wailea-resort-association/history-culture).

3.0 SCOPING METHODS AND RESULTS

Scoping and community outreach for this cultural impact assessment was completed by Angela Petersons, B.A. and ethnographic researcher Kim-Hee Wong, M.A.

3.1 SCOPING METHODS

In order to identify individuals with knowledge of the traditional cultural practices within and adjacent to the proposed project as it relates to this study, contact was initiated with government agencies, advisory councils, local community organizations, and traditional cultural practitioners, as well as *kamaʻāina* (local residents) and *kūpuna* (knowledgeable elders) with generational ties to the proposed project area via an introductory letter and project related figures. Follow up attempts were then made to all contacts on the initial mailing list in a good-faith effort to make contact.

Table 4-1 presents the community consultation effort conducted with *kamaʻāina*, Hawaiian cultural advisors and Hawaiian organizations. Consultation outreach was initiated via e-mail which included a scoping letter containing the project description along with figures that showed the project location and project scope. If an e-mail was not obtained or was returned undelivered then a hard copy of the scoping letter and figures was sent to available physical addresses. Follow up telephone calls were then initiated when e-mail responses were not obtained.

Table 3-1. Outreach Summary

Name	Title/Affiliation	Organization Name	Outreach	Contacted/Notes
Adolpho, Jacob	Recommended by Cody Nemet Tuivaiti as Cultural Descendant of the area		Letter and figures sent via email 11/5/19, 11/12/19. Phone call 11/13/19. Texts sent 11/18/19, 11/21/19, 11/25/19.	Y, attempted to schedule interview
Akana, Kalani	Culture Specialist	Office of Hawaiian Affairs	Letter and figures mailed 10/31/19	Y, Routed our email to Kai Markell
Akina-Ancog, Cassie	Kula Kai ʻohana, prominent fishing family		Letter and figures sent via email 10/31/19 Follow up phone calls 12/01/19	Y, attempted to schedule interview

Table 3-1 (continued). Outreach Summary

Name	Title/Affiliation	Organization Name	Outreach	Contacted/Notes
Delima, Ashford	Cultural Descendant Honuaʻula Moku (Papaʻanui, Kaʻeo, Moʻoloa, Moʻoiki, Mohopilo, Kanahena Ahupuaʻa)	Hoʻoponopono o Makena	Letter and figures sent via email 10/31/19	N
DeNaie, Lucienne		Maui Tomorrow	Letter and figures sent via email 10/31/19, phone call	Y, completed a project site walk through and pointed out areas of concern that included a cultural material scatter in the westernmost section of the project area and an examination of wall feature SIHP 50-50-14-4791 (see Section 4.5)
Drummond, Leina**ʻala Teruya**	Realtor ʻOhana owned lands above Maui Hill	Keller Williams	Letter and figures sent 10/31/19, 11/12/19. Phone call 11/14/19.	Y, interview summary provided in Section 3.2.3
Hussey, Sylvia	Interim Ka Pouhana	Office of Hawaiian Affairs	Letter and figures mailed 10/31/19	N
Kalanikau, Vernon	Kula Kai Moku Poʻo, Cultural Descendant of Kula (Kula Kai) Moku – Waiakoa, Pūlehunui, and Keokea Ahupuaʻa; Cultural Descendant of Honuaʻula Moku	Aha Moku Council	Letter and figures sent via email 10/31/19	Y, interview summary provided in Section 3.2.2
Kanahele, Daniel	Resident of Paeahu		Letter and figures sent via email 10/31/19	Y, interview provided in Section 3.2.4
Kapu, Ke**ʻeaumoku**	CEO	Aka Moku o Maui, LLC	Letter and figures mailed 10/31/19	N

Table 3-1 (continued). Outreach Summary

Name	Title/Affiliation	Organization Name	Outreach	Contacted/Notes
Kekiwi, Justin	Cultural Descendant Honuaʻula Moku (Papaʻanui, Kaʻeo, Moʻoloa, Moʻoiki, Mohopilo, Kanahena Ahupuaʻa)	I	Letter and figures sent via email 10/31/19	N, requested more project information on 10/18/19, but no further correspondence
Kuloloia, Leslie	Kupunakāne		Letter and figures sent via mail 10/31/19	N
Lee, Carol-Marie "Kaʻonohi"	Honuaʻula Moku Poʻo Cultural Descendant Honuaʻula Moku (Papaʻanui, Kaʻeo, Moʻoloa, Moʻoiki, Mohopilo, Kanahena Ahupuaʻa)	Aha Moku Council	Letter and figures sent via email 10/31/19	Y, interview summary provided in Section 3.2.1
Markell, Kai	Compliance Enforcement	Office of Hawaiian Affairs	Letter and figures mailed 10/31/19	N
Medeiros, Johnny and Leona	Maui Meadows Resident		Letter and figures mailed 12/10/19	Y, permission to incorporate the interview summary was not able to be obtained.
Nakahashi, Christopher	Cultural Historian	State Historic Preservation	Letter and figures mailed 10/31/19	N
Nakanelua, Kyle	Maui Poʻo	Aha Moku Council, Moku o Kahekili	Letter and figures mailed 10/31/19	N
Nemet Tuivaiti, Cody	Resident of Kula Kai, active in traditional Hawaiian practices in Kula and Honuaʻula Moku		Letter and figures sent via email 10/31/19	Y, respectfully withdrew interview *manaʻo*
Phillips, Andrew	Burial Sites Specialist	State Historic Preservation	Letter and figures mailed 10/31/19	N
Shimaoka, Thelma	Maui Community Resource Coordinator	Office of Hawaiian Affairs	Letter and figures mailed 10/31/19	N

3.2 COMMUNITY OUTREACH RESULTS AND INTERVIEWS

Scoping letters were sent to a total 20 individuals with diverse backgrounds. Contacts included representatives of Native Hawaiian organizations including, The Office of Hawaiian Affairs (OHA) and the State Historic Preservation Office. In addition, we reached out to representatives from the Aha Moku Councils. At least two attempts were made to contact each potential consultant. Some individuals were contacted but chose not to share information regarding the cultural practices and resources of Wailea and Paeahu.

Collectively, interviewees emphasized the importance of fishing and gathering *limu* in the Paeahu *ahupuaʻa* and surrounding areas. Some expressed concerns about the potential of historical sites and *iwi* in the proposed project area.

3.2.1 Interview with Carol-Marie Kaʻonohiokalā Lee

Carol Kaʻonohi Lee was born and raised in Makena, Maui. She has generational ties throughout the island but particularly along the south shore from Kanahena to Kihei. As a child she lived with her parents near Puʻuolaʻi. Her maternal grandfather, Kauwekane Kukahiko, obtained the land by exchanging his Kanahena land with Ulupalakua Ranch. Her fraternal great-great grandfather was William Slocum Wilcox, a whaling captain and the patriarch of a strong Hawaiian family.

Ms. Lee shared that her family engaged in traditional fishing and limu gathering practices in Makena and the costal areas of Paeahu. Her father would go fishing in a skipper (boat) with her uncles and they would catch *akule*, *manini* and *weke*. When asked about their fishing techniques, Ms. Lee recalled that they would "surround" when out at sea, but she prefered to use a pole and remain closer to shore. Although she herself did not recall seeing her father fish using *palu* (fish chum), Ms.Lee shared that her grandfather did. Her grandfather also used a small canoe in Kanahena that he would use to go fishing in. Ms. Lee shared that before she was born, her mother and grandfather would paddle out to sea and canoe fish. This was a common practice amongst members of her family, but Ms. Lee herself did not expereince this. Ms. Lee's mother often gathered limu– including *limu lipoa*, *kohu*, *wāwaeʻiole*– along the Makena and Paeahu shoreline. As a child Ms. Lee would spend all day in Makena Bay and rather than go home to eat lunch, she would eat the limu straight off of the rocks. In addition, she would eat *ʻopihi* along with *pipipi* and *hāʻueʻue* while her brothers would collect *wana* and catch fish. Ms. Lee also shared that her family would use *hukilau* nets to collect large quantities of fish for family gatherings or church events.

According to Ms. Lee the project site was once a dry open space filled with kiawe trees. She said they would drive on the old road along the coast and could easily access the beach; unlike today where parking and beach accesses are limited. Ms. Lee recalled a crown flower orchard in Paeahu near the Akina family property. Once upon a time there were white and purple crown flowers that attracted butterflies; but, now Ms. Lee says that there are none. She also recalls gathering both varities of *ʻuhaloa* (*Waltheria indica*) that would then be used as a form of *lāʻau lapaʻau* (Hawaiian medicine).

When asked about the project, Ms. Lee shared that she is concerned for the local people and the impact that this project will have. According to Ms. Lee the area of the project site was once a dry area filled with dry shrub and *kiawe* trees, but now there is no open space only housing developments. Ms. Lee suggests that if the project were to really address the needs of Maui people the plan would include real affordable homes for locals. In addition, the plan should include a central space for a Hawaiian cultural center where artifacts and stories discovered through the archaeological process can be shared with the public.˙

Ms. Lee also expressed concern over the environmental impacts that the project will have on the area. This includes water resources. Ms. Lee is interested to learn where the water will be coming from and how it will affect the surrounding area – especially during the summer months when there is a water shortage. Ms. Lee believes that farmers should be given priority over water usage so that they are able to cultivate crops that will then support the masses. Another concern is regarding the density of the project. Ms. Lee suggests decreasing the number of housing units and potential occupants as part of the saving the view plane. Common sense will tell you that plants and trees are better for the environment and view planes rather than housing rooftops.

Most importantly, Maui has a housing issue; we are an island people. Our kupuna understood how to manage the very fragile environment and to be self-sustaining. However, if developments are designed for part time residents and transients, it solves nothing. It creates an obstruction of the flow, *mauka* to *makai,* of the native culture and landscape and the practices that sustain it. That management system is known as the *Aha Moku System*.

3.2.2 Interview with Mr. Vernon Kalanikau

Vernon Kalanikau was born and raised on the south shore of Maui. Mr. Kalanikau shared memories of going with his uncle and father to gather *panini* (cactus) in the uplands of Paeahu, the area above the present site of Maui Meadows. Panini, he cautioned, must be gathered downwind and one must avoid touching his or her eyes after doing so. After picking the *panini* they would take it home, clean it and put it in a cooler to get cold before cutting it up into pieces to eat. He remembers his father giving offerings after picking *panini*, but being a kid Mr. Kalanikau was not allowed to participate or watch his father; however, he did share that his father would give offerings at two different historical sites, but he does not know the exact location nor their signifiance. Although he does not know what the particular offerings were, he theorizes that it consisted of *ʻawa*, *kalo* and a red fish wrapped inside of a *pūʻolo* (ti-leaf bundle) made from 12 tī-leaves. This *pūʻolo* would then be wrapped in *kaunaʻoa*, which was the favorite lei of Keōpūolani, his ancestor.

In terms of cultural practices, Mr. Kalanikau spent a lot of time in the ocean swimming, fishing, diving, gathering, etc. He identified Keawakapu, Mana Kai and Kamaʻole 3 as areas he would frequent as a child. As a kid he remembers other families such as the Kanahele's and the Akina's who would fish for *akule* in their boats. He also shared memories of helping to pull in the large *hukilau* net. Mr. Kalanikau shared that they would catch *akule* and *heʻe* and then eat it at the

beach. He noted that they were not allowed to eat certain fish at the beach and so they had to take it home to clean. Near the present spot of the Mana Kai hotel, Mr. Kalanikau described being able to gather *limu* along the reefs when he was a kid. His father would use *limu kala* when he practiced *hoʻoponopono* or to give as an offering. He mentioned that *limu kohu* and *limu wāwaeʻiole* could be found near Kamaʻole, Keokea and Kalama Park.

In terms of sites within Paeahu, Mr. Kalanikau noted the signifiance of Keawakapu. As a child he remembers his father would go to Mākena and feed a shark. According to Mr. Kalanikau his family would camp near Mākena Landing. One day, his father was going to feed the shark and he told Vernon to stay behind, but out of curiosity, he secretly followed his father to a large cave, almost like a lava tube. It was there where his father left an offering for the shark.

Mr. Kalanikau is very passionate about protecting and preserving the *ʻāina* and animals of Maui. He talked about his work with protecting the whales that are stranded on the beach. Mr. Kalanikau also commented that his family is involved with keeping the waterways clear (streams, *kahawai*, *muliwai*, etc.) for the *moʻo* (lizard *ʻaumakua* [guardians]). According to Mr. Kalanikau, a portion of Kīhei used to be majority wetlands, but due to development in the area he estimates that only 25% of wetlands are left.

3.2.3 Interview with Leinaʻala Teruya Drummond

Leinaʻala Teruya Drummond was born and raised on Maui and originally lived in Naval Air Station Kahului (NASKA) area near the airport, but shortly after moved to the neighboring *ahupuaʻa* of Kamaʻole in the Kula Kai section (Kīhei). The oldest in a family of eight children, she spent her formative years being raised on a 13 acre farm in a farming family near the area currently known as Maui Hill, which is located just *mauka* of the Kīhei Boat Ramp. The dry, arid landscape of the Maui Hill area housed seven farming families, although they were about 5-10 minutes away from the next farmer, and that family was 10 minutes away from the next. They were the only part-Hawaiian family and the rest were Okinawan. She recalls that there were Hawaiian families nearby including the Akina ʻohana – a large fishing family – but in her area, there were primarily Okinawan families. Her biological father was Caucasian and her mother was three quarters Hawaiian and one quarter Chinese. She was raised by her mother and Okinawan stepdad.

On her family farm, they raised hogs and produce including tomatoes, bell peppers, corn and alfalfa. Most of the tomatoes, bell peppers and corn were shipped to Oʻahu to be sold in stores and they would sell whatever was left to local Maui grocery stores. They grew the alfalfa to feed the hogs and she learned that the alfalfa also helped to make the land more fertile. She recalls the hard work she put in as she would *hanawai* the acres and acres of tomato fields until it got dark and then she would have to go to school as well. She can now understand the importance of being sustainable and the hard work farmers put in to tend their land. She even helped her father dig a well to provide water for her family and the farm. Her ʻ*ohana* did not fish, but one of her dad's best friends was a fisherman. He would provide her family with fish, turtle, and Kona crabs in exchange for items from her family farm. She vividly remembers eating fried turtle – and

at that time there was no restriction on turtle fishing. They would also trade with other farmers for goat. And her mom would purchase a whole cow and freeze the meat for her large family.

Leinaʻala recalls the views from her family farm – she was able to see just about all of Maui from Māʻalaea to Makena including a view of Haleakalā and Kahoʻolawe. She remembers her house shaking all the time from the bombings.

In her free time, her favorite pastime was going to the beach at Keawekapu. She would walk down the shoreline through the kiawe trees and she recalls seeing people gathering *limu*. She remembers that people would collect all types of *limu – limu kohu, limu kala, ʻeleʻele and wāwaeʻiole* – and one type of yellow *limu* in particular that smelled really good, but she couldn't recall the name. She said that her *ʻohana* can no longer find *limu*. As more immigrants arrived in the area, instead of "Hawaiian style" collecting the *limu* they needed for just that meal, immigrants would gather as much *limu* as they could and sell it. She recalls that the water was always clean and clear but as condos were developed up and down the shoreline, they could see the water changing.

In 1958 or 1959 there was a hurricane that completely ruined their farm and the farm could no longer sustain their family. Her mom quickly taught herself real estate and sold their family farm and they moved to ʻĪao Valley. She did not spend much time in this home as she was boarding at Kamehameha Schools at that point. But eventually, her parents moved back to Kīhei because her dad didn't like the wet rainy weather in ʻĪao – preferring the dry climate of Kīhei.

When asked about the project area, she recommended that they keep some big open spaces for people who want to do small "truck farming" as her family did. More and more young people are looking to farm the land and keeping some open space would allow for that. Providing spaces for small farmlands would allow opportunities to increase sustainability. In addition, she recommends creating more affordable residential opportunities. Anything over $300,000 is not affordable anymore so developments need to adjust what "affordable" means.

In addition, she suggests widening the highway to at least 3-4 lanes going each way on Piʻilani Highway to plan ahead for the increase in residents and mitigate the already growing traffic issues. She also believes that more thought needs to be put into a plan for where they are going to get their water moving forward as the population increases.

3.2.4 Interview with Daniel Kanahele

Daniel Kanahele is a longtime resident of Maui Meadows. Maui Meadows is in the ahupuaʻa of Paeahu and is immediately mauka of the proposed Wailea SF-S residential project. His father, Daniel Keli'i Kanahele is from Maui and his mother is from Hawaii Island. Born and raised on Oʻahu, Mr. Kanaheleʻs parents moved to Maui Meadows and built a house in the 1970's. After traveling between Oʻahu and Maui for several decades, Mr. Kanahele permanently moved into his parents home in 2009.

Mr. Kanahele practices *aloha ʻāina*. This means he has aloha (love) for *ʻāina* (land) and kanaka (people)– not just Hawaiians, but all people. He shared his wholistic perspective and belief that *ʻāina* and kanaka are inseparably connected and interdependent, one upon the other. Native Hawaiians trace this relationship back to the Kumulipo, the Hawaiian cosmology chant. In the Kumulipo, man (kanaka) is the last to be born and therefore as the youngest sibling of the ʻāina and all living things, we (kanaka) have the kuleana (duty) to care for our older siblings. We observe, listen, and learn from them. In return, they care for us and provide us with nourishment. As such, Mr. Kanahele recognizes *ʻāina* as a *kumu* (teacher) and that there is a symbiotic relationship to care for the natural resources and elements that he is afforded.

Mr. Kanahele explains, "All of us who live on Maui, who make Maui our home, have a *kuleana*, a moral obligation, to take care of our natural resources...our life systems. This is everybody's stewardship...to take care of (*mālama*) Mother Earth, particularly in the area we live. This is one of the meanings of *aloha ʻāina*."

As a resident of Maui Meadows and Paeahu Ahupua'a, Mr. Kanahele frequently walks through and around different parts of his neighborhood and the larger area of Paeahu as part of his cultural practice to *mālama* and be a student of the *ʻāina*. On these walks he carefully observes natural features of the land, cultural landscapes, native flora and fauna and their habitats. These observations over time helps to deepens his connection and understanding of the *ʻāina* and its life systems. He believes that he must *mālama* and serve the *ʻāina* as well. Mr. Kanahele has observed that with few exceptions almost all of the undeveloped lands in Paeahu have cultural landscapes, native flora and fauna, and cultural and historic properties.

On the other hand, Mr. Kanahele commented that he has observed that almost all the developed lands within Paeahu, with few exceptions, have few to no preserved historic properties and little to no native habitat left. He concludes that the destruction or displacement of natural features, native habitat and Hawaiian cultural landscapes as a result of development makes whatever is left that much more valuable in terms of preserving and defining a sense of place and providing a sense of history of Paeahu for current and future generations. He says that in many respects much of Paeahu has become a very non-Hawaiian place, unrecognizable by locals who once lived here. Mr. Kanahele shared that one of his mentors, a *kanaka* (*kanaka ʻōiwi* or native man or human) born and raised in this Moku (District) of Honua'ula, Kevin Mahealani Kaiʻokamalie, said that "modern-day man brings with him the ability to wipe-out everything that define people of culture."

For Mr. Kanahele, this *ahupuaʻa* is like a library– each natural feature, each micro-habitat, each cultural site and traditional place name is a book that has its own story to tell. Together, they tell the *moʻolelo* (story) of this specific place, this *ahupuaʻa* and this *moku*. Mr. Kanahele likens the concept of destroying habitats and cultural/historic properties to burning books and the destruction of knowledge and vessels that hold valuable information. He shares that most of the books (natural and cultural resources) in the developed lands of Paeahu have been destroyed– and when its gone, itʻs gone forever. This makes whatever sites and stories that are left much

more precious and the need to preserve them much greater for future generations and *kanaka maoli* that have, are and will yet engage with the *'āina* to better understand who they are, where they come from, why they are here and where they are headed.

If each site has a story to tell then Mr. Kanahele believes there are no insignificant sites in Paeahu. He believes that all sites are significant and valuable for Native Hawaiians. These sites serve as places of connection for local Native Hawaiian families. He notes that there are far fewer Hawaiians that still live in the area compared to the 1970's and 80's. He says that there are only two other Native Hawaiian individuals, besides himself, that he is aware of that presently live in Maui Meadows. He believes that some of the reasons many local families left the area or do not live here are due to real estate speculation, rising real property taxes and the lack of affordable housing. Many locals work in in this district, but don't live here due to lack of workforce housing. And that's a sad situation that Hawaiians often feel like strangers and foreigners in their homeland. He understands the role that he currently has as a resident of Maui Meadows is to speak for future generations so that they have a place to return and plant their roots here too.

When provided the opportunity to comment on a project, Mr. Kanahele shared that he asks certain questions:

1. How is your project going to advance the history of this area?
2. What is the name of the moku and ahupua'a that your project is being built in?
3. How is your project going to honor the sense of place?
4. What cultural properties, historic properties, cultural landscapes are you going to design into the project?
5. How is your project going to help relieve the affordable housing needs?
6. Will locals be able to afford to live there...is there a place for locals in your project?

Over the years Mr. Kanahele has seen firsthand the many changes that have occurred in Paeahu. He recalls that Paeahu was once a much greener area due to more frequent rains, like the Kona rains. Nowadays, Mr. Kanahele says that the rain is more concentrated, and more intense in terms of occurrence...so it rains less frequently and those rains are often more intense and heavier. According to Mr. Kanahele, this intense rainfall results in an increase in soil runoff and a decrease in time and opportunities for rain to be absorbed into the ground. Mr. Kanahele said that the gulch near his property quickly fills with water and from his house he can hear boulders rolling down the gulch. If the gulch becomes filled with debris, Mr. Kanahele said the water will move onto the road and head *makai* or west on Kumulani Drive. This path can lead to water damage to homes and properties. According to Mr. Kanahele, heavy rain that leads to the gulch overflowing occurs more often than not. If the water were to continue through the gulch to the ocean it would exit from an outlet on Keawakapu Beach near the Wailea Resort. Another gulch shoreline outlet is south of the Kilohana Street beach parking lot. According to Mr. Kanahele, the water travels down these gulches and is diverted under Pi'ilani Highway where it continues to be diverted into grass covered drainage ways until it reaches *makai* (ocean).

The surface and subsurface freshwater that runs off into the ocean is important to sustain the marine life in the bay. Mr. Kanahele shared that the fresh and saltwater combination is what produces healthy *limu* growth along the shoreline; therefore, sustaining the marine life and kanaka that depend upon the *limu* as a source of nutrients. According to Mr. Kanahele, the quantity of *limu* in the area has decreased over the years. He recalled being able to smell the *limu* from his house during certain times of the year. He said the wind would carry the smell up *mauka* (upland) and nowadays that does not happen anymore. Large patches or strands of *limu* are no longer found along the shoreline and one is not able to gather *limu* in the way that was done in the past. At one time, Mr. Kanahele shared that there was so much *limu* on the shore that large trucks would come and haul the *limu* away. In addition, Mr. Kanahele said that his family would gather *limu* species from the shoreline, like *limu ʻeleʻele*, *limu kala* and *limu līpoa* and others--but that there is now less variety and quantity. Mr. Kanahele theorizes that the decrease in fresh water flowing mauka to makai is one factor causing the decline of limu.

In terms of marine life in the area, Mr. Kanahele says that the ocean is a desert compared to what it was in the 1970s. At the time there were many more fish. There are a lot of green sea turtles, but nowadays a lot less fish. Mr. Kanahele shared that while he is very concerned about the health of the ocean, he focuses his energy on land-related issues because he believes that everything that occurs on land will affect the ocean. Everything flows into the ocean. He commented that if the land is healthy, then the ocean is healthy and so it is important for him to focus on protecting the land. Mr. Kanahele shared that he has an emotional attachment to the land. Although he may not access certain areas of land on a regularly basis, he wants to know that the cultural or natural resources are still there for him and others to use. Mr. Kanahele believes that the native flora and fauna on those lands are the first Hawaiians because they were here long before man arrived. His mentor, Kevin, taught that Hawaii's natural history, or biology redefined the first Polynesians that came here and made them Hawaiian's (Kanaka). Mr. Kanahele affirms, “The biota and biology of this land had transformative, um, powers that made the kanaka who they were, and consequently who we are as descendants. And so, as *kanaka*, we must *mālama* our cultural and natural resources because, among other things, it defines who we are.”

The decline in marine resources aligns with what Mr. Kanahele identifies as a decrease in the population of Native Hawaiian residents in Paeahu. Mr. Kanahele shared that he is one of few residents in Maui Meadows that identifies as *Kanaka Maoli* (Hawaiian aboriginal). He notes that the increase in development in what is now called Wailea, led to an increase in real property taxes that local Native Hawaiians are unable to afford; thus, they move out of Paeahu, to another area of Maui, or off-island. The decrease in ocean resources has also led to a change in dietary needs and gathering practices for Native Hawaiians that remain in Paeahu. Instead of engaging in traditional fishing and gathering methods these individuals must go to other parts of the island to gather resources.

Mr. Kanahele believes that this new project will impact the number of visitors or users to the beach. There will be an increase of recreational activities at Keawakapu. This could potentially

increase the pollutants in the water. Mr. Kanahele also mentions that an increase in recreational activity, decreases the number of fishermen on the beach who rely on the natural resources of the area for food. He notes that visitors do not pay attention to the fishing lines and walk or swim right into them; therefore, impacting the ability of locals to gather their resources.

Mr. Kanahele also commented on the changes in the sounds of the area. When his family first moved to Paeahu, Mr. Kanahele recalled hearing the sounds of birds and the crash of the waves on the beaches below. Today those sounds are no longer heard due to the steady increase of cars that are constantly moving through the area, especially on Piʻilani highway.

In response to the impact of the development on the natural habitat, Mr. Kanahele would like to see a section of project area set aside to honor the native flora found within and adjacent to the project. The coastal area was known for *maʻo*, *noni*, *kukui* and *pili* grass. Mr. Kanahele would like to see some of these plants being grown on the property as a native plant educational garden. After all the project is on Kapili Street (The Pili). In terms of landscaping, Mr. Kanahele suggested utilizing plants that attract rainfall, but do not use a lot of water. He shared that it is well known fact that trees attract rain. He said that water use needs to be properly planned so that the project does not take more than its fair share of water. There is a domino effect for every action and so water use must be properly managed. Avoiding putting in tropical landscapes not suited to the coastal zones of Paeahu is recommended.

Mr. Kanahele commented on the obstruction of view plains. He explained the importance of experiencing sunrise and sunset. Hawaiians practiced *kilo*, observation, and he notes that even today people gather on Kapili St. to watch the sunset. Mr. Kanahele shared that he can see the night sky in the East, South and North but not so much towards the West because of all the light pollution that make it impossible to view the western sky from the horizon to 15-20 degrees above it. He said that being able to see the moon, the stars and planets in the night sky are critical to traditional cultural practices. He thinks that more can be done to reduce light pollution in this area by going beyond County and Wailea Resort lighting standards.

He explained that Kevin Kaiʻokamalie shared that, “places like Honua'ula ... still harbor our history. Our natural history. Our cultural history... and should be preserved because they are the last Hawaiian places. And it's not just because of the cultural sites that exist there, but the botanical treasures.”

Mr. Kanahele believes that Hawaiian cultural landscapes that are already on the property should be preserved and incorporated into the overall aesthetic design of new developments in a genuine and meaningful way. This design approach will increase the sense of place and the appreciation for individual stewardship that new residents can have for the place they now call home. Just making building pads high enough to insure new owners have a great views of the ocean and the sunsets is not enough to preserve a sense of place.

4.0 TRADITIONAL CULTURAL PRACTICES OF PAEAHU AHUPUA'A

The arrangement of a typical Hawaiian *ahupua'a* extended from several fathoms out from the coastline to the upland forested areas. Depending on the location within this broad *makai* to *mauka* context, and guided by knowledge of the natural environment, a wide variety of cultural practices and resources within the *ahupua'a* could be found. Such resources and rights would include marine resources and fishing rights in the coastal area, arable lands for crop cultivation, as well as, water rights in the planting zones, and valuable bird catching along with plant and timber harvesting privileges at the higher elevations and toward the valley headwater (Handy et al. 1991:48). Based on testimony for *kuleana* claims presented before the Land Commission during the Mahele 'Āina; and in addition to the stories and information gathered during the background research and consultation completed for this study, it is apparent that settlement and land use within Paeahu Ahupua'a functioned in the typical traditional sense, with a focus marine resource gathering within the off-shore waters and along the coastline; as well as cultivation of *kula 'uala* (potato land), *maia* (banana), and *kalo* (taro) in the *mauka* reaches.

Discussions on specific aspects of traditional Hawaiian cultural resources and practices, as identified through background research and community consultation, that may relate to the current study area, are presented below.

4.1 TRADITIONAL HAWAIIAN AGRICULTURE AND PLANT RESOURCE GATHERING PRACTICES

The late Sam Po described how the seasonality of water availability in the Honua'ula region dictated agricultural patterns, adaptation, and types of crops that were successful along the coastline (see also Section 2.1.3.1). For the most part, Mr. Po noted that gourds and melons did very well during the coastal growing season and listed the following varieties as being grown in the lower elevations of Honua'ula: *ipu oloolo* (Hawaiian watermelon), *ipu nuhou-lani*, pumpkin, and *poha* or *ipu 'ala* (Cantaloupe melon [*Cucumis melo var. cantalupensis*]). Such gourd and melon type crops were important for both dietary subsistence, as well as *'umeke pōhue* (gourd containers) for the storage and transport of *poi* and water (Abbott 1992:90).

While gourd and melon crops were an important part of Hawaiian livelihood, it is also well known that the primary agricultural staple noted for Honua'ula in general and Paeahu specifically was *'uala* (potato) (see also Section 2.1.3.1). From historic accounts we understand that the importance of *'uala* for this *ahupua'a* was paramount and is reflected in the place name of Paeahu where the literal translation of the name as provided by Pukui and others (1974:173) is "row of heaps" and when broken down into the root words of *pae* and *ahu* may relate to a type of sweet potato for the former and heaps or mounds for the latter (Pukui and Elbert 1986:298). Based on the testimony for *kuleana* claims during the Mahele 'Āina, the writings of Handy and others (1991), poetic descriptions, and historical accounts, it is clear that intensive traditional potato cultivation was largely carried out in the *mauka* elevations of Paeahu Ahupua'a. Testimony of the Māhele 'Āina and L.C.A awards within Paeahu also shows that in the mid-19th Century, *mahi 'uala* (potato agriculture) was the primary agricultural pursuit, along with *moku*

mauʻu (grassland areas) (see also 3.1.4.1). While many of the claimants stated that their potato field claims were planted with white (or Irish) potatoes (*ʻuala haole*), it is also likely that those fields that were then planted in *ʻuala haole* were once planted in *ʻuala maoli* (native potato) (LCA 5370 Apana 3 to Anahe, see also see Sections 2.1.3.1 and 2.2.3.1.1).

This transition to a focus on *ʻuala haole* by native tenants in the mid-19th Century was an economic response to commercialization of supplying provisions to first the whaling ships that would come port, followed by the Irish Potato Boom fueled by the needs of the California Gold Rush. With waning demand of Irish Potatoes following the end of the California Gold Rush, the focus of agriculture shifted to other commercial crops at Paeahu and on adjacent lands, thus further illustrating the fertility of the soil when properly supplied with water.

Ms. Teruya Drummond recalled the success of her family's 13-acre farm, as well as that of seven other families, located at a comparable elevation to the current project area that was located along the border of Paeahu and Kamaʻole Ahupuaʻa (Section 3.2.3). At the Teruya farm the focus was alfalfa feed for the hog along with several acres of tomato fields along with bell peppers and corn. Maintaining the success of crop yields required the availability of water, which the Teruya ohana had developed on their farm with the successful drilling of a well. The presence of ground water at Paeahu is not surprising given the *mauka* springs of Waihou, Nupawai o Kukulu o Piikea, and Waikaahi (see Section 2.1.1 and Figure 2-2), the mention of a *luawai* along the boundary of Land Grant 548 at Wailea bay, as well as the once prominent *limu* beds along the Paeahu shoreline that would have required freshwater seeps to thrive (see Section 4.2 below).

In addition to the agricultural staples noted above, claims for *maiʻa* (banana) and *lauhala* (Screwpine) stands at Paeahu were also presented during the Mahele ʻĀina while noted resources along the boundary of Kanekoa's grant include *lāʻau kukui* (kukui trees or groves) and a large *koa* tree. Mr. Kanahele also shared that *maʻo* (Hawaiian cotton, *Gossypium tomentosum*), *noni* (*Morinda citrifolia*), *kukui* (*Aleurites moluccana*) and *pili* grass (*Heteropogon contortus*) were once dominant in the coastal region and area just back from this region. While Ms. Lee noted that *ʻuhaloa* or *hialoa* (*Waltheria indica*) grew throughout the Honuaʻula region, including Paeahu Ahupuaʻa, and has been used for generations in *lāʻau lapaʻau* (traditional plant medicine).

With regard to day-to-day tasks and the needs of traditional Hawaiian lifeways, *lauhala* was likely one of the more important resources of daily domestic life prior to Western contact. The seeds of the tree were used in personal adornment (i.e. paint brushes for *kapa* and *lei* making) (Abbott 1992:54-55, 128), while the leaves were woven to produce *moena* (mats) for sleeping or house floors (Abbott 1992:73-74), *uluna* (small pillows) (Abbott 1992:74; Summers 1999:15), canoe sails (Abbott 1992:82), cordage and baskets for household use (Abbott 1992:75, 76), and as thatch finish (Abbott 1992:69). In addition to domestic needs, *lauhala* was also versatile in that it also used for medicinal purposes and minor dietary needs (Abbott 1992:43, 99). With regard to the art of weaving, the plaiting of a *lauhala* weave could vary from a *makanui* (coarse) type of weave using wide strips of *hala* to a *makaliʻi* or very fine weave of narrow *hala* strips. On Maui, Fornander translates a *moʻolelo* given by G.S. Kahanai regarding the names for the various types of *moena* made of *hala* on Maui (G.S. Kahanai in Fornander 1919a:626):

pueo – coarse, thick mat of large size
puukaio – a mat of many layers
hiialo – end section of a mat
opuu – a mat with rounded edges that resemble flower buds
kumukolu – three layers of matting
alolua – a mat that is smooth on both sides
kumulua – a mat with two layers
puhala – a mat made from the flower of the hala tree

Lauhala weaving continues to be a prominent customary practice within the Hawaiian community with both traditional weaves and uses for mats, storage vessels, and personal adornment (e.g. hats and bands); as well as, modern takes on vessel forms and integration with non-indigenous materials like metals and cloth for jewelry and contemporary fashion.

Like *lauhala*, *kukui* (*Aleurites moluccana*) was also a versatile plant that used in domestic life, as well as, canoe building. With regard to the manufacture of canoes, the *kukui* created a black pigment from blending the juices of the inner bark of the *kukui* roots with charcoal, and studies have shown that where the kukui juices were used in high concentration the paint was resistant to abrasion and water (Abbott 1992:81). Pigments made from the charcoal of the *kukui* nut and juice of the flesh of the fruit were also used in traditional tattooing and yield completely black tattoos (Abbott 1992:128) The oil of the *kukui* nut was most prized for its oils, and traditionally used as the final finish on all parts of the canoe with frequent applications made after each use (Abbott 1992:81). The most common use of *kukui* nut oil was for lighting (Abbott 1992:77). *Kālī kukui* were simple lamps with a low or weak light that consisted of skewered kernel on dry midrib portion of the coconut leaf. *Pōho kukui* were lamps made out of hollowed stones that could hold pools of oil with wicks of folded *wauke* (*Broussonetia papyrifera*) cordage or *kapa* (bark cloth). *Lama* lamps were made of *'ohe* (bamboo lengths) that were filled with *kukui* kernels (Abbott 1992:77).

For *lei* making, it is postulated that rather than manually working and polishing the *kukui* kernels to be strung, kernels that were collected on the beach and polished through wave action and sand abrasion were the ones chosen for *lei kukui* (Abbott 1992:125) as manually processing the fruit and kernels would be time consuming. *'Ilima* (*Sida fallax*), which was observed throughout the project area (Figure 4-1 and Figure 4-2), was also used in *lei pua* and made in the *lei kui* style where the flowers were strung through the center. This style of *lei* required several hundreds of *'ilima* flowers to complete a single lei (Abbott 1992:127).

Figure 4-1. 'Ilima (Sida fallax) flowers.

Figure 4-2. Patches of 'Ilima (Sida fallax) within the current project area.

Other types of resources included the gathering of plants used in *lā'au lapa'au* (traditional plant medicine) throughout the *ahupua'a*. Ms. Lee shared that *'uhaloa* (*Waltheria indica*) grew throughout the Honua'ula region, including Paeahu Ahupua'a, and recalls gathering this plant for home remedies to treat the common cold. Also known as *hala 'uhaloa, ala'ala pu loa, hialoa, and kanakaloa, 'uhaloa* is a short-lived shrub that can grow up to 6 ft. tall (Choy 2011:D9). Though common throughout the region and often regarded as weed, the bark of the roots were pounded, strained, and used as either a gargle for a sore throat (Abbott 1992:101) or to ease a cough. The flower buds were chewed by infants, the stems and leaves by older children, and the roots where used primarily by adults (Choy 2011:D9).

Finally, Mr. Kalanikau shared memories of going with his uncle and father to gather *pānini* (prickly pear cactus) in the uplands of Paeahu, the area above the present site of Maui Meadows. *Pānini*, he cautioned, must be gathered downwind and one must avoid touching his or her eyes after doing so. After picking the *pānini* they would take it home, clean it and put it in a cooler to get cold before cutting it up into pieces to eat. Introduced prior to 1809 (Fish and Wildlife Service 1995:51428) by Don Francisco Marin, one of the three most influential foreigners who assisted Kamehameha I with his wars of conquest (Apple and Apple 1977), prickly pear cactus (*Opuntia ficus-indica*) was given the Hawaiian name of *pānini*, or *pāpipi*, which means fence or wall. It was thought that the *pānini* was brought by Marin to project his vineyards in Honolulu from animals and would be thieves (Apple and Apple 1977). The plant has since become naturalized in dry, disturbed habitats on Maui (Fish and Wildlife Service 1995:51428) and was once prominent on the slopes of Honua'ula. With regard to gathering, and aside from cattle forage, the fruit of the *pānini* is eaten either raw, as in Mr. Kalanikau's experience, in jellies, as a base in homebrewed swipe or moonshine (Taylor 1949a:36). The young joints were either pickled or cut and dried,

while the expressed juice was used in whitewash for exterior work. The pulp of the fruit was also used for poultices and the production of cactus candy (McClelland 1916:35), while the school children of 'Ulupalakua School substituted gum for the sap of the *pānini* leaves that would be gathered into a white gum. Mr. Miranda, a teacher at the school, noted that the *pānini* gum was highly nutritious and gave the students strong white teeth (Taylor 1949b:24).

4.2 MAKAI RESOURCES AND THE TRADITIONAL CULTURAL PRACTICES OF THE SHORELINE AND OFFSHORE AREA

The shoreline of Paeahu Ahupua'a extends from Keawakapu to Kuhulu and consists of bays white sand beaches bordered by rocky points that continue into the sea. Use of the shoreline resources and preference for residency along the coastline from a time period prior to Western contact to the present is evident in the *mo'olelo* of Paeahu (Section2.1.3.2), locations of house lots awarded during the Māhele (Table 2-1), and the continuation of fishing traditions practiced by families and those consulted for this study (see Section3.2). The nearshore and offshore marine environment provides excellent opportunities for fishing and *limu* (seaweed) gathering.

The fishing traditions of the Honua'ula region in general, and Paeahu specifically, were shared by Ms. Carol-Marie Ka'onohiokalā Lee who recalled that her family engaged in traditional fishing in Makena and the costal areas of Paeahu. When asked about their fishing techniques, Ms. Lee recalled that they would "surround" when out at sea, but she prefered to use a pole and remain closer to shore. Although she herself did not recall seeing her father fish using *palu* (fish chum), Ms.Lee shared that her grandfather did. Her grandfather also used a small canoe in Kanahena that he would use to go fishing in. Ms. Lee shared that before she was born, her mother and grandfather would paddle out to sea and canoe fish. This was a common practice amongst members of her family, but Ms. Lee herself did not experience this.

Ms. Lee's father would go fishing in a skipper (boat) with her uncles and they would catch *akule*, *manini* and *weke*. *Akule* (*Selar crumenophthalmus*), or big-eyed scad, generally travel in large migratory schools along the south Maui coastline which was well known to *akule* fishermen. Prior to Western contact and into the historic era, *akule* fishing would require at least two manned canoes and a *kilo* (spotter), who was either stationed on the prominent headland or in a canoe, to guide the fishermen toward the grounds where they would surround the fish with curtain nets and draw them toward the shore to those who waited to help with the catch (Kahā'ulelio 2006:201). Ms. Lee also described this method of fishing where her family would use *hukilau* nets to collect large quantities of fish for family gatherings or church events. *Akule* was eaten raw, broiled, cooked in *ti* leaf bundles over *kalo* in the *imu* (earth oven), dried, or used for *palu* (Titcomb and Pukui 1977:62). *Manini* (*Acanthurus triostegus*), or surgeon fish, was enjoyed by both *ali'i* and *maka'āinana*. A bony and white fleshed fish, *manini* was eaten both raw and cooked, as well as dried, but rarely gutted if eaten fresh except for the gall bladder (Titcomb and Pukui 1977:104-105). Mary Kawena Pukui relayed the following practice with regard to *manini* at Ka'u that may have some bearing for *mauka – makai* trade at Paeahu:

> *Every summer the natives used to catch the spawn by the million. Large, flat lava rocks were swept clean with brooms of coconut midribs. Then the 'ōhua (young stage), about postage stamp size, were mixed with salt and scattered to dry in the hot sun. Later they were stored for the future or taken inland for exchange with those who lived far from the shore. (Titcomb and Pukui 1977:106)*

Finally, *weke* (*Mullidae*), are large scaled fish that are usually found inside the reefs and sometimes in the deeper waters but always near the reefs. A popular fish for food, *oama* (young *weke*) was eaten either raw after being salted or dried, while full-grown *weke* were sometimes eaten raw, but more commonly cooked by broiling in *ti* leaves over hot coals (Titcomb and Pukui 1977:162). Titcomb and Pukui (1977:162) also describe the following method for descaling *weke* of their large scales:

> *To remove the scales, the oama were put into a large container with pebbles and sand, stirred until the scales were loosened or rubbed off, then rinsed in sea-water. Large weke were scaled by scraping.*

Besides food, both red and light-colored *weke* were popular as offerings and chosen as demanded by custom with red offered for particular ceremonies or reasons and white for others. *Weke* was also used in sorcery, drawing on the meaning of the word "to open" and offering the fish with a prayer to open or release either something unwanted, in preparation for forgiveness, or in prayer to open a door to reveal truth. Finally, the flesh of the head of some *weke*, like *weke pahulu*, is known to have a poisonous substance that causes those who eat it to have restless sleep or nightmares where the head feels lower than the feet thus producing a sort of delirium (Titcomb and Pukui 1977:161). *Mo'olelo* also associates *weke pahulu* with Kaululā'au's encounter with Pahulu, the chiefs of the ghosts that resided on Lāna'i, during his banishment on Lāna'i and before he expelled the spirits and made the island hospitable for man (Fornander 1880:82; 1917a, 1919b). Articles recounting *mo'olelo* as it relates to Kaululā'au and the effects of eating the head flesh of *weke pahulu* were also published in the Hawaiian language newspapers. Pukui (in Titcomb and Pukui 1977:162) gives the following translations for a section of *Na Wahi Pana o Lanai (Nupepa Kuokoa 1912)*

> *Kaululaau sat in the* milo *tree with a flat stone. He saw Pahulu peer into the spring, for the light of the moon shone fully upon it. As Pahulu stooped to dip up some water, Kaululaau pushed aside some of the milo leaves. The moon cast his reflection in the water. He made grimaces, and when Pahulu saw the reflection making faces (he was deceived), and he dived to catch him. As son as Kaululaau saw that Pahulu's whole body had gone into the water, he threw the stone down. The spark of life went out of Pahulu's body and he died. His spirit leaped into the sea, and that is why the people who eat weke are troubled with nightmares.*

An excerpt from the story of Eleio as it relates to Kaulula'āu that was published in the Hawaiian language newspaper Ke Au Hou (October 31, 1863) was also translated by Pukui (in Titcomb and Pukui 1977:162)as follows:

> *Then Kaululaau went and sat over the pool where he dropped a stone on Pahulu, killing him. Pahulu died but he lived on in the itching caused by certain fish. That is why there*

> *is itching in the head of the weke and the itch is always there in the fish caught off Lanai to this day.*

With regard to coastal gathering practices of *limu* or seaweed, Ms. Lee, as well as Ms. Teruya and Mr Kanahele, all recall the *limu* beds of the Paeahu shoreline. Ms. Lee's mother often gathered *limu*– including *limu līpoa*, *kohu*, and *wāwaeʻiole*– along the Makena and Paeahu shoreline, while Ms. Leinaʻala Teruya would walk down the shoreline at Keawakapu through the kiawe trees and recall seeing people gathering *limu*. Ms. Teruya remembers that people would collect all types of *limu – limu kohu, limu kala, ʻeleʻele and wāwaeʻiole* – and one type of yellow *limu* in particular that smelled really good, but she couldn't recall the name. Mr. Daniel Kanahele shared that his family would gather limu species from the shoreline, like *limu ʻeleʻele*, *limu kala* and *limu līpoa* and others.

Limu kohu (*Asparagopsis sp.*) was amongst the most sought after *limu* for the Hawaiian household. Once a staple condiment in every Hawaiian household, this *limu* has a peppery taste that can be rolled into balls for storage and when used, is pounded and mixed with salt to be eaten with fresh fish (Setchell 1907; Wianecki 2010). *Limu kala* (*Turbinaria ornate* or *Sargassum echinocarpum*), where *kala* translates to loosen or untie and interpreted as forgiveness and atonement, was said to have been used first for food and second for atonement for religious purposes rather than moral. An account regarding the incorporation of *limu kala* into ritual was given by a Kawaihae fisherman and recorded as follows:

> *The one who has sinned gets all persons concerned together, makes a prayer, and then throws the limu from him. It takes with it all the sins. (Setchell 1907)*

On Maui, the following incorporation of *limu kala* into ceremony and ritual was also recorded:

> *… when a kahuna has treated and cured a patient he has the patient bathe, put Limu kala in his mouth, spit it out, and then put a lei of Limu kala on his head. This is symbolic of being healed. (Setchell 1907)*

Limu ʻeleʻele (*Enteromorpha sp.*) was particularly preferred, sometimes at the expense of others, and is found growing in running water, either fresh or brackish with the fresh-water form keeping only for a couple of days and the salt-water form keeping for up to a week. This *limu* is slippery and fragrant and was widely consumed as a part of the traditional diet with no specific preparation (Setchell 1907). *Wāwaeʻiole* (*Lycopodium sp.*) translates to "rat foot" and is generally eaten raw alone or combined with *wana* (sea urchin) or *heʻe* (squid or octopus). Finally, *limu līpoa* (*Dictyopteris plagiogramma*) was noted as an especially well-regarded food resource that was said to be fragrant and pleasant to taste it was a common condiment in the Hawaiian diet.

According to Mr. Kanahele, the quantity of *limu* in the area has decreased over the years and while he recalled being able to smell the *limu* from his house during certain times of the year, winter months in particular, as the wind would carry the smell up *mauka* (upland), presently that does not happen anymore as the *limu* beds are virtually gone with less variety and quantity of what little remains. Large patches or strands of limu are no longer found along the shoreline and one is not able to gather limu in the way that was done in the past. Ms. Teruya echoes that sentiment when she notes that her *ʻohana* can no longer find *limu*. She observed that as more

people arrived in the area, instead of "Hawaiian style" collecting the *limu* they needed for just that meal, settlers would gather as much *limu* as they could and sell it. She recalls that the water was always clean and clear but as condos were developed up and down the shoreline, they could see the water changing.

Mr. Kanahele theorizes that the terrestrial changes brought on by development is a major factor in the decrease in fresh water flowing *mauka* to *makai* and the resulting decline of *limu*. When examining the 1922 USGS topographic map for the area that shows both the topography and stream routes prior to the development of modern Paeahu, a total of seven *kahawai* (streams) draining into the sea through four *muliwai* (stream mouths) along the Paeahu shoreline were noted (Figure 4-3). At one time, Mr. Kanahele shared that there was so much *limu* on the shore that large trucks would come and haul the *limu* away. In terms of the marine life of the area, Mr. Kanahele likens the ocean to a desert in relation to what it was in the 1970s. At the time he notes that the fish were far more abundant. While now there are a lot of green sea turtles due to their protected status, there is a lot less fish which is likely linked to the overall degradation of the *limu* beds and availability.

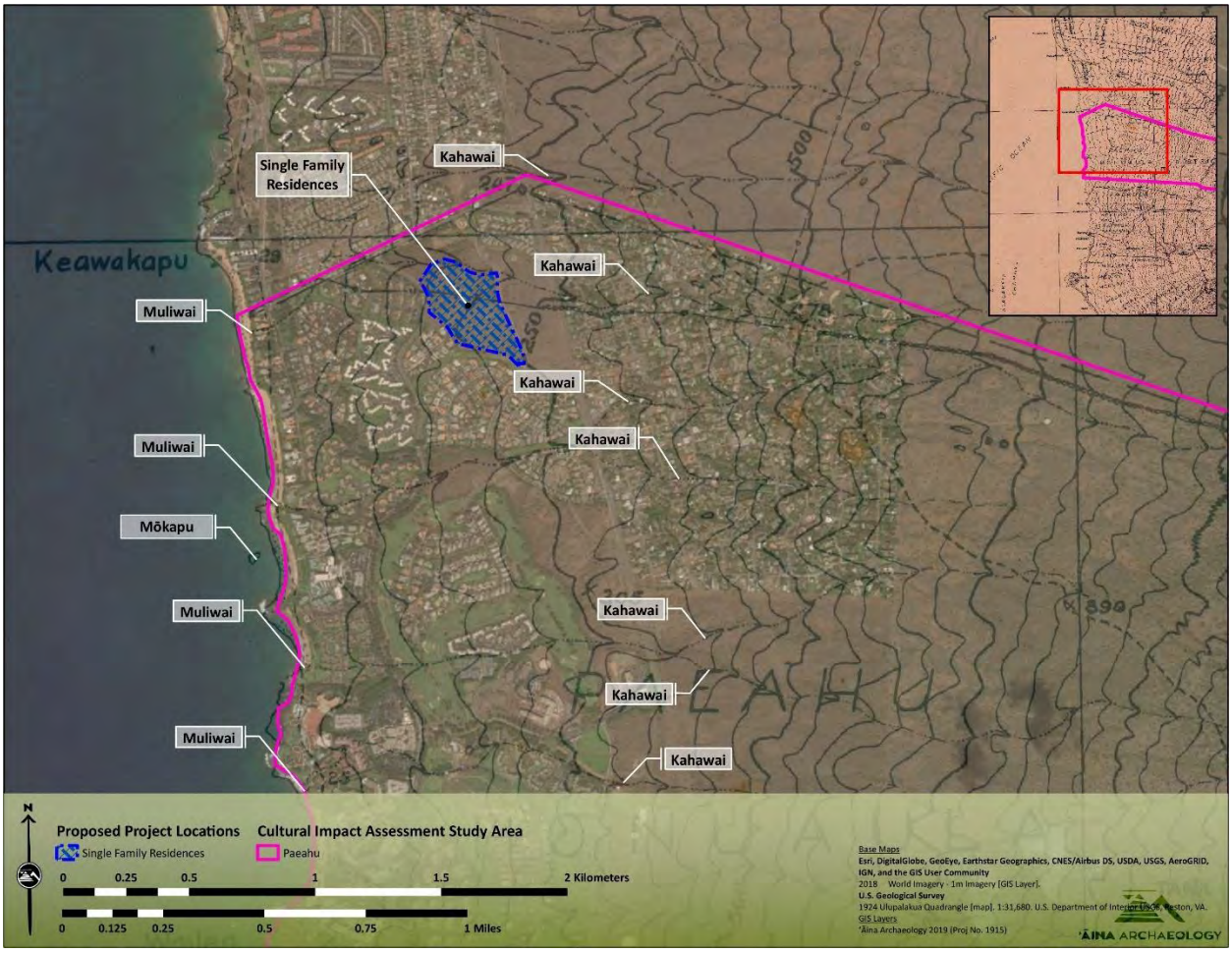


Figure 4-3. A portion of the 1922 USGS topographic map, Kihei Quadrangle overlain on the ESRI World Imagery map (Esri et al. 2018) highlighting the historic stream routes and muliwai locations in relation to the current project area and modern built environment.

4.3 NA ALA HELE -- TRADITIONAL ACCESS AND TRAILS

Prior to the arrival of Western vessels to the waters of Maui, trail networks served to connect the various settlements within and between the ahupuaʻa and districts of the Hawaiian Islands. The island of Maui is thought to have been the only *mokupuni* to have had a paved, delineated footpath that encircled the entire island around both the east and west ends. Following the unification of the eastern and western *moku* of Maui, and his acknowledgment as *mōʻī* by the East Maui chiefs (Fornander 1880:65, 87), Chief Piʻilani initiated the construction of the Alaloa, or Long Road (Ashdown 1971:5). The completion of the *alaloa* was accomplished by his son, Kiha-a-piʻilani, after securing his reign over Maui from his brother Lono-a-piʻilani (Fornander 1917b; Kamakau 1992:22-33). Handy and others (1991:489) note that while the beaches were used as crossings where gulches reached the shore, and travelers sometimes used canoes to cross the mouths of larger streams or swinging ropes and vines to make torrential stream crossings, a significant extent of the *alaloa* was paved with stones, hence the reference to the *alaloa* as the Kīpapa of Kihapiʻilani. Martha Fleming provides the following general description of constructed portions of the *alaloa*:

> *The Alii had a line of men stand from the sea and hand stones along the line till they reached the required place. Here the stones were artfully put into position. The trail was paved with flat, hard beach stones. Those on the steeper grades were very flat, while those in less sloping country were more rounded. In open country, each side of the trail was flanked with large field boulders solidly sunk into the ground and standing above the center from one to five feet... On the steep gulches, only one side of the trail had this guard. The stones, or flags, on the floor of the trail were placed horizontally to the abutments in quite regular lines. It took four or five stones to make a line across. The second row of horizontal stones was placed parallel to the other in a checker-board fashion in order to prevent wash. The width of the trail between the balustrades was from four to five feet, giving a regular appearance as it stretched over the country. There were few turns in the trail, even where the grade was steepest. (Fleming 1933:5)*

At Honuaʻula, this trail, or road, was situated along the coastline, where it crossed along the sandy beaches from Waileʻa to Poʻolenalena toward Maluaka and across the lava fields to Keoneʻoʻio where it would later evolve into the Makena to Keoneoʻiʻo Government road and across the lava fields constructed and delineated as described by Fleming above. Handy and others (1991:489) go on to explain that in addition to the usefulness of the *alaloa* in facilitating travel and establishing intra-island communication, this footpath was also used during the time of Makahiki by the *konohiki* (tax collectors), the priests who released the land from *kapu* after the collections of the *hoʻokupu* (taxes), and the bearers of the symbol of Lono. In times of war, *kuakini*, or trained runners, would also use the *alaloa* to carry messages along the road to their *aliʻi*.

Traditional Hawaiian land tenure, as well as resource management and use, was also reliant on the ability to traverse the land from the shoreline (*makai*) to the forested zone (*mauka*). The arrangement of a typical Hawaiian *ahupuaʻa*, or primary land management unit, extended from the coastline to the upland forest areas. This right of access was so important and integral in traditional Hawaiian thinking and settlement, that such rights for the native tenant were explicitly

stated during the division of lands according to a Western model, award, and sale of lands in fee simple during the Great Māhele (Van Dyke 2008:32-33), following the transition of the Hawaiian social structure from chiefdom to Kingdom, and codified in the Civil Code of Hawaiian Kingdom. As previously stated in Section 2.2.2, in designations of lands as either Crown or Government, and through all awards of whole *ahupuaʻa* and *ʻili*, the rights of the native tenants were expressly reserved, "*Koe na Kuleana o Kanaka*" (Reserving the Rights of Native Tenants) (Alexander 1890:114; Handy et al. 1991:48; "Na ke Aupuni: He Kanawai no na Aina Ponoi o ka Moi, a me na Aina o ke Aupuni" 1848). In an Act ratified on August 6th, 1850, the gathering rights of the common people for personal use, which included the gathering of both terrestrial and marine resources, in addition to the right to water and the right of way on the lands of the Konohiki, were guaranteed and embodied in Section 1477 of the Civil Code:

> *Where the landlords have obtained, or may hereafter obtain, allodial title to their lands. the people on each of their lands shall not be deprived of the right to take firewood, house-timber,* aho *cord, thatch, or ki (ti) leaf, from the land on which they live, for their own private use, but they shall not have a right to take such articles to sell for profit. The people shall also have a right to drinking water, and running water, and the right of way. The springs of water, running water, and roads, shall be free to all, on all lands granted in fee simple: provided , that this shall not be applicable to wells and water-courses, which individuals have made for their own use (private). (Alexander 1890:114-115)*

Though not located on the overall maps during the Mahele ʻĀina, there is reference to both *ala* (trail) and *ala loa* (road) in the boundary descriptions of LCA 5281, Apana 2 to Kuhilani (Figure 4-4) and LCA 5329, Apana 1 to Pahu (Figure 4-5) within Paeahu. Though archaeological data for the mid to upper elevations of Paeahu *mauka* of the current project area is not yet available, both pre-contact trail systems and historic roads were identified in the mid elevations above the current project area and *mauka* of the golf courses of Wailea as a part of an archaeological inventory survey of a portion of neighboring Palauea Ahupuaʻa that was completed by Scientific Consultant Services (Perzinski et al. 2014). Twenty-seven features were identified in their project area and interpreted as travel paths with formal types that included stepping stone trail segments and two historic roads, with the stepping stone trails with at least one (SIHP 50-50-14-7753) appearing to link gardening plots to habitation areas (Perzinski et al. 2014:213).

For Paeahu Ahupuaʻa, examination of Hawaiian Government map of Maui shows the location of the coastal trail or road, which may also be a part of the Alaloa (Figure 4-6), as being well *makai* of the current project area while an upland road or cart trail, later referred to as the Kalama-Kanaio Extension, is situated well *mauka* of the current project area. The alignment of these trails, which would later evolve into modern roads, continue into at least the 1920s, as shown on the 1922 USGS topographic map (figure). While it is possible that similar trails as identified by Perzinki and others (2014:213) may have been present in Paeahu and with extensions to the coast and uplands, and though there are survey descriptions containing reference to trails in Paeahu it is not currently known where these more commonly used foot paths were situated and if there were trails that crossed the current project area.

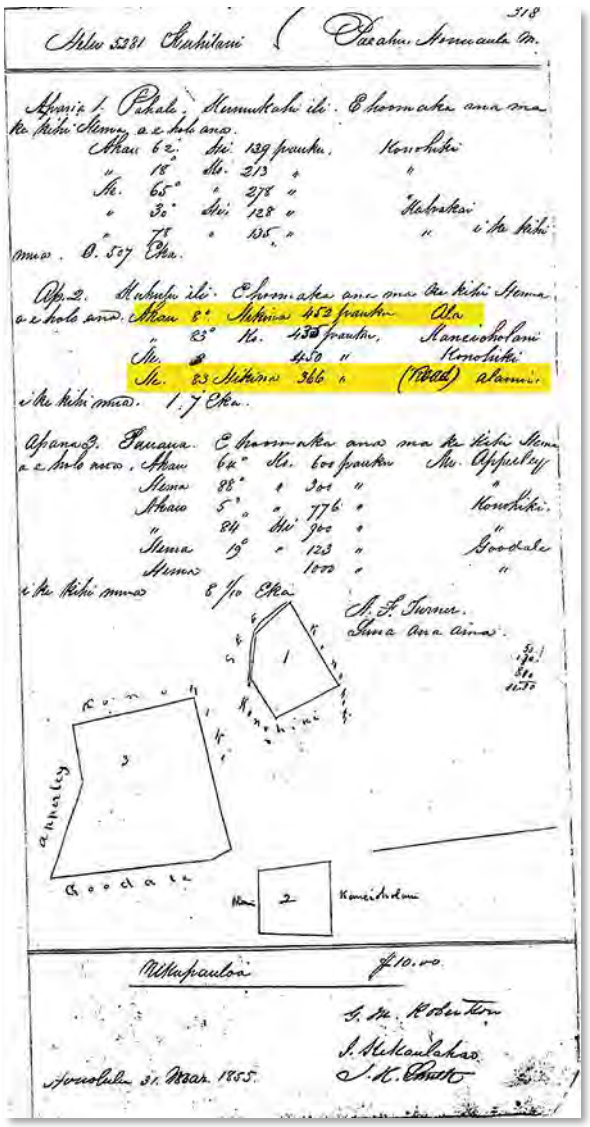


Figure 4-4. Boundary Descriptions for Mahele Award 5281 to Kuhilani (Office of Hawaiian Affairs 2011)highlighting the notation of Apana 2 being bound by the ala and alanui.

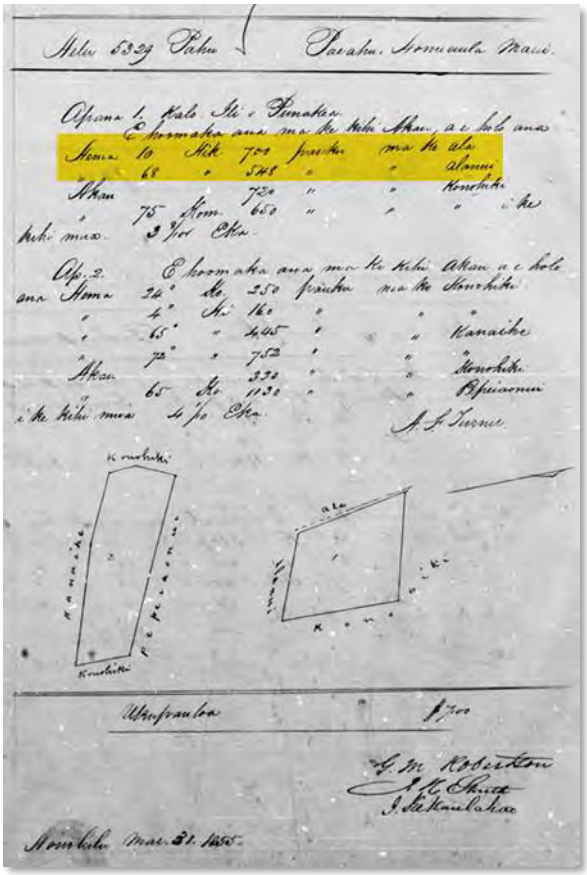


Figure 4-5. Boundary Descriptions for Mahele Award 5329 to Pahu (Office of Hawaiian Affairs 2014) highlighting the notation of Apana 1 being bound by the ala and alanui.

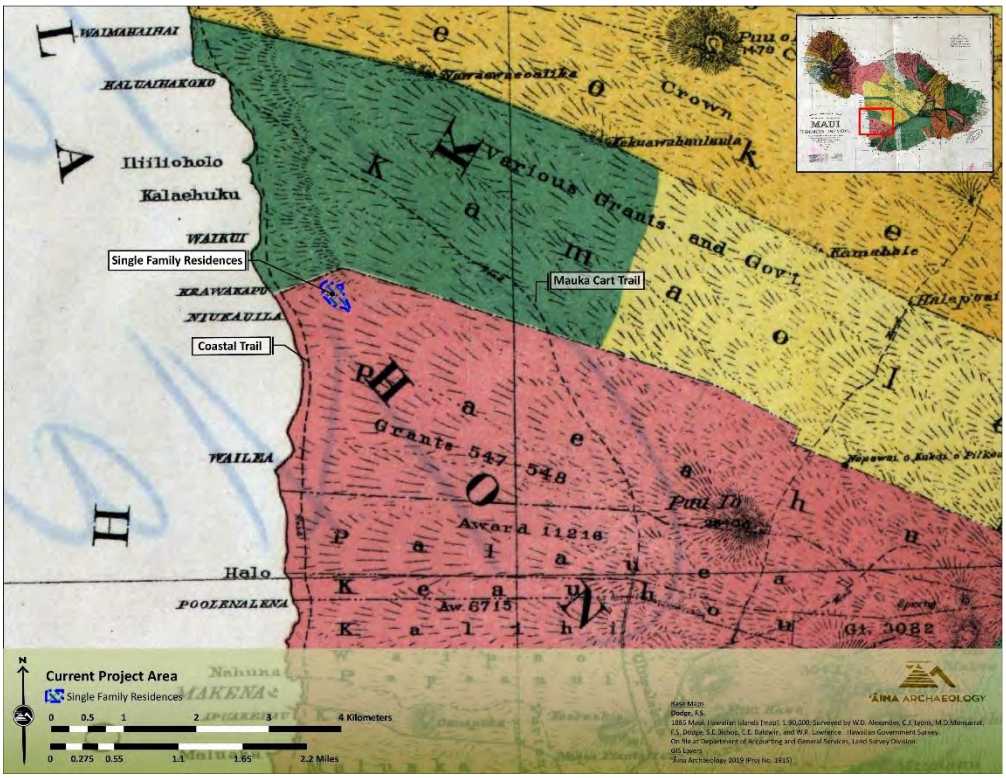


Figure 4-6. A portion of the F.S. Dodge (1885) Hawaiian Government Survey map of Maui showing the current project area in relation to coastal trail and mauka cart trail.

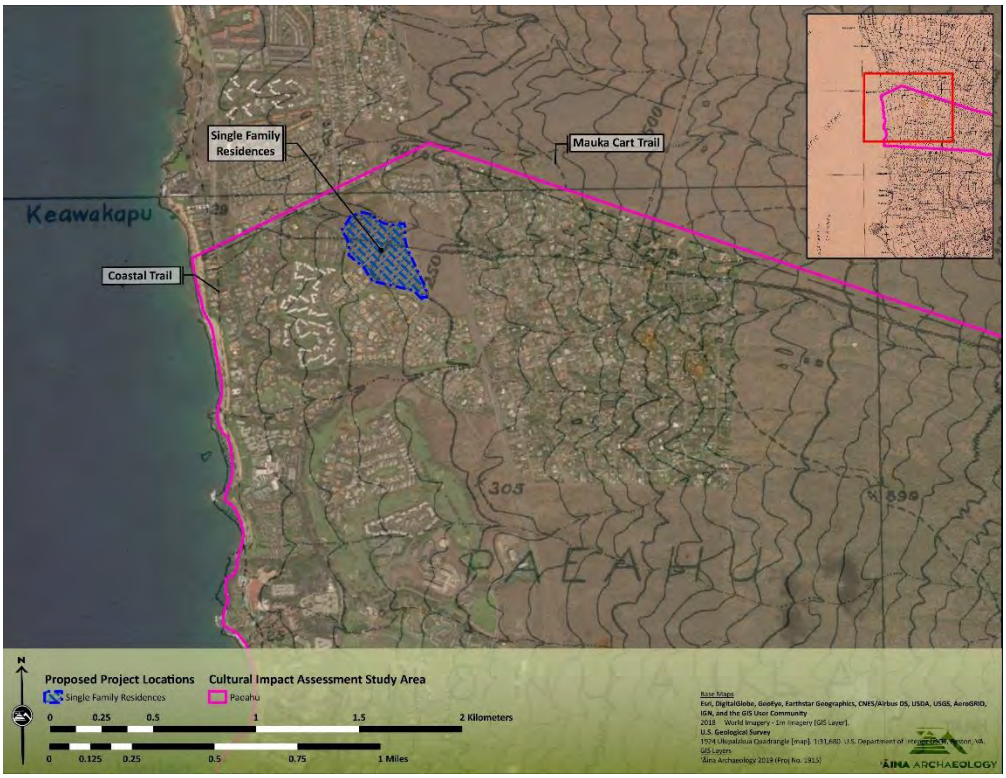


Figure 4-7. A portion of the 1922 USGS topographic map, Kihei Quadrangle overlain on the ESRI World Imagery map (Esri et al. 2018) highlighting the coastal trail and mauka cart trail in relation to the current project area and modern built environment.

4.4 TRADITIONAL HAWAIIAN BURIAL PRACTICES

The most common and widespread method of interment as a part of traditional Hawaiian mortuary practices was burial within sand dunes, with nearly all dune land environments across the island chain being known to contain large numbers of traditional, pre-contact burials. The individual burial takes a variety of forms that range from secondary bundle burials (cranium and long-bones), to primary fully flexed burials (most common), to fully extended burials. According to David Malo (in Westervelt 1903) the process of interment in the earth occurred as follows:

> *Two or three persons only, not a large number, take the body away secretly. This is done by night, not by day. Then a grave is dug – a round pit like the hole in which bananas are planted. The proper depth is just above the hips. The grave is made smooth and sloping. While digging they take the dirt away in a mat or dish, lest traces should be seen…. The natives think that if anyone knows the place the ones would be taken away and made into fish-hooks and the flesh be made food for a shark.*

At Paeahu, previous archaeological studies associated with the development of the Grand Wailea Resort identified traditional Hawaiian burials in the underlying dune lands and beach sands. Data recovery efforts by Paul Rosendahl, Inc. in 1987, then referred to a Rosendahl Consulting, encountered one burial as a result of data recovery at the Wailea Resort along the Paeahu Coastline (Rosendahl and Haun 1987). During the archaeological monitoring of hotel construction, three archaeological sites were formally recorded, SIHP Sites 50-50-14-2802, 2804, all of which contained human remains as well as other archaeological features and midden deposits. With regard to burial finds, a total of 119 individuals were identified during the course of monitoring in four distinct contexts: primary burials, indigenously disturbed interments, previously re-interred remains, and scattered remains while an additional 80-100 individuals were identified in secondary contexts (Rechtman 1999:ii, 130). The practice of including *moepū*, or grave goods, with individual interments was also true for this coastal population with 63 artifacts or other *moepū* documented in direct association with 24 individuals (Rechtman 1999:14 and 132). These items included *lei niho palaoa* made of bone, perforated shell, animals such as chickens and dog as well as other bird species and fish (Rechtman 1999:14). While there were a few burials identified within constructed archaeological sites, the burials encountered within Paeahu were interred within the Dune Land deposits that once extended across the area that is now commonly referred to as the Wailea Resort area (Figure 4-8).

With regard to the current project area, the proposed project is situated well above the *mauka* boundary of the Dune Land deposits (see Figure 4-8). While the location of the current project as being in stony loam (Makena loam, stony complex [MXC]) and stony silty clay loam (Keawakapu extremely stony silty clay loam [KNXD]) does not altogether preclude the possibility of encountering pre-contact burial interments as *'iwi kūpuna* earthen areas have been identified in association with archaeological sites characterized by traditional architecture (e.g. terraces, mounds, or platforms).

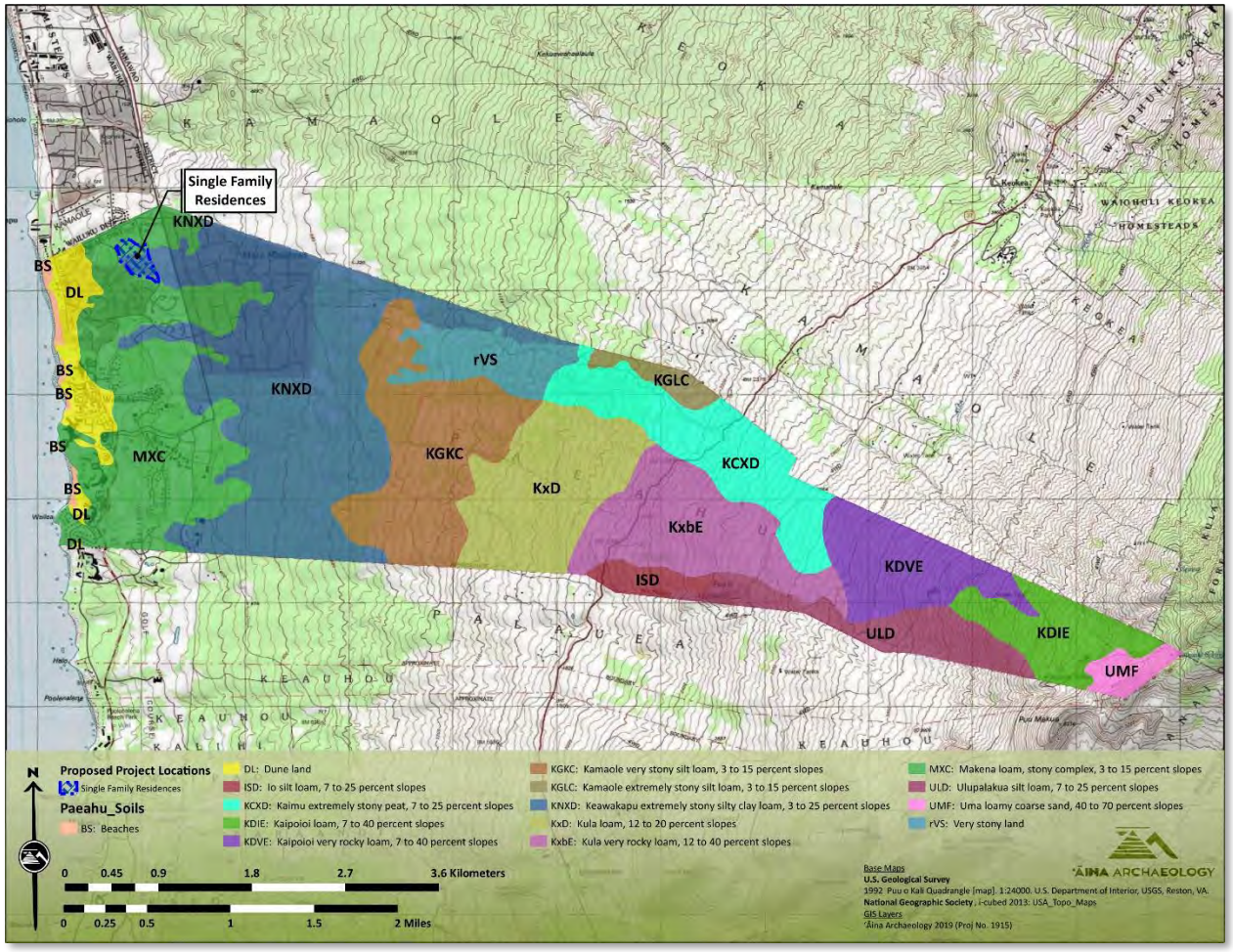


Figure 4-8. . A portion of the USGS 7.5' topographic map, Puu o Kali Quadrangle (1992), showing the location of the proposed project (outlined in blue) in relation to the underlying soil units of Paeahu Ahupua'a (U.S. Department of Agriculture 2001).

4.5 THE CULTURAL LANDSCAPE AND PRACTICES AS REFLECTED IN THE ARCHAEOLOGICAL RECORD

An archaeological inventory specific to the current project area was completed by Scientific Consultant Services (Lyman and Dega 2020) and resulted in the identification of a total of two newly identified historic properties comprised of 10 component features and the re-identification of a wall feature SIHP 50-50-14-4791 with two associated fenceposts. One of the two newly documented historic properties was interpreted as pre-contact to early historic era agricultural complex (SIHP 50-50-14-08709) consisting of seven component features potentially associated with the cultivation of potatoes with some possibility that they may have also been adapted for the cultivation of Irish potato during the intensification of commercial potato agriculture during the Irish Potato Boom (see also Section 2.2.3.1.1 The Irish Potato Boom) (Lyman and Dega 2020:25). These features include four modified outcrop sections, an L-shaped enclosure, and two linear stone mounds. The remaining historic property was interpreted as WWII era military training sites (SIHP 50-50-14-08710) comprised of two low lying C-shaped enclosures and one low lying U-shaped enclosure (Lyman and Dega 2020:25).

With regard to the general cultural historical landscape as it pertains to the extant distribution of archaeological sites within the lower Paeahu region, Mr. Kanahele commented that he has observed that almost all the developed lands within Paeahu. With few exceptions, Mr. Kanahele goes on to say there are few to no preserved historic properties and concludes that the destruction or displacement of Hawaiian cultural landscapes as a result of development makes whatever is left that much more valuable in terms of preserving and defining a sense of place and providing a sense of history of Paeahu for current and future generations. He laments that when it is gone, then it is gone forever, and if each site has a story to tell then Mr. Kanahele believes there are no insignificant sites in Paeahu. He believes that all sites are significant and valuable for Native Hawaiians as they could serve as places of connection for local Native Hawaiian families.

During the site walk with Ms. Lucienne DeNaie, she pointed out the several scattered areas of cultural material (e.g. shell, coral fragments, and *ʻili*) on a bluff at the westernmost extent of the project area. In addition to surface scatter, Ms. DeNaie spoke about the previously documented wall feature (SIHP -4791) and the story of Paeahu being told to include representations of the ranching history of Paeahu, though she gave some thought as to the possibility of this wall potentially being associated with an *ʻili* boundary.

5.0 ANALYSIS AND RECOMMENDATIONS

The State of Hawaiʻi has a constitutional and statutory obligation to protect native Hawaiian customary and traditional gathering rights. We offer this introductory section to explain the basis and substance of the state's obligations, as well as the impact of this protection upon traditional western private property rights and the role of private landowners in the necessary research and analysis of traditional and customary practices. To provide the appropriate historical context for such traditional and customary practices, an authoritative treatise on this subject states:

> At the time of Western contact in 1778, Native Hawaiians "lived in a highly organized, self-sufficient, subsistent social system based on communal land tenure with a sophisticated language, culture, and religion." Access from one area to another—along the shore, between adjacent ahupuaʻa (land divisions [usually extending from the mountains to the sea along rational lines, such as ridges or other natural characteristics]), to the mountains and the sea, and to small plots of land cultivated or harvested by native tenants—was a necessary part of early Hawaiian life. Gathering activities supplemented everyday food and medicinal supplies, while cultural and religious practices sustained the people in a variety of ways.
>
> Prior to 1839, ancient Hawaiian custom and usage governed the islands. To ensure the political existence of the kingdom in the face of expanding foreign influence, Kamehameha III developed a system of codified laws that incorporated protections for ancient tradition, custom, and usage. In other words, the laws in force at the time of the Māhele in the mid-1800s and for some time thereafter recognized the importance of traditional and customary practices to the native people. Many of these laws survived later political transformations and continue to apply as background principles of private property law in the State of Hawaiʻi. (MacKenzie et al. 2015:1082).

With respect to "laws [that] survived later political transformations", the present-day obligation of the State to protect native Hawaiian traditional and customary practices is based, first, upon the State Constitution and, in addition, upon the legislature's acts as codified in the Hawaiʻi Revised Statutes and the judiciary's interpretation of the state constitution and state statutes through case law. These authoritative sources of law, in essence, describe how the State seeks to integrate and protect native Hawaiian traditional and customary practices in a western system of private property ownership.

Article XII, section 7 of the Hawaiʻi Constitution provides:

> The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupuaʻa tenants who are descendants of native Hawaiians who inhabited the

> Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.

Delegates to the 1978 Hawaiʻi Constitutional Convention explained:

> The proposed new section reaffirms all rights customarily and traditionally held by ancient Hawaiians. . . . [B]esides fishing rights, other rights for sustenance, cultural and religious purposes exist. Hunting, gathering, access and water rights, while not provided for in the State Constitution, were nevertheless an integral part of the ancient Hawaiian civilization and are retained by its descendants." Hawaiian Affairs Comm., Standing Comm. Rep. No. 57, reprinted in 1 Proceedings of the Constitutional Convention of Hawaiʻi of 1978, at 637, 640 (1980).

With respect to legislative acts, Section 7-1 of the HRS specifically protects the right to gather, although that right is limited in scope to the enumerated items that are primarily used for constructing a house or starting a fire. Section 1-1 of the HRS offers broader protection for the exercise of traditional and customary rights. By codifying "Hawaiian usage" as an exception to the common law of the State, this statutory provision provides "a vehicle for the continued existence of those customary rights which continued to be practiced" after November 25, 1892. *Kalipi v. Hawaiian Trust Co.,* 66 Haw. 1, 10, 656 P.2d 745, 750–51 (1982).

In a series of landmark cases beginning with *Kalipi*, the Hawaiʻi Supreme Court reaffirmed the customary and traditional gathering rights of *ahupuaʻa* tenants, particularly under article XII, section 7 of the Hawaiʻi Constitution *See Kalipi,* 66 Haw. at 10–12, 656 P.2d at 750–52; *Pele Defense Fund v. Paty*, 73 Haw. 578, 837 P.2d 1247 (1992), *cert. denied*, 507 U.S. 918 (1993); *Public Access Shoreline Haw. v. Haw. Cnty. Planning Comm'n*, 79 Hawaiʻi 425, 903 P.2d 1246 (1995), cert. denied, 517 U.S. 1163 (1996) (commonly known as "*PASH*"); *Ka Paʻakai O Ka ʻĀina v. Land Use Com'n, State of Hawaiʻi*, 94 Hawaiʻi 31, 7P.3d 1068 (2000). Through this line of cases, the Supreme Court established the way that State agencies must apply constitutional protections of native Hawaiian gathering rights in the development of private real property.

In *Kalipi*, the Hawaiʻi Supreme Court ruled that "any argument for the extinguishing of traditional rights based simply upon the possible inconsistency of purported native rights with our modern system of land tenure must fail.". *Kalipi,* 66 Haw. at 4, 656 P.2d at 748. *In Pele Defense Fund v. Paty*, the Court held that "native Hawaiian rights protected by article XII, section 7 may extend beyond the *ahupuaʻa* 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. at 620, 837 P.2d 1272. In the PASH case, the Court stated that "legitimate customary and traditional practices must be protected to the extent feasible in accordance with article XII, section 7." *PASH*, 79 Hawaiʻi at 451, 903 P.2d at 1272

The Court in PASH stated that the "State retains the ability to reconcile competing interests under article XII, section 7". *PASH*, 79 Hawaiʻi at 447, 903 P.2d at 1268. As part of this balance of interests, the Court stated: (a) "[although access is only guaranteed in connection with

undeveloped lands, and article XII, section 7 does not require the preservation of such lands, the State does not have the unfettered discretion to regulate the rights of ahupua'a tenants out of existence", *id.* at 451, 903 P.2d at 1272, and (b) "the balance of interests and harms clearly favors a right of exclusion for private property owners as against persons pursuing non-traditional practices or exercising otherwise valid customary rights in an unreasonable manner", although, "[o]n the other hand, the reasonable exercise of ancient Hawaiian usage is entitled to protection under article XII, section 7", *id.* at 442, 903 P.2d at 1272.

In Ka Paʻakai O Ka ʻĀina, the Supreme Court provided further direction on the constitutional and statutory responsibility of state agencies to preserve and protect the rights of native Hawaiians to carry-out their traditional and customary practices to the extent feasible and, in so doing, "the Court introduced an analytical framework that governmental agencies must specifically consider when balancing their obligations to protect traditional and customary practices against private property (as well as competing public) interests." (MacKenzie et al. 2015:1109).

In *Ka Paʻakai O Ka ʻĀina*, 94 Haw. at 35, 7 P.3d at 1072, the Court held that the State Land Use Commission (LUC) failed to satisfy its constitutional and statutory obligations to preserve and protect customary and traditional rights of native Hawaiians (Belatti 2003). At issue was the LUC's grant of a petition to reclassify over 1,000 acres of land in the *ahupuaʻa* of Kaʻupulehu on Hawaiʻi Island from the State Land Use "Conservation District" to the State Land Use "Urban District" in order to allow the development of a new resort. The Court acknowledged a variety of traditional and customary rights asserted by the petitioners, who were comprised of a coalition of Native Hawaiian community organizations. These rights included "fishing [and] gathering salt, ʻopihi, limu, kūpeʻe (edible marine snails whose shells are used for ornaments; the rare ones by chiefs), Pele's Tears (tear drops made from pahoehoe lava), and hāʻukeʻuke (edible sea urchins)." *Ka Paʻakai O Ka ʻĀina*, 94 Haw. at 43 and nn.19-21, 7 P.3d at 1080 and nn. 19-21. The Court also recognized the "special religious significance" of an 1800-1801 lava flow to gather salt for subsistence and religious purposes. *Id.*

The petitioners further asserted that "the petition area is associated with important personages and events in Hawaiian history, contains well-known physical entities (such as the shoreline, Ka Lae Mano and the 1800-1801 lava flow) and remnants of the native tenants' lateral shoreline and mauka-makai trail system, living areas and burials." *Id*. at 43, 7 P.3d at 1080. Agreeing with the petitioners that their interests as native Hawaiians and as tenants of the *ahupuaʻa* of Kaʻupulehu would be impaired by the proposed development in relation to the use of ancient trails and the shoreline area to practice traditional and customary gathering rights, the Court held the LUC had failed to develop a proper record on such rights and consider and analyze the extent of Native Hawaiian practitioners' exercise of traditional and customary rights in the affected area. The Court stated that the LUC, as the reviewing state agency, must consider and make express findings of fact and conclusions of law regarding the cultural, historical, and natural resources of a subject property as they relate to Native Hawaiian rights when determining what restrictions should be placed on land use. *Ka Paʻakai O Ka ʻĀina* , 94 Haw. at 35, 7 P.3d at 1072.

The Court further held that the LUC, by directing the developer to work independently to protect cultural rights, impermissibly delegated the LUC's constitutional and statutory responsibility, as a State agency, to protect and preserve cultural resources and native Hawaiian rights. The Court vacated the LUC's grant of the developer's application for a land use boundary reclassification and remanded the case to the LUC to make findings of fact and conclusions of law relating to:

> (1) the identity and scope of "valued cultural, historical, or natural resources" in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;
>
> (2) the extent to which those resources - including traditional and customary native Hawaiian rights - will be affected or impaired by the proposed action; and,
>
> (3) the feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist. Ka Paʻakai O Ka ʻĀina, 94 Haw. at 35, 7 P.3d at 1072.

The Court's framework seeks "to effectuate the State's obligation to protect native Hawaiian customary and traditional practices while reasonably accommodating competing private [property] interests". *Id*. at 46-47, 7 P.3d at 1083-84. Beyond the directives to the LUC in this specific case, this three-part framework provides specific direction to state and county agencies when considering land use and development projects on previously undeveloped land and should provide guidance to developers with respect to the record that must be prepared for a discretionary land use authorization or permit.

In attempting to comply with the *PASH* and *Ka Paʻakai O Ka ʻĀina* cases, the LUC had to address the issue of who has the responsibility to identify (and place on the record) any pre-existing native Hawaiian gathering rights. In subsequent boundary amendment proceedings, the LUC directed the petitioner to consult with the Office of Hawaiian Affairs (OHA) and with *kūpuna* in the area regarding past and present practices. The Office of Planning (OP) also consults with OHA. The LUC does not do any independent investigation, rather relies on the record made by the petitioner and OP (and any intervenor) and determines whether that record is sufficient.

Once the rights have been identified and the impacts assessed, the LUC is faced with the difficult problem of reconciling the private property rights, particularly the right of exclusion, with the gathering rights of native Hawaiians, which of themselves can require a certain amount of privacy and seclusion. Following the Supreme Court's remand in *Ka Paʻakai O Ka ʻĀina* and in another case, *In the Matter of the Petition of Destination Villages Kauai*, Docket No. A00731 (2001) in which native Hawaiian gathering rights were shown to exist, the LUC put conditions on its approval of reclassification of property that in each case required the formation of a committee made of up a developer's representative and a representative from the local native Hawaiian community to develop a plan to ensure that the gathering rights are protected. The plans are subject to LUC approval; any controversy arising from the plan is to be resolved by the

committee. In the event the committee members cannot agree, they must agree on a third person who then will break the tie.

The LUC chose the committee approach because it did not believe it had sufficient information on resource conservation and management for the area in either of the two cases to make the final decision and, as a practical matter, would not be able to create such a record within the statutorily-mandated (365-day) time frame for making a decision. Because the Supreme Court has forbidden the LUC to delegate its decision-making power over balancing the private property rights and native Hawaiian gathering rights, forming a committee with each party having an equal vote in the outcome and requiring that any plans be approved by the LUC ensured that both sides would have their interests adequately represented and that the LUC would be the final arbiter that the balance reached meets the requirements of the law.

For purposes of the present project, the following sections provide an analysis of potential effects to currently known traditional and customary practices within and adjacent to the proposed project footprint. Recommendations for managing potential impacts to on-going practices or protecting the integrity of traditional cultural resources that may be present within and adjacent to the project area should traditional cultural practices that were once carried out in the area be re-established.

5.1 ANALYSIS OF EFFECT TO TRADITIONAL AND CUSTOMARY PRACTICES AND PROPOSED PROJECT RECOMMENDATIONS

5.1.1 Traditional Cultural Resources and Customary Practices Specific to the Proposed Project Area

While *'ilima* resources were observed within the project area, no active or historically known traditional and customary practices related to the gathering and use of *'ilima* from within the project area have been identified at this time. This factor notwithstanding, *'ilima* continues to figure prominently in traditional *lei* making (see discussion in Section 4.1), and the availability and integrity of this resource that grows naturally in the project area may be adversely impacted by construction related activities.

With regard to traditional Hawaiian archaeological sites, a total of four historic properties, consisting of modified outcrops, linear mounds, and an L-shape were identified within the current project area (see Section 4.5**Error! Reference source not found.**) and interpreted as having an agricultural function related to either traditional potato agriculture and/or potato agriculture related to the Irish Potato Boom (Lyman and Dega 2020:25) and evaluated as being historically significant under Criterion "d" for informational purposes under HAR §13-13-275-6 and HAR §13-13-284-6. These sites have been further evaluated as being of degraded integrity and as a result it was determined that no additional archaeological documentation beyond that of the inventory survey study or archaeological mitigation in the form of data recovery or preservation was needed. As mentioned above Mr Kanahele notes that when a traditional Hawaiian site is "gone,

it is gone forever" and that there are not insignificant sites. To this end, both he and Lucienne DeNaie note that the number of historic properties preserved within Paeahu are few and far between.

5.1.2 Traditional Cultural Resources and Customary Practices Identified within Paeahu Ahupuaʻa and adjacent to the Proposed Project

The Guidelines for Assessing Cultural Impacts, adopted on November 19, 1997 by the Environmental Council, State of Hawaiʻi also states:

> (For) the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place (proposed project area). This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. (State of Hawaii Office of Environmental Quality Control 2012:11)

While there are no currently known currently active traditional customary practices being carried out within the footprint of the proposed project area and there appear to be no potential for adverse effects on the cultural resources of the *mauka* region of Paeahu Ahupuaʻa as a result of the proposed project, concerns with regard to the cumulative effects of runoff and additional development in the region on the shoreline resources that remain was expressed by those who participated in this study.

Mr. Kanahele notes that the quantity of *limu* in the area has decreased over the years. He recalled being able to smell the *limu* from his house during certain times of the year. He said the wind would carry the smell up *mauka* (upland) and now notes that the wind does not carry the smell of *limu* anymore. Large patches or strands of *limu* are no longer found along the Paeahu shoreline and both Mr. Kanahele and Ms. Teruya have said that families are not able to gather *limu* in the way that was done in the past. Most poignant, is Mr. Kanahele's comparison of the ocean and beaches to a desert which is echoed by Ms. Lee and Ms. Teruya who also note that the fishing resources have become limited and the schools of fish appear have dwindled. Mr. Kanahele shared that the surface and subsurface freshwater that runs off into the ocean is important to sustain the marine life along the Paeahu shoreline noting that the fresh and saltwater combination is what produces healthy *limu* growth along the shoreline which then sustains the marine life and *kanaka* that depend upon the *limu* as a source of nutrients. Mr Kalanikau, whose family is involved with keeping the ways clear for the *moʻo* and advocating for the wetlands of South Maui, has noted that it is important for healthy waterway flow to *malama* the *kahawai* for *ʻāina*, *kai*, and *ʻaumakua*. To this end, the current project will not be making modifications to the existing drainage or make alterations within the historic pathway of the streams and drainages that border the north and southern boundary of the project area (see Figure 4-3).

As recommended by those who participated in this study, the overall project design incorporates the use of 4.6-acres of green space to be situated between the proposed locations of the house

pads and roads, along with two detention basins (see Figure 1-1) that would allow for storm and rainwater absorption and percolation and therefore reduce runoff into the ocean. In this way, it is believed that storm runoff into the ocean would not significantly add to the cumulative runoff from the surrounding built environment.

Finally, concerns regarding building heights in relation to view shed were brought forward by Mr. Kanahele who expressed that there may be potential effects to view sheds toward the ocean from Kapili Street due to building heights, thus removing one of the last remaining places in the built-out region of Paeahu from an elevated location to view sunset. In this regard, the project proponent notes that the proposed homes will be sited such that the view study from Kapili St. continues to have very good ocean and sunset views from Kapili St. Moreover, the zoning density requirements for the project of no more than 2.5 units per acre will also help to preserve viewshed into the future.

5.2 RECOMMENDATIONS FOR THE PROPOSED PROJECT

5.2.1 Hiʻohiʻona ʻĀina No Nā Kūpuna Mai-- Honoring the Traditional Cultural Landscape of the Current Project Area

- With regard to the traditional Hawaiian archaeology of the current project area, it is strongly recommended that consultation with those who participated in this study, as well as some of those who may have declined at this time, be undertaken by the project proponent in order to understand how the *moʻolelo* of this land might be preserved and shared, either through physical preservation of the identified historic properties and incorporated into the design of the project, or through interpretation to retain and return a sense of place that opens up access to the area for the local native Hawaiian families and generations to come.
- In consultation with Aha Moku O Maui and those who participated in this study, incorporate traditional place names (see also Section 2.1.1 Wahi ʻInoa and Figure 2-2) into project design, street naming, signage, and other project related materials, as well as the overall project name as a means to honor Hawaiian space and restore the knowledge of place that is inherent in *wahi ʻinoa*.
- Incorporate native plants suitable to the leeward environment of Paeahu into the landscaping palette to foster and support *lāʻau lapaʻau* practices and provide resources for *hana noʻeau* practices (see also Sections 2.1.3.3 and 4.1).

Resource	Traditional Uses
Maʻo (*Gossypium sp.*)	*Kapa* dyes and scenting
ʻIlima (*Sida fallax*) (observed within the current project area	*Lei* making
Noni (Morinda citrifolia)	*Lāʻau lapaʻau*

Resource	Traditional Uses
Kukui (*Aleurites molucanna*)	Fruit and nut: Traditional tattooing ink, traditional light source, *waʻa* (canoe) manufacture, food resource.
Pili	House thatching and other household uses (e.g. tinder, floor padding, etc.) Burnt leaves and stalks: dyes and *lāʻau lapaʻau*.
ʻUhaloa (*Waltheria indica*)	*Lāʻau lapaʻau*
ʻAʻaliʻi (*Dodonaea viscosa*)	Wood: Posts for traditional *hale* construction and fishing implements Capsules and Leaves: *Lei* making Leaves: *Lāʻau lapaʻau*

- Reduce light pollution by exceeding the lighting standards of the area currently referred to as Wailea Resort to assist with reducing sea bird fallout due to disorientation related to artificial lighting (https://dlnr.hawaii.gov/wildlife/seabird-fallout-season/) and maintain the visibility of the night sky.

5.2.2 Malama i ke Kai, a Malama ke Kai Ia ʻOe – Taking Care of Ocean Resources through Land and Stormwater Management

- Identify potential runoff and flooding zones within the project area to ensure proper maintenance of water channels in order to help minimize coastal resource degradation that may result from flooding.
- Reduce stormwater runoff by using low impact development and green infrastructure methods to capture, collect, and retain stormwater, as well as potentially remove pollutants in any stormwater runoff that might eventually enter the ocean through the project area.

6.0 REFERENCES CITED

Abbott, Isabella Aiona

1992 *Lāʻau Hawaiʻi : Traditional Hawaiian Uses of Plants*. Bishop Museum Press, Honolulu, HI.

Akana, Collette Leimomi and Kiele Gonzalez

2015 *Hānau Ka Ua: Hawaiian Rain Names*. Kamehameha Publishing, 597 South King St. Honolulu Hawaiʻi 96813.

Alexander, W.D.

1882 *Interior Department, Appendix 1, to Surveyor Generals Report. A Brief History of Land Titles in the Hawaiian Kingdom*. P. C. Advertiser Company Steam Print, Honolulu, HI.

1890 A Brief History of Land Titles in the Hawaiian Kingdom. In *Hawaiian Almanac and Annual for 1891*, edited by T. G. Thrum. Press Publishing Company Print, Honolulu, HI.

Americans at Otaheite

1792. In *The Gentleman's Magazine*. Vol. 26, No. 4. London.

Apple, Russell A. and Peg Apple.

1977 "Don Francisco Marin." *Honolulu Star-Bulletin,* 02 Dec 1977. Vol. 66, No. 336 No. Honolulu, HI.

Ashdown, Inez

1971 *Ke Alaloa O Maui, The Broad Highay of Maui*. Ace Printing Company, Wailuku, HI.

1979 Inez McPhee Ashdown. Interviewed by L. Mair. Honolulu, HI.

Barrere, Dorothy B.

1975 *Waileʻa: Waters of Pleasure for the Children of Kama*. Prepared for Bishop Museium Department of Anthropology, Honolulu, Hawaiʻi Bernice P. Bishop Museum, Honolulu, Hawaiʻi

Beckwith, Martha W.

1970 *Hawaiian Mythology*. University of Hawaii Press, Honolulu, HI.

Belatti, Della Au

2003 Act 50: The Protections, Pitfalls, and Possibilites of the New Cultural Assessment Requirement for Hawaiʻi's Diverse Communities. In *He Mau Moʻolelo Kānāwai o ka ʻĀina "Stories of the Law of the Land"*, pp. 3-28. Hawaiʻi Environmental Law Program, University of Hawaiʻi at Mānoa.

Bodlaender, K. B. A., C. Lugt and J. Marinus

1964 The induction of second-growth in potato tubers. *European Potato Journal* 7(1):57-71.

Chinen, Jon J.

1958 The Great Māhele, Hawaiʻi's Land Division of 1848. University of Hawaiʻi Press, Honolulu.

Choy, Duane.

2011 "Uhaloa is a treasure fo traditional medicine." *Honolulu Star-Advertiser,* 9 Jan 2011.Honolulu, HI.

Clark, John R. K.

1989 *The Beaches of Maui County*. University of Hawaii Press, Honolulu, HI.

Coffee, Frank

1920 *Forty Years on the Pacific*. Oceanic Ppublishing Company, New York, NY.

Cooke, Mary.

1956 "From Whales to Cane and Cattle: The Ulupalakua Story." *Honolulu Star-Bulletin,* August 1, 1965.D1 and D9,

Cottrell, Curt

2018 *Alan Downer, Administrator, State Historic Preservation Division*. Honolulu, HI.

Craig, J.E.

1899 *The Hawaiian Islands, and the Islands, Rocks, and Shoals to the Westward*. Hydrographic Office, U.S. Department of the Navy, Washington, D.C.

de Naie, Lucienne and Theresa Donham

2007 *Project Kaʻeo: The Challenge to Preserve Cultural Landscapes in Modern Makena, a Land Famous with the Chiefs from the Distant Past*.

Dodge, F. S.

1903 (1885) *Maui Hawaiian Islands* [map]. Revised 1903 by John M. Donn.1:60000. Surveyed by W.D. Alexander, S.E.Bishop, C.J.Lyons, M.D. Monsarrat, F.S.Dodge, E.D. Baldwin, and W.R. Lawrence. Hawaiian Government Survey, Honolulu, HI. On file at Department of Accounting and General Services, Land Survey Division.

Dodge, F.S.

1885 *Maui, Hawaiian Islands* [map]. 1:90,000. Surveyed by W.D. Alexander, C.J. Lyons, M.D.Monsarrat, F.S. Dodge, S.E.Bishop, E.E. Baldwin, and W.R. Lawrence. Hawaiian Government Survey. On file at Department of Accounting and General Services, Land Survey Division.

Dunmore, John

1985 *Pacific Explorer: The Life of Jean François de La Pérouse 1741-1788*. The Dunmore Press Limited, Palmerston North, New Zealand.

Emerson, Nathaniel B.

1915 *Pele and Hiiaka: A Myth from Hawaii*. Honolulu Star-Bulletin, Ltd., Honolulu, HI.

Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN and GIS User Community

2018 World Imagery - 1m Imagery [GIS Layer].

Fischer, John Ryan

2015 *Cattle Colonialism: An Environmental History of the Conquest of California and Hawai'i*. University of North Carolina Press, Chapel Hill.

Fish and Wildlife Service

1995 *50 CFR Part 17 Endangered and Threatened Wildlife and Plants; Proposed Endangered or Threatened Status for Fourteen Plant Taxa From teh Hawaiian Islands*. Honolulu, HI. Office of the Federal Register, National Archives and Records Administration, Washington D.C.

Fleming, Martha Foss

1933 *Old Trails of Maui*. Daughters of the American Revolution, William & Mary Alexander Chapter.

Fornander, Abraham

1880 *An Account of the Polynesian Race, its Origins and Migrations, and the Ancient History of the Hawaiian People to the Times of Kamehameha I.* Vol. II, 6 Vols, edited by J. F. G. Stokes. Trubner & Co., London.

1916a History of Moikeha. In *Fornander Collection of Hawaiian Antiquities and Folk-lore: The Hawaiians' Account of the Formation of Their Islands and Origin of Their Race, with the Traditions of Their Migrations, Etc., as Gathered from Original Sources*, Vol. IV, Part 1, edited by T. G. Thrum, pp. 112-155. Bishop Museum Press, Honolulu.

Fornander, Abraham (continued)

1916b Story of Islands' Formation and Origin of Race. In *Fornander Collection of Hawaiian Antiquities and Folk-Lore the Hawaiians' Account of the Formation of Their Islands and Origin of Their Race, with the Traditions of Their Migration, Etc., as Gathered from Original Sources*, Vol. IV, edited by T. G. Thrum. Memoirs of the Bernice Pauahi Bishop Museum. Bishop Museum Press, Honolulu, HI.

1917a Legend of Eleio, Relating to Kaululaau. In *Fornander Collection of Hawaiian Antiquities and Folk-Lore The Hawaiian Account of the Formation of their Islands and Origin of their Race with the Traditions of their Migrations, Etc., as Gathered from Original Sources*, Vol. IV, Part III, edited by T. G. Thrum, pp. 486-488. Bishop Museum Press, Honolulu, HI.

1917b Relating to Kihapiilani. In *Fornander Collection of Hawaiian Antiquities and Folk-lore The Hawaiians' Account of the Formation of their Islands and Origin of their Race, with the Traditions fo their Migrations, Etc., as Gathered from Original Sources*, Vol. IV, Part II, edited by T. G. Thrum, pp. 242-246. Bishop Museum Press, Honolulu, HI.

1918 Mythical Tales. In *Fornander Collection of Hawaiian Antiquities and Folk-lore: The Hawaiians' Account of the Formation of Their Islands and Origin of Their Race, with the Traditions of Their Migrations, Etc., as Gathered from Original Sources*, Vol. V, Part 3, pp. 506-569.

1919a The Mat. In *Fornander Collection of Hawaiian Antiquities and Folk-Lore the Hawaiians' Account of the Formation of Their Islands and Origin of Their Race, with the Traditions of Their Migration, Etc., as Gathered from Original Sources*, Vol. V, Part III, edited by T. G. Thrum, pp. 626-629. Bishop Museum Press, Honolulu, HI.

1919b Relating to Kekaa. In *Fornander Collection of Hawaiian Antiquities and Folk-Lore the Hawaiians' Account of the Formation of Their Islands and Origin of Their Race, with the Traditions of Their Migration, Etc., as Gathered from Original Sources*, Vol. V, Part III, edited by T. G. Thrum, pp. 540-544. Bishop Museum Press, Honolulu, HI.

Gilman, G. D.

1854 *The Transactions of the Royal Hawaiian Agricultural Society: At its Fourth Annual Meeting, in June, 1854*. Prepared for Royal Hawaiian Agricultural Society, Honolulu. Government Press, Honolulu.

Gutmanis, June

1983 *Na Pule Kahiko: Ancient Hawaiian Prayers*. Editions Limited, Honolulu, HI.

Handy, E. S. Craighill and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*. Bishop Museum Press, Honolulu.

Handy, E. S. Craighill, Elizabeth Green Handy and Mary Kawena Pukui
1991 *Native Planters in Old Hawaii : Their Life, Lore, and Environment*. Rev. ed. Bernice P Bishop Museum Bulletin 233. Bishop Museum Press, Honolulu, HI.

Henke, L.A.
1929 *University of Hawai'i Research Publication No 5: A Survey of Livestock in Hawaii*. University of Hawaii, Honolulu, HI.

Jarves, James J.
1843 *History of the Hawaiian Or Sandwich Islands: Embracing their Antiquities, Mythology, Legends, Discovery by Europeans in the Sixteenth Century, Re-Discovery by Cook, with their Civil, Religious and Political History, from the Earliest Traditionary Period to teh Present Time*. Tappan and Dennet, Boston, MA.

Jean-François de Galaup, La Pérouse
1969 *Voyages and Adventures of La Pérouse*. Translated by J. S. Gassner. University of Hawaii Press, Honolulu, Hawai'i.

Kahā'ulelio, Daniel
2006 *Ka 'Oihana Lawai'a - Hawaiian Fishing Traditions*, edited by M. P. Nogelmeier. Translated by M. K. Pukui. Bishop Museum Press, Honolulu, HI.

Kamakau, S.M.
1992 *Ruling Chiefs of Hawaii*. Revised ed. The Kamehameha Schools Press, Honolulu, HI.

Kapiikauinamoku.
1956 "The Story of Maui Royalty: Mighty Isle Warriors were Closely Related. Article 21: Kiha-a-Piilani." *The Honolulu Advertiser,* 16 May 1956.A7, Honolulu, HI. Home edition.

Kingdom of Hawaii
1848 An Act Relating to the Lands of His Majesty the King and of the Government. In *A Supplement to the Statute Laws of His Majesty, Kamehameha III., King of the Hawaiian Islands, Containing the Acts and Resoultions Passed by the Houses of Nobels and Representatives, During the Twenty-Third Year of His Reign and the Sixth Year of His Public Recognition, A.D. 1848*, pp. 22-43. Government Press, Honolulu, HI.

Land Commission Book of Testimony. Prepared for Board of Commissioners to Quiet Land Titles. Honolulu.

Lee-Greig, Tanya L.

2002 *Archaeological Inventory Survey of the Chang Family Property, Keauhou and Kalihi Ahupua'a, Honoua'ula, Maui*. Prepared for Mr. and Mrs. Joseph Noland, Wailuku, HI. Island Archaeology, Makawao, HI. On file at State of Hawai'i Department of Land and Natural Resources State Historic Preservation Division.

Lee-Greig, Tanya L., Robert R. Hill and Hammatt H. Hallett

2014 *Cultural Historical Background for Keauhou, Kalihi, Waipao, Pāpaʻanui, Kāʻeo, Maluaka, Moʻoiki, Moʻoloa, and Moʻomuku Ahupuaʻa, Honuaʻula Moku, Makawao District, Island of Maui TMK: [2] 2-1-05 through 2-1-08: Multiple Parcels*. Prepared for ATC Makena Holdings, LLC. Cultural Surveys Hawaiʻi, Inc., Wailuku, Maui.

Lever, Christopher

1994 *Naturalized Animals: The Ecology of Successfully Introduced Species*. T. & A. D. Poyser, London.

Lucas, Paul F. Nahoa

1995 *A Dictionary of Hawaiian Legal Land-Terms*. Native Hawaiian Legal Corp. : University of Hawaiʻi Committee for the Preservation and Study of Hawaiian Language, Art, and Culture, Honolulu, HI.

Lyman, Kepa and Michael Dega

2020 *Archaeological Inventory Survey of 23 Acres in Paeahu Ahupuaʻa, Makawao District, Island of Maui, Hawaiʻi, TMK (2) 2-1-008:145 -- Draft*. Prepared for Wailea Resort SF-S Partners LP, Kihei, HI. Scientific Constultant Services, Inc., Honoulu, HI.

Lyons, Curtis J.

1903 *A History of the Hawaiian Government Survey with Notes on Land Matters in Hawaii, Appendixes 3 and 4 of Surveyor's Report for 1902*. The Hawaiian Gazette Co., Honolulu, HI.

MacKenzie, Melody Kapilialoha, Susan K. Serrano, D. Kapua ala Sproat, Ashley Kaiao Obrey, Avis Kuuipoleialoha Poai, Corporation Native Hawaiian Legal, Law Ka Huli Ao Center for Excellence in Native Hawaiian and Publishing Kamehameha

2015 *Native Hawaiian Law : A Treatise*. Kamehameha Publishing, Honolulu, HI.

MacLennan, Carol

1997 Hawaii Turns to Sugar: The Rise of Plantation Centers, 1860-80. *Hawaiian Journal of History,* 31:97-125.

Malo, David

1951 *Hawaiian Antiquities: Moʻolelo Hawaiʻi*. 2d ed. Translated by N. B. Emerson. Bernice Pauahi Bishop Museum, Honolulu, HI.

Maly, Kepa and Onaona Maly

2003 *Ka Hana Lawaiʻa a me Nā Koʻa o na Kai ʻEwalu : A History of Fishing Practices and Marine Fisheries of the Hawaiian Islands Compiled from: Oral History Interviews with Kūpuna and Kamaʻāina*. Prepared for The Nature Convervancy, Honolulu, HI. Kumu Pono Associates, Hilo, HI.

2005 *He Moʻolelo ʻĀina No Kaʻeo Me Kāhi ʻĀina E Aʻe Ma Honuaʻula -- A Cultural-Historical Study of Kaʻeo and Other Lands in Honuaʻula, Island of Maui (TMK 2-1-07:67)*. Prepared for Sam Garcia, Jr. & Jon Garcia, Makena, HI. Kumu Pono Associates, Hilo, HI.

Manu, Moke.

1899 "Ke Kaua Nui Weliweli Mawaiena o Pele-Keahialoa ame Waka-Keakaikawai." *Ka Loea Kalaiaiana,* 16 September 1899. Vol. III, No. 36 No. Honolulu.

Matsuoka, Jon K., Davianna Pomaikaʻi McGregor, Luciano Minerbi, Pualani Kanahele, Marion Kelly and Noenoe Barney-Campbell

1996 *Native Hawaiian Ethnographic Study for the Hawaiʻi Geothermal Project Proposed for Puna and Southeast Maui*. Prepared for U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tennessee.

Maui General Plan 2030

2006 Prepared for Maui County Long-Range Planning Division. Chris Hart & Partners, Inc., Wailuku, Hawaiʻi.

McClelland, C.K.

1916 *Bulletin No. 36, Grasses and Forage Plants of Hawaii*. Hawaii Agricultural Experiment Station Under the Supervision of Office of Experiment Stations, U.S. Department of Agriculture. Government Printing Office, Washington D.C.

Mueller-Dombois, Dieter

2007 The Hawaiian *Ahupuaʻa*Land Use System: Its Biological Resource Zones and the Challenge for Silvicultural Restoration. In *Biology of Hawaiian Streames and Estuararies*, edited by N. L. Evenuis and J. M. Fitzsimions, pp. 23-33. Bishop Museum Bulletin in Cultural and Environmental Studies 3.

"Na ke Aupuni: He Kanawai no na Aina Ponoi o ka Moi, a me na Aina o ke Aupuni."

1848 *Ka Elele Hawaii,* Iuali 14, 1848. Vol. 4, No. 5 No.:17-20, Honolulu, HI.

Nakuina, Moses K.

1990 *The Wind Gourd of Laʻamaomao.* Translated by E. T. Mookini and S. Nākoa. Kalamaku Press, Honolulu, HI.

Nellist, George F.

1925 *The Story of Hawaii and Its Builders*. Vol. III. Honolulu Star-Bulletin, Ltd., Territory of Hawaii.

Nupepa Kuokoa.

1912 "Wahi Pana o Lanai." *Nupepa Kuokoa,* May 31, 1912. Vol. 48 No. 22 No.

Office of Hawaiian Affairs

2011 Papakilo Database: Kūkulu ka ʻike i ka ʻōpua [Online Database].Māhele ʻĀina Index, DL Consulting. https://papakilodatabase.com

2014 Kipuka Databse [Online GIS Database], BEI Consulting and ʻĀina Arts Photography. kipukadatabase.com

Perzinski, David, Kepa Lyman, Colleen Medieros, Rachel Hodara and Michael Dega

2014 *Arhcaeological Inventory Survey of a 670-acre Parcel in Honuaʻula (Formerly Wailea 670), in Palauea and Keauhou Ahupuaà, Makawao District, Island of Maui, Hawaiʻi [TMK: (2) 2-1-008:71 and 56 por.] Volume I Report*. Prepared for Honuaʻula Partners, LLC,, Kihei, HI. Scientific Constultant Services, Inc., Honolulu, HI. On file at Hawai'i State Historic Preservation Division.

Pukui, Mary Kawena

1983 *ʻŌlelo Noʻeau: Hawaiian Proverbs & Poetical Sayings*. Bernice P Bishop Museum special publication. Bishop Museum Press, Honolulu, HI.

Pukui, Mary Kawena and Samuel H. Elbert

1986 *Hawaiian Dictionary Hawaiian-English, English-Hawaiian*. Rev. and enl. ed. University of Hawaii Press, Honolulu, HI.

Pukui, Mary Kawena, Samuel H. Elbert and Esther T. Mookini

1974 *Place Names of Hawaii*. Revised and expanded edition. ed. University Press of Hawaii, Honolulu, HI.

Purdy, Martin

2006 Martin Purdy Oral History Interview. Interviewed by I. Loomis. Oahu Catlemen's Association, Paniolo Hall of Fame, Waimea, HI.

Rechtman, Robert B.

1999 *Archaeological Monitoring at Development Parcel A/B Wailea Resort Property Land of Paeahu, Makawao District Island of Maui*. Prepared for TSA International, Ltd. c/o Wilson Okamoto and Associates, Inc. Paul H. Rosendahl, Ph.D., Inc.

Rosendahl, Margaret L.K. and Alan Haun

1987 *Archaeological Date Recovery Excavations Development Parcels A/B/C-Wailea Resort, Maui, Hawaiian Islands*. Prepared for TSA Internationa, Ltd. c/o Mr Gary Okamoto, Honolulu, Hawaii 96811. Rosendahl Consulting, Hilo, Hawaii 96720. On file at SHPD, Maui Office.

Schmitt, Robert

1973 *The Missionary Census of Hawaii*. Prepared for Pacific Anthropological Records. Bishop Museum Press, Honolulu, Hawaiʻi.

Semi-Weekly Maui News.

1922 "Improvements to Kahului Harbor Greatly Needed." *Semi-Weekly Maui News,* November 14, 1922. Vol. 22. 1218 No. Wailuku, HI.

Setchell, William Albert

1907 Limu. *University of Californa Publications, Botany* 2(3):91-113.

State of Hawaii Office of Environmental Quality Control

2012 *Guide to the Implementation and Practice of the Hawaii Environmental Policy Act. 2012 Edition*. Honolulu, HI.

Sterling, Elspeth P.

1998 *Sites of Maui*. Bishop Museum Press, Honolulu, HI.

Summers, Catherine C.

1999 *Material Culture: The J.S. Emerson Collection of Hawaiian Artifacts*. Bishop Museum Press, Honolulu, HI.

Taylor, Clarice.

1949a "Little Tales, All About Hawaii." *Honolulu Star-Bulletin,* 31 Mar 1949. Vol. LV, No.17665 No. Honolulu, HI.

1949b "Panini Gum." *Honolulu Star-Bulletin,* Vol. LV, No.17665 No. Honolulu, HI.

The Polynesian.

1856 "Valuable Real Estate at Auction." *The Polynesian,* January 19, 1856.Honolulu, HI.

Thrum, Thomas G.

1909a Excursion to the Mountains of Maui, Extract from M.S.–"A Menzies' Journal in Vancourver's Voyage, 1790-1794.". In *Hawaiian Almanac and Annual for 1909, The Reference Book of Information and Statistics Relating to the Territory of Hawaii, of Value to Merchants, Tourists and Others*, edited by T. G. Thrum, pp. 92-97. Thomas G. Ghrum, Honolulu, HI.

Thrum, Thomas G. (continued)

1909b Heiaus: their kinds, construction, ceremonies, etc. In *Hawaiian Almanac and Annual for 1910, The Reference Book of Information and Statistics Relating to the Territory of Hawaii, of Value to Merchants, Tourists and Others*, edited by T. G. Thrum, pp. 53-71. Thomas G. Ghrum, Honolulu, HI.

1925 Early Ulupalakua Data. In *The Hawaiian Annual For 1926*, edited by T. G. Thrum, pp. 80-87. Honolulu, HI.

1926 James Makee: Master Mariner, Merchant, Rancher, Planter, Pioneer. In *The Hawaiian Annual for 1927*, edited by T. G. Thrum, pp. 27-39. Honolulu, HI.

Titcomb, Margaret and Mary Kawena Pukui

1977 *Native Use of Fish in Hawaii*. 2d ed. University Press of Hawaii, Honolulu, HI.

Translation of the Constitution and Laws of the Hawaiian Island, Established in the Reign of Kamehamaha III

1842. Lahainaluna, Lahaina, HI.

U.S. Department of Agriculture, Natural Resources Conservation Service

2001 Soil Survey Geographic (SSURGO) database for Island of Maui, Hawaii (hi980). U.S. Department of Agriculture, Natural Resources Conservation Service. <http://www.ncgc.nrcs.usda.gov/products/datasets/ssurgo/> (last accessed March 2005).

U.S. Geological Survey

1922 *Kihei Quadrangle* [map]. 1:31,680. U.S. Department of Interior USGS, Reston, VA.

1992 *Puu o Kali Quadrangle* [map]. 1:24000. U.S. Department of Interior, USGS, Reston, VA.

Van Dyke, Jon M.

2008 *Who Owns the Crown Lands of Hawai'i*. University of Hawai'i Press, Honolulu, HI.

Westervelt, W. D.

1903 Hawaiian Burial Caves. In *Hawaiian Alamanac and Annual for 1904 The Reference Book of Information and Statistics Relating to the Territory of Hawaii, of Value to Merchants, Tourists and Others*, edited by T. G. Thrum, pp. 145-154. Thomas G. Thrum, Honolulu, HI.

Wianecki, Shannon

2010 The Lure of Limu. Haynes Publishing Group. https://www.mauimagazine.net/the-lure-of-limu/.

Wight, Kahikāhealani
2005 *Illustrated Hawaiian Dictionary*. Bess Press, Honolulu, HI.

ECONOMIC AND FISCAL IMPACT ANALYSIS TABLE

APPENDIX

G

Appendix G. Economic and Fiscal Impact Analysis Tables

	Multiplier or Source	Amount	Units
Project Information			
Land Area[a]			
Residential & Amenity Center		8.0	acres
Open Space		12.0	acres
Roadway, Infrastructure, and Parking		3.0	acres
Total Land Area		23.0	acres
Building Square Footage[a]			per year
Residential			
Residential Unit		57	units
Residential Square Footage	3,000 sq.ft. per unit	171,000	sq.ft.
Amenity Center			
Building		2,000	sq.ft.
Pool, Hardscape		4,000	sq.ft.
Total Square Footage		177,000	sq.ft.
Economic Impacts - Construction Period			
Construction Duration [a]		3	years
Construction Cost [a]			
Infrastructure		$ 17,150,000	
Residential	$ 1,950,000 per unit	$ 111,150,000	
Amenity Center		$ 1,500,000	
Total Construction Cost		$ 129,800,000	
Average Construction Cost Per Year		$ 43,267,000.00	per year
Hawaii	55% of construction cost	$ 23,797,000	per year
Direct Sales	40% of Hawaii	$ 9,518,800	per year
Indirect Sales	60% of Hawaii	$ 14,278,200	per year
Imports	45% of construction cost	$ 19,470,000	per year
Construction Employment			
Average Employees per Year [b] [c]	3.74 x sales/$1 mil	77	FTE
Average Wages and Salaries [d] [e]	$ 75,500 per job	$ 5,777,000	per year
Property Sales			
Residential Sales	$ 3,600,000 per home	$ 205,200,000	
Economic Impacts - Operational Period			
Number of New Residents	2.05 residents per HH	117	residents
Part-time Residents	90% of total residents	105	residents
Full-time Residents	10% of total residents	12	per year
On-site Employment			
Average On-site Employees per Year[a]		3	FTE
Average Wages and Salaries [c] [d]	$ 46,100 per job	$ 138,300	per year

	Multiplier or Source	Amount	Units
Fiscal Impacts - Construction Period			
STATE OF HAWAII			
General Excise Tax			
Final Sales	4% of final sales	$ 380,752	per year
Indirect Sales	0.5% of indirect sales	$ 71,391	per year
Annual General Excise Tax		$ 452,000	per year
Total General Excise Tax for Construction Period		$ 1,356,000	
Personal Income Tax	6% of Wages/ Salaries	$ 347,000	per year
Conveyance Tax	$ 0.60 per $100	$ 1,231,000	for all homes
COUNTY OF MAUI			
Permitting Fees		Not Estimated	
Fiscal Impacts - Operational Period			
STATE OF HAWAII			
Personal Income Tax	6% of Wages/ Salaries	$ 8,300	per year
General Excise Tax		Not Estimated	
COUNTY OF MAUI			
Taxable Property Value			
Full-time Residential Taxable Value			
Homeowner Exemption [f]	5% of total homes	3	homes
Less Exemption	$ 200,000 per home	$ (600,000)	
Net Taxable Value		$ 9,660,000	
Part-time Residential Taxable Value	95% of total homes	$ 194,940,000	
Amenity Center Value		$ 1,500,000	
Property Tax			
Full-time Residents	$ 2.90 /$1,000 of taxable value	$ 28,000	per year
Part-time Residents	$ 5.60 /$1,000 of taxable value	$ 1,091,700	per year
Amenity Center (Building)	$ 5.60 /$1,000 of taxable value	$ 8,400	per year
Total Property Tax		$ 1,128,100	
Less Exsting Property Tax Revenue[g]		$ (60,800)	per year
Total Net New Property Tax		$ 1,067,300	per year

Source/Note:
(a) Wailea Resort SF-S Partners, LP, 2020.
(b) State of Hawaii, Department of Business, Economic Development & Tourism, 2012 State Input-Output Study, 2016
(c) U.S. Bureau of Labor Statistics, Average Weekly Hours and Overtime of All Employees on Private Nonfarm Payrolls by Industry Sector, Seasonally Adjusted, https://www.bls.gov/news.release/empsit.t18.htm (Accessed December 2019)
(d) 2018 Employment and Payrolls in Hawaii, State of Hawaii, Department of Labor and Industorial Relations, October 2019
(e) CPI Historical Table, Honolulu, HI - November 2019, U.S Department of Labor, Bureau of Labor Statistics, https://www.bls.gov/regions/west/data/consumerpriceindex_honolulu_table.pdf (Accessed December 2019)
(f) 6 units (10% of all homes) are assumed to be full-time residences (6 units). Of which, 3 units (5% of all homes) is anticipated to be owner-occupied and receive homeowner exemption.
(g)Maui County Real Property Assesment Division, 2019

TRAFFIC IMPACT ANALYSIS REPORT

APPENDIX

H

TRAFFIC IMPACT ANALYSIS REPORT
SF-S PARCEL
WAILEA, MAUI, HAWAII

FINAL DRAFT

May 12, 2020

Prepared for:

Wailea Resort Development LP
c/o Ledcor Development LP
1300 N. Holopono Street, Ste. 201
PO Box 220, Kihei, Maui, Hawaii 96753

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

TRAFFIC IMPACT ANALYSIS REPORT

SF-S PARCEL

Wailea, Maui, Hawaii

FINAL DRAFT

Prepared for

Wailea Resort Development LP

Prepared by

Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

May 12, 2020

TABLE OF CONTENTS

		Page
1.	INTRODUCTION	1
1.1	Project Location	1
1.2	Project Description	1
2.	METHODOLOGY	4
2.1	Study Methodology	4
2.2	Intersection Analysis	4
2.3	Study Area Intersection Analysis	4
3.	EXISTING TRAFFIC CONDITIONS	5
3.1	Roadway System	5
3.2	Existing Traffic Volumes	6
3.3	Existing Observations and Intersection Analysis	6
4.	BASE YEAR 2024 TRAFFIC CONDITIONS	10
4.1	Defacto Growth Rate	10
4.2	Traffic Forecasts for Known Developments	10
4.3	Planned Roadway Improvements	12
4.4	Base Year 2024 Analysis	13
5.	FUTURE YEAR 2024 TRAFFIC CONDITIONS	22
5.1	Background	22
5.2	Travel Demand Estimations	22
5.2.1	Trip Generation	22
5.2.2	Trip Distribution & Assignment	23
5.3	Future Year 2024 Analysis	23
6.	CONCLUSION	28

TABLE OF CONTENTS
Cont'd

6.1 Existing Conditions 28

6.2 Base Year 2024 28

6.2.1 Planned Roadway Improvements 29

6.2.2 Base Year 2024 Analysis 29

6.3 Future Year 2024 29

7. REFERENCES 31

TABLE OF CONTENTS
Cont'd

TABLES

3.1 EXISTING 2019 LEVEL OF SERVICE SUMMARY 9

4.1 TRIPS GENERATED BY KNOWN DEVELOPMENTS IN KIHEI 17

4.2 TRIPS GENERATED BY KNOWN DEVELOPMENTS IN WAILEA AND MAKENA..... 18

4.3 EXISTING AND BASE YEAR 2024 LEVEL OF SERVICE SUMMARY 20

5.1 PROJECT TRIP GENERATION RATES..... 22

5.2 PROJECT-GENERATED TRIPS 23

5.3 EXISTING, BASE YEAR 2024 AND FUTURE YEAR 2024 LEVEL OF SERVICE SUMMARY 26

TABLE OF CONTENTS
Cont'd

FIGURES

1.1 LOCATION MAP 2

1.2 SITE PLAN 3

3.1 EXISTING CONDITIONS, LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS 8

4.1 KIHEI BACKGROUND PROJECTS 14

4.2 WAILEA BACKGROUND PROJECTS 15

4.3 MAKENA BACKGROUND PROJECTS 16

4.4 BASE YEAR 2024 LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS 19

5.1 PROJECT GENERATED TRIPS 24

5.2 FUTURE YEAR 2024 LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS 25

TABLE OF CONTENTS
Cont'd

APPENDICES

A. TRAFFIC COUNT DATA

B. LEVEL OF SERVICE CRITERIA

C. LEVEL OF SERVICE CALCULATIONS

D. SIGNAL WARRANTS

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

TERRANCE S. ARASHIRO, P.E.
ADRIENNE W.L.H. WONG, P.E., LEED AP
DEANNA M.R. HAYASHI, P.E.
PAUL K. ARITA, P.E.
ERIK S. KANESHIRO, L.P.L.S, LEED AP
MATT K. NAKANOTO, P.E.
GARRETT K. TOKUOKA, P.E.

ADRIENNE W.L.H. WONG, P.E., LEED AP
Maui Branch Manager

TRAFFIC IMPACT ANALYSIS REPORT

SF-S PARCEL

Wailea, Maui, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi, and Associates, Inc. (ATA) to evaluate the traffic impacts resulting from the proposed SF-S Parcel (hereinafter referred to as the "Project") located in Wailea, Maui, Hawaii.

1.1 Project Location

The Project is located in Wailea on the island of Maui on parcels of land more specifically identified as TMK: (2) 2-1-008:145. The Project is bounded by Kapili Street to the east, Wailea Kialoa to the south, County Park property to the north, and Wailea Alanui Drive to the west.

1.2 Project Description

The Project proposes to develop 57 single-family residential units on a currently undeveloped 23.1-acre lot south of Kilohana Drive. Access to the SF-S parcel will be provided by one (1) driveway via Kapili Street. An emergency access will be provided via Wailea Alanui Drive with possible emergency egress at two locations along Kapili Street. See Figure 1.2 for Project Site Plan.

LEDCOR SF-S PARCEL TIAR

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors

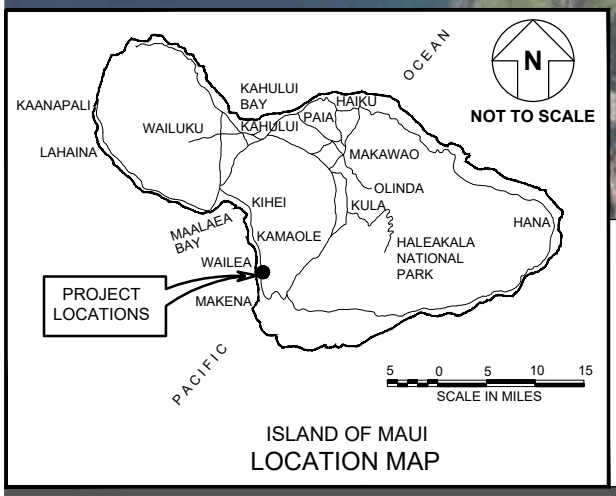
NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

N
NOT TO SCALE

PROJECT LOCATION

ALA KOA ST.
AHEKOLO ST.
HOOLAPA ST.
WELA ST.
LAWAKUA ST.
KAUHALE ST.
PIILANI HWY.
MAPU DR.
KILOHANA DR.
WAILEA ALANUI DR.
WAIKAI ST.
KAPILI ST.
KUPULAU DR.
HELEUMA PL.
KIKIHI ST.
KEHALA DR.
AKALA DR.
MIKIOI PL.
OKOLANI DR.
S. KIHEI RD.
KUALONO PL.
KAI MALU DR.
KAINUI LP.
HOALA DR.
KUMULANI DR.
WAILEA IKE PLACE
WAILEA IKE DRIVE

1 2 3 4 5 6 7 8 9 10 11



ISLAND OF MAUI
LOCATION MAP

STUDY INTERSECTIONS

1. S. KIHEI RD. & KILOHANA DR.
2. KILOHANA DR. & LAWAKUA ST. & WAILEA ALANUI DR.
3. KILOHANA DR. & KAPILI ST.
4. PIILANI HWY. & KILOHANA DR. & MAPU DR.
5. PIILANI HWY. & OKOLANI DR.
6. OKOLANI DR. & KUALONO PL.
7. OKOLANI DR. & KAPILI ST.
8. OKOLANI DR. & WAILEA ALANUI DR.
9. WAILEA ALANUI DRIVE & WAILEA IKE DRIVE
10. WAILEA IKE DRIVE & WAILEA IKE PLACE (NORTH)
11. WAILEA IKE DRIVE & WAILEA IKE PLACE (SOUTH)

FIGURE 1.1

LOCATION MAP

LEDCOR SF-S PARCEL TIAR

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors

NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

N
NOT TO SCALE

FIGURE 1.2

SITE PLAN

2. METHODOLOGY

2.1 Study Methodology

This study will address the following:

- Assess existing traffic operating conditions at key intersections during the weekday morning (AM) and afternoon (PM) peak hours of traffic within the study area.
- Traffic projections for Base Year 2024 (without the Project) including traffic generated by other known developments in the vicinity of the Project in addition to an ambient growth rate. These other known developments are projects that are currently under construction or known new/future developments that are anticipated to affect traffic demand and operations within the study area.
- Trip generation and traffic assignment characteristics for the proposed Project.
- Traffic projections for Future Year 2024 (with the Project), which includes Base Year traffic volumes in addition to traffic volumes generated by the Project.
- Recommendations for Base Year and Future Year roadway improvements or other mitigative measures, as appropriate, to reduce or eliminate the adverse impacts resulting from traffic generated by known developments in the region or the Project.

2.2 Intersection Analysis

Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), 6th Edition, includes methods for calculating volume to capacity ratios, delays, and corresponding Levels of Service that were utilized in this study. LOS definitions for signalized and unsignalized intersections are provided in Appendix B.

Analyses for the study intersections were performed using the traffic analysis software Synchro, which is able to prepare reports based on the methodologies described in the HCM. These reports contain control delay results as based on intersection lane geometry, signal timing, and hourly traffic volumes. Based on the vehicular delay at each intersection, a LOS is assigned to each approach and intersection movement as a qualitative measure of performance. These results, as confirmed or refined by field observations, constitute the technical analysis that will form the basis of the recommendations outlined in this report.

2.3 Study Area Intersection Analysis

Analysis within the Project's study area was performed on the following intersections:

- South Kihei Road/Kilohana Drive (Unsignalized)
- Kilohana Drive/Wailea Alanui Drive (Unsignalized)
- Kilohana Drive/Kapili Street (Unsignalized)
- Piilani Highway/Kilohana Drive (Signalized)
- Piilani Highway/Okolani Drive (Unsignalized)
- Okolani Drive/Kualono Place (Unsignalized)
- Okolani Drive/Kapili Street (Unsignalized)
- Okolani Drive/Wailea Alanui Drive (4-way stop)

- Wailea Alanui Drive/Wailea Ike Drive (signalized)
- Wailea Ike Drive/Wailea Ike Place (North) – (unsignalized)
- Wailea Ike Drive/Wailea Ike Place (South) – (unsignalized)

3. EXISTING TRAFFIC CONDITIONS

The existing conditions scenario represents the traffic conditions within the Project area as it currently stands, with no build-out of the Project.

3.1 Roadway System

The following are brief descriptions of the existing roadways studied within the vicinity of the Project:

Piilani Highway is a north-south State Highway that extends southward from Maui Veterans Highway at its intersection with North Kihei Road and terminates approximately seven (7) miles to the south at Wailea Ike Drive. Piilani Highway provides regional access to Kihei and Wailea and is generally a two-way, four-lane, principal arterial that transitions to a two-way, two-lane roadway south of its intersection with Kilohana Drive and Mapu Drive. Exclusive left-turn lanes and right-turn deceleration lanes are provided at all major intersections with the shoulder areas of the highway designated as bicycle lanes. Within the study area, the posted speed limit along this roadway is 45 mph.

South Kihei Road is generally a two-way, two-lane, undivided, north-south County roadway that traverses the Kihei coastline. This roadway begins at a T-intersection with North Kihei Road near Maui Veterans Highway and eventually terminates at Okolani Drive in Wailea. South Kihei Road provides local access to shopping centers and visitor accommodations. The posted speed limit along this roadway in the Project vicinity is 20 miles per hour (mph). Continuous sidewalks and a shoulder/bike lane are provided along South Kihei Road in the vicinity of the Project.

Kilohana Drive is a two-way, two-lane, east-west County roadway that extends from South Kihei Road eastward to Piilani Highway. The posted speed limit along this roadway is 25 mph.

Okolani Drive is a two-way, two-lane, east-west, County roadway that extends eastward from its intersection with South Kihei Road and terminates at its intersection with Mikioi Place and Kehala Drive. Between South Kihei Road and Kikihi Street, Okolani Drive is a two-way, four-lane, divided roadway. The posted speed limit along this roadway is 30 mph. Continuous sidewalks are provided along the north side of Okolani Drive.

Kapili Street is a two-way, two-lane, undivided, north-south roadway that extends southward from its intersection with Kilohana Drive to its intersection with Okolani Drive. The posted speed limit along this roadway is 30 mph. Continuous sidewalks are provided adjacent to the southbound side for the entire length of Kapili Street and along the northbound side within residential areas. Kapili Street is currently privately owned but is open for public use.

Wailea Alanui Drive is a two-way, two-four lane, divided, north-south, County roadway that extends northward from its intersection with Makena Road and terminates to the north at its intersection with Kilohana Drive and Lawakua Street. The posted speed limit along this roadway is 30 mph. Continuous sidewalks are provided along the southbound side of Wailea Alanui Drive within the Project vicinity.

Wailea Ike Drive – is a divided, east-west, two-way, four-lane collector roadway that connects Piilani Highway with Wailea Alanui Drive. Wailea Ike Drive provides access to resort, residential and commercial areas. The posted speed limit is 30 mph

Wailea Ike Place – is an undivided, north-south, two-way, two-lane roadway that provides access to the Grand Champions Villas residential neighborhood, Wailea Tennis Club and various retail/office space to the north of Wailea Ike Drive and the Wailea Ekolu Village residential neighborhood and Wailea Village Center to the south of Wailea Ike Drive. The posted speed limit is 20 mph.

Kualono Place is a two-way, two-lane, private driveway providing residents with access from the Wailea Pualani Estates gated community to Okolani Drive.

3.2 Existing Traffic Volumes

The hourly traffic volume data utilized in this report were collected on Wednesday, May 8, 2019 and Thursday, May 9, 2019. See the traffic count data provided in Appendix A for the existing intersections studied and their corresponding traffic count data. Based on the traffic count data, the weekday AM and PM peak hours of traffic were determined to occur between 7:30 AM and 8:30 AM and between 3:15 PM to 4:15 PM, respectively. At the time of traffic counts, Wailea Village Center construction was occurring, which impacted turning movements at the Wailea Ike Drive/Wailea Ike Place (South) intersection. As a result, 2017 traffic counts were used at this intersection.

3.3 Existing Observations and Intersection Analysis

In the study area, Piilani Highway acts as the main thoroughfare between Kihei and Wailea, and Wailea Alanui Drive acts as the main thoroughfare between Wailea and Makena. Wailea Ike Drive provides the main connection between Piilani Highway and Wailea Alanui Drive.

The majority of movements at the study intersections operated adequately at LOS D or better and under-capacity conditions during the peak hours of traffic with the exception of the following:

Piilani Highway & Kilohana Drive – This signalized intersection primarily serves north-south vehicle traffic along Piilani Highway and provides protected access for the minor street movements. Piilani Highway is generally a four-lane roadway about 700 feet to the north of this intersection, and reduces to a two-lane highway south of this intersection. One of the two southbound through lanes terminates to an exclusive southbound right-turn lane onto Kilohana Drive.

During the AM peak hour, traffic was observed to traverse the intersection smoothly. Traffic analysis indicates the intersection operates at an overall LOS B with all movements operating at LOS D or better. However, these movements are low volume, with only 4 southbound left-turn vehicles that were delayed due to a long cycle length at this intersection.

During the PM peak hour of traffic, northbound through volumes were observed to queue for about a 30-35 minute period extending as far south to Okolani Drive. By 4:50 PM, vehicle queues were observed to clear without heavy congestion. Traffic analysis indicates the intersection operates at overall LOS C with all movements operating at LOS D or better, with the exception of the northbound left-turn movement, which operates at LOS E.

Piilani Highway & Okolani Drive – This unsignalized intersection primarily serves north-south traffic along Piilani Highway.

During the AM peak hour, all approaches operate relatively smoothly with minor movements experiencing moderate delay with traffic analysis indicating that the northbound and southbound left-turn movements operate at LOS A and the eastbound and westbound left-turn/through movements operating at LOS E and LOS C, respectively.

During the PM peak hour, higher volumes along Piilani Highway result in longer delays to the minor street movements. The northbound and southbound left-turn movements operate at LOS A/B and the eastbound/westbound approaches operate at LOS E/F, with eastbound approach operating over-capacity. A traffic signal is currently being designed and will be implemented at the Piilani Highway/Okolani Drive/Mikioi Place intersection as part of the mitigation for the Kai Malu Wailea residential development.

Okolani Drive & Wailea Alanui Drive – This intersection provides stop-control for all approaches and currently operates adequately at overall LOS B during the AM and PM peak hours of traffic. During both peaks, the eastbound right-turn and northbound left-turn movements were heavier, providing regional flows between South Kihei Road and Wailea Alanui Drive. Both movements are stop controlled, but since the eastbound right-turn movement is provided with a dedicated receiving lane, most eastbound right-turners were observed to operate similar to a free or yield right-turn movement. As a result, no lengthy queues formed.

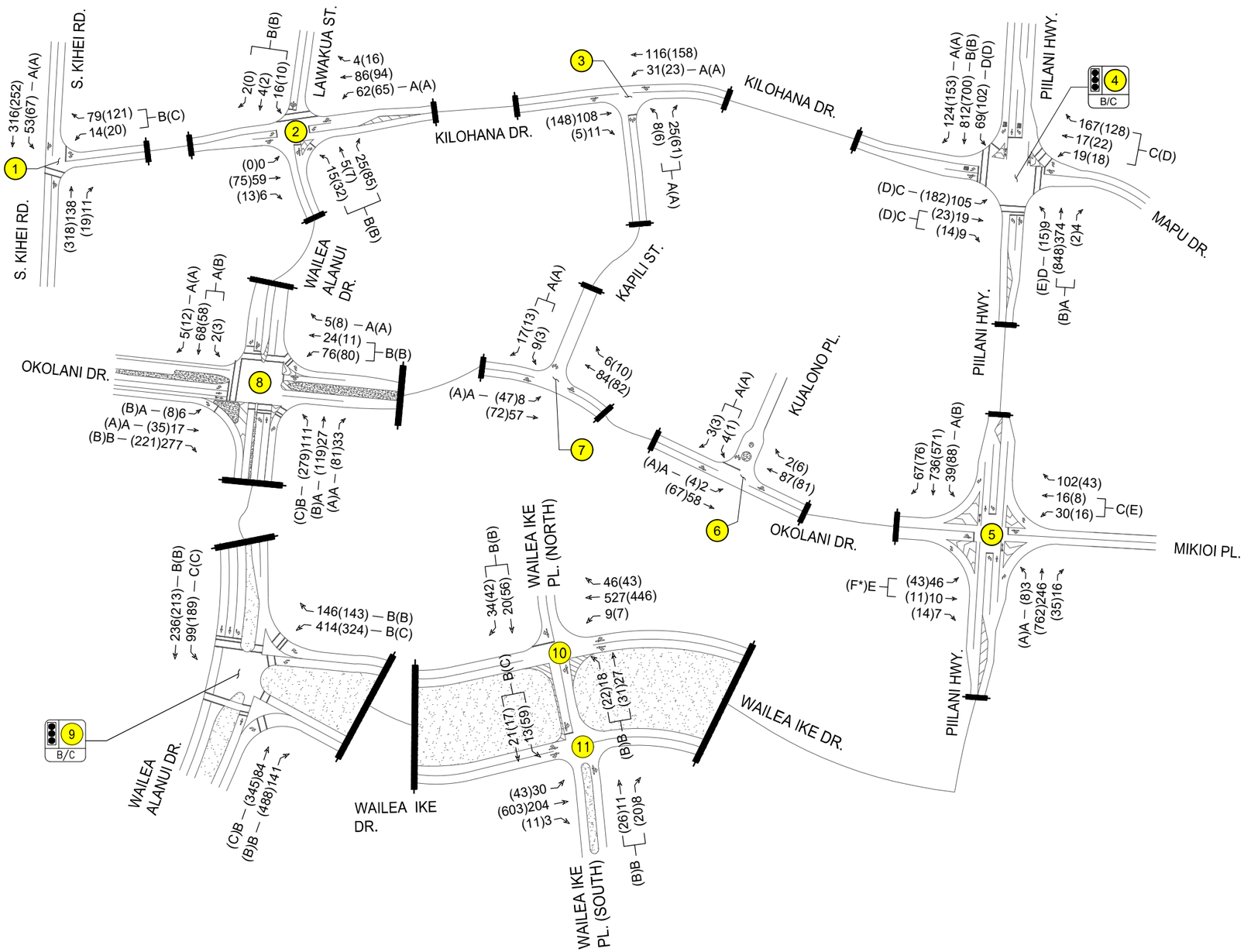
During the AM peak hour, all approaches operate at LOS B or better due to relatively low vehicular volumes of 100-300 vehicles in each direction.

During the PM peak hour, the northbound left turn movement operates at LOS C due to the increase in vehicles utilizing the lane to make a left onto Okolani Drive from Wailea Alanui Drive. The longest observed queue, during the PM peak hour, consisted of 7 vehicles, which completely cleared within 40 seconds. All other movements operate at LOS B or better during the PM peak hour of traffic.

Figure 3.1 illustrates the existing lane configuration, existing traffic volumes, and LOS for each study intersection. Table 3.1 summarizes the existing LOS at the study intersections. LOS worksheets are provided in Appendix C.

LEDCOR SF-S PARCEL TIAR

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors



NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

N
NOT TO SCALE

DATE OF COUNTS:
WEDNESDAY, MAY 8, 2019
THURSDAY, MAY 9, 2019
* May 2017 counts used at Wailea Ike Drive/Wailea Ike Pl (South) due to construction on south leg.

AM PEAK HOUR:
7:30 AM - 8:30 AM

PM PEAK HOUR:
3:15 PM - 4:15 PM

LEGEND

##(##)	- AM(PM) VEHICLE VOLUMES
X	- UNSIGNALIZED INTERSECTION X
Y / X/X	- SIGNALIZED INTERSECTION Y, OVERALL AM/PM LOS
X(X)	- AM(PM) LOS

FIGURE 3.1

EXISTING CONDITIONS, LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS

Table 3.1: Existing 2019 Level of Service Summary

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: S Kihei Rd & Kilohana Dr						
WB LT/RT	11.5	0.15	B	15.0	0.30	C
SB LT	8.0	0.05	A	8.6	0.07	A
Overall	2.4	-	-	3.4	-	-
2: Wailea Alanui Dr & Kilohana Dr						
NB LT/TH/RT	10.1	0.07	B	10.7	0.18	B
WB LT	7.5	0.05	A	7.6	0.05	A
SB LT/TH/RT	11.2	0.04	B	12.6	0.03	B
Overall	4.1	-	-	4.9	-	-
3: Kapili St & Kilohana Dr						
NB LT/RT	9.5	0.04	A	9.7	0.09	A
WB LT	7.5	0.02	A	7.6	0.02	A
Overall	1.8	-	-	2.1	-	-
4: Piilani Hwy & Kilohana Dr/Mapu Dr						
NB LT	37.7	0.44	D	55.1	0.50	E
NB TH/RT	7.7	0.38	A	19.3	0.82	B
EB LT	28.5	0.40	C	43.2	0.65	D
WB LT/TH/RT	28.4	0.39	C	37.6	0.20	D
SB LT	35.2	0.75	D	50.9	0.80	D
SB TH	10.6	0.75	B	11.0	0.61	B
SB RT	4.9	0.09	A	6.5	0.12	A
Overall	13.3	-	B	20.5	-	C
5: Piilani Hwy & Okolani Dr						
NB LT	9.7	0.00	A	9.1	0.01	A
EB LT/TH/RT	45.9	0.45	E	207.1	1.01	F*
WB LT/TH/RT	15.7	0.32	C	40.8	0.43	E
SB LT	7.9	0.03	A	10.3	0.12	B
Overall	4.2	-	-	10.6	-	-
6: Okolani Dr & Kualono Pl						
EB LT	7.4	0.00	A	7.4	0.00	A
SB LT/RT	9.1	0.01	A	8.9	0.01	A
Overall	0.5	-	-	0.4	-	-
7: Okolani Dr & Kapili St						
EB LT	7.5	0.01	A	7.5	0.04	A
SB LT/RT	9.2	0.03	A	9.2	0.02	A
Overall	1.6	-	-	2.2	-	-
8: Wailea Alanui Dr & Okolani Dr						
NB LT	11.1	0.22	B	17.3	0.56	C
NB TH	9.1	0.05	A	10.5	0.22	B
NB RT	8.4	0.05	A	9.0	0.13	A
EB LT	9.0	0.01	A	10.1	0.02	B
EB TH	8.6	0.03	A	9.9	0.07	A
EB RT	11.4	0.42	B	12.7	0.40	B
WB LT/TH	10.8	0.20	B	12.2	0.21	B
WB RT	8.2	0.01	A	9.2	0.02	A
SB LT/TH	10.0	0.13	A	10.9	0.13	B
SB RT	8.4	0.01	A	9.3	0.02	A
Overall	10.7	-	B	13.1	-	B
9: Wailea Alanui Drive & Wailea Ike Drive						
NB TH	16.7	0.18	B	20.5	0.56	C
NB RT	16.3	0.10	B	18.0	0.34	B
WB LT	16.9	0.65	B	28.4	0.70	C
WB RT	11.6	0.10	B	19.9	0.10	B
SB LT	25.1	0.46	C	29.6	0.58	C
SB TH	16.5	0.25	B	12.2	0.15	B
Overall	16.8	-	B	21.2	-	C
10: Wailea Ike Drive & Wailea Ike Place (North)						
NB LT/TH	14.2	0.11	B	13.6	0.12	B
SB TH/RT	12.4	0.11	B	13.2	0.20	B
Overall	1.9	-	-	3.1	-	-
11: Wailea Ike Place (South) & Wailea Ike Drive						
NB TH/RT	10.2	0.03	B	14.6	0.12	B
SB LT/TH	10.8	0.06	B	15.6	0.20	C
Overall	1.9	-	-	2.4	-	-

Notes

* Denotes over-capacity conditions

4. BASE YEAR 2024 TRAFFIC CONDITIONS

The Year 2024 was selected to reflect the Project completion year. The Base Year 2024 scenario represents the traffic conditions within the study area without the Project. Traffic projections were formulated by applying a defacto growth rate to the existing 2019 traffic count volumes as well as trips generated by known future developments in the vicinity of the Project.

4.1 Defacto Growth Rate

Projections for Base Year 2024 traffic were based upon the Maui Regional Travel Demand Model (MRTDM) growth for forecast years between 2007 and 2035, and nearby developments in the immediate vicinity of the Project. The overall annual growth rate along the studied roadways was approximately 0.6 percent per year.

4.2 Traffic Forecasts for Known Developments

By the Year 2024, numerous developments are forecast to be completed within the Project study area. Many of the following known developments were determined to be accounted for in the MRTDM. Other known developments with forecast build-outs beyond Year 2024 were not included. The known developments that are projected to be complete by Year 2024 and generate traffic within the Project study area are illustrated in Figures 4.1-4.3 and are listed below based on the available information:

Kihei Developments

- South Maui Community Park Phase1-B, 1-C, 2 and 3 – Proposed along the future Liloa Drive Extension (with Phase 3 along East Welakahao Road) and will include construction of a gymnasium, two (2) soccer fields, two (2) baseball/softball fields, six (6) multi-use courts, and a pavilion. A playground, soccer field and softball field are currently constructed as part of the Phase 1 completion of South Maui Community Park.
- Krausz Downtown Kihei – Proposed to construct approximately 249,450 SF of retail space, 18,500 SF of office space, and a 150-room specialty hotel along Piikea Avenue, west of Liloa Drive. *Assumed buildout timeline: 50% in 2024.*
- Ohukai Affordable Housing – Proposed to construct 40 duplex units along Ohukai Road.
- Kenolio Apartments – Proposed to construct 186 apartments with access via Liloa Drive.
- Kaiwahine Village – Proposed to construct approximately 120 multi-family dwelling units with access via Kaiwahine Street.
- Kamalani (formerly Kihei Residential) – Proposed to construct approximately 631 total single-family & multi-family dwelling units and a 3,000 SF recreational center with access via Kaiwahine Street. At the time traffic counts were conducted in May 2019, an estimated 150 residential units were occupied. Traffic from the remaining residential units was included in this TIAR.
- Kihei High School – Proposed along the mauka side of Piilani Highway with access via an extension of Kulanihakoi Street and anticipated to initially serve approximately 800 students.
- Maui Bay Villas (formerly Maui Lu) – Upon full build-out, this project proposes to construct approximately 388 timeshare dwelling units and 12 beach parking stalls with

access via Kaonoulu Street. *Approximately 280 timeshare units are expected to be developed and occupied by Year 2024.*

- Welakahao Village – Proposed to construct approximately 86 single family dwelling units and up to 86 ohana units with access via East Welakahao Road.
- Kalama Kai – Proposed to construct approximately 40 affordable multi-family residential units with access via Kanani Road.

Wailea Developments

- Kahoolawe Island Reserve Commission (KIRC) Education & Operations Center – Proposed 23,950 square feet building that will provide educational, administrative exhibition, and office functions.
- Kilohana Makai – Proposed to construct approximately 28 affordable single-family residential units with access via Wela Street.
- Makalii at Wailea (MF-15) – This project proposes to develop 68 multi-family residential units. The project is located on the northeast corner of the Wailea Alanui Drive/Kaukahi Street intersection. Groundbreaking for this Project started in January 2019.
- Wailea Village Center Expansion – This project proposes to expand the existing Wailea Village Center by developing an additional 22,000 square-feet of shopping center use. The project is located to the south of Wailea Ike Drive between Wailea Alanui Drive and Wailea Ike Place. At the time of traffic counts in May 2019, construction was still ongoing for the expansion.
- Parcel MF-7 – Proposed to construct approximately 75 resort multi-family residential units with access via Okolani Drive.
- Large Parcel (SF-7a, MF-12, MF-13) – Proposed to construct 289 resort multi-family units along Okolani Drive. 23 of these units will be Transient Vacation Rental (TVR) units. *Approximately 40% of the Large Parcel is anticipated to be occupied by 2024.*
- Keala O Wailea (MF-11) – This project proposes to develop 70 multi-family units as part of the Wailea Resort. The project is located next to the Wailea Gateway Center on the northwest corner of the Piilani Highway/Wailea Ike Drive intersection. At the time traffic counts were conducted in May 2019, an estimated 75% of the units were sold. For purposes of this TIAR, it was assumed that 50% of the units were occupied.
- Parcel B-1 – This project proposes to develop an approximate 97,600 SF square-foot shopping center. The project is located on the southeast corner of the Wailea Ike Drive/Kalai Waa intersection.
- The Ridge at Wailea (MF-19) – This project proposes to develop nine (9) single-family residential units as part of the Wailea Resort. The project is located east of Kalai Waa Street and north of Hotel Wailea.
- Hotel Ike Project (MF-10) – This project proposes to construct a 110-room hotel at the northeast corner of the Wailea Ike Drive and Wailea Ike Place (North) intersection. Primary access to the site will occur at the Wailea Ike Drive/Wailea Ike Place (North) intersection with the Project access located along Wailea Ike Place (North). The project will also share an internal easement with the adjacent Marriott Residence Inn Hotel to

the east, and secondary access may occur at the Wailea Ike Drive/Wailea Ekolu Place intersection.

- Honuaula- This is a master planned residential and commercial community being proposed mauka of Piilani Highway at the southern terminus adjacent to the Piilani Highway/Wailea Ike Drive intersection. It is unknown when development will occur, but for purposes of this study, the initial 250 affordable single family residential units are assumed to be built by Year 2024.
- Grand Wailea Expansion – The existing Grand Wailea Hotel is proposing to increase the room count by an additional 224 rooms.

Makena Developments

- Makena Parcel H-1 Ocean Villas Maluaka Development – Construction is ongoing for this project, which proposes to develop 13 single-family residential units and six (6) multi-family condominium units. Parcel H-1 is located south of the former Makena Beach & Golf Resort and is bordered by the Makena Golf Course to the south and west and by Makena Keoneoio Road to the east.

- Makena Resort H-M Development – This project proposes to convert the former 310-room hotel at the Makena Beach & Golf Resort into 65 multi-family resort residential units, including a beach club for residents only.

- Makena M-5/M-6/S-7/B-2 – This project will consist of 46 resort single-family and residential units, 88 resort multi-family residential units, 10 Transient Vacation Rental (TVR) units, 14 residential condominium units, and approximately 27,300 square feet (SF) of retail space. The project also proposes to provide two new vehicular accesses; one (1) access along Honoiki Street and one (1) access along Makena Alanui Road.

- Makena H-2 - This Project proposes to develop a 53-unit CPR residential development with a 57-stall beach parking lot. An existing 51-stall beach parking lot will be replaced, resulting in a beach parking stall count increase of 6 stalls. *Assumed buildout timeline: 50% in 2024.*

The forecast trip generation for each of the background developments in Kihei, Wailea and Makena are summarized in Table 4.1 and Table 4.2.

4.3 Planned Roadway Improvements

The following roadway improvements are assumed to be implemented by Year 2024.

- Piilani Highway/Okolani Drive/Mikioi Place Intersection:
    - Installation of a traffic signal.
        - The construction of a traffic control signal by Armstrong Builders is currently being designed as part of the roadway improvements for the Kai Malu at Wailea residential development.
- Piilani Highway/Kilohana Drive/Mapu Place Intersection:

- Widening of Piilani Highway to provide an additional northbound through lane and an exclusive northbound right-turn lane at the Piilani Highway/Kilohana Drive/Mapu Place intersection.
- In addition, widening of the westbound Mapu Drive approach to provide an exclusive left-turn, through and right-turn lane.
    - These improvements are anticipated to occur before Year 2024 as part of construction and phasing agreements for the Wailea Resort Master Plan.

4.4 Base Year 2024 Analysis

For Base Year 2024 conditions, regional traffic along Piilani Highway is anticipated to increase by approximately 215-300 vehicles per direction (average 28 percent increase) and along South Kihei Road by approximately 110-170 vehicles per direction (average 42 percent increase). As mentioned above, widening improvements will occur at the Piilani Highway/Kilohana Drive/Mapu Place intersection and a traffic signal will be constructed at the Piilani Highway/Okolani Drive/Mikioi Place intersection. These improvements are assumed to be implemented as part of the Base Year 2024 scenario.

The majority of study intersection will continue operating adequately, similar to existing conditions, with the exception of the following:

Piilani Highway/Kilohana Drive/Mapu Place – With the proposed widening improvement, the intersection will operate adequately with an overall LOS C for AM and PM peak hours of traffic. The northbound left-turn movement is anticipated to operate at LOS E due to longer signal cycles which favors through movements along the highway. Mainline through movements will operate adequately at LOS C or better and below capacity.

Wailea Alanui Drive/Okolani Drive – At this four-way stop intersection, the AM peak traffic will operate adequately with all movements operating at LOS C or higher and LOS C overall. During the PM peak hour, the overall intersection will operate at LOS E with the northbound left-turn movement forecast to operate at-capacity and LOS F conditions. The northbound left-turn and eastbound right-turn movements provide for heavier flows that service regional traffic between Kihei and the Wailea/Makena regions. All remaining movements at this intersection are relatively low, with peak volumes generally below 100 vehicles per movement. Based on the MUTCD four-hour signal warrant, which assumes the critical Wailea Alanui Drive northbound left-turn movement as the “minor street” and conflicting Okolani Drive movements as the “major street”, a signal will likely not be warranted by Year 2024. It should be noted that due to the low conflicting major street traffic at this intersection, the four-hour signal warrant graph had to be interpolated from the MUTCD graph to estimate thresholds for major street volumes in the 200-300 vehicle range at this intersection.

Wailea Ike Drive/Wailea Ike Place (South) – The southbound left-turn/through movement is anticipated to operate at LOS E conditions, however should operate well below capacity. Existing observations also showed minimal southbound queues ranging from only 1-2 vehicles. Based on MUTCD, a signal will likely not be warranted by Year 2024.

Figure 4.4 illustrates the Base Year 2024 forecast traffic volumes and LOS for all study intersections. Table 4.3 summarizes the Base Year 2024 LOS at the study intersections with the planned roadway improvements discussed in section 4.3. LOS worksheets are provided in Appendix C. Signal warrant figures are shown in Appendix D.

LEDCOR SF-S PARCEL TIAR

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors

NEARBY DEVELOPMENTS

1. KIHEI RESIDENTIAL
2. KAIWAHINE VILLAGE
3. OHUKAI AFFORDABLE HOUSING
4. MAUI BAY VILLAS
5. KENOLIO APARTMENTS
6. KIHEI HIGH SCHOOL
7. WELAKAHAO VILLAGE RESIDENTIAL SUBDIVISION
8. SOUTH MAUI COMMUNITY PARK – PHASES 1–B, 1–C, 2 & 3
9. KRAUSZ – DOWNTOWN KIHEI
10. KALAMA KAI

FIGURE 4.1

KIHEI BACKGROUND PROJECTS

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors

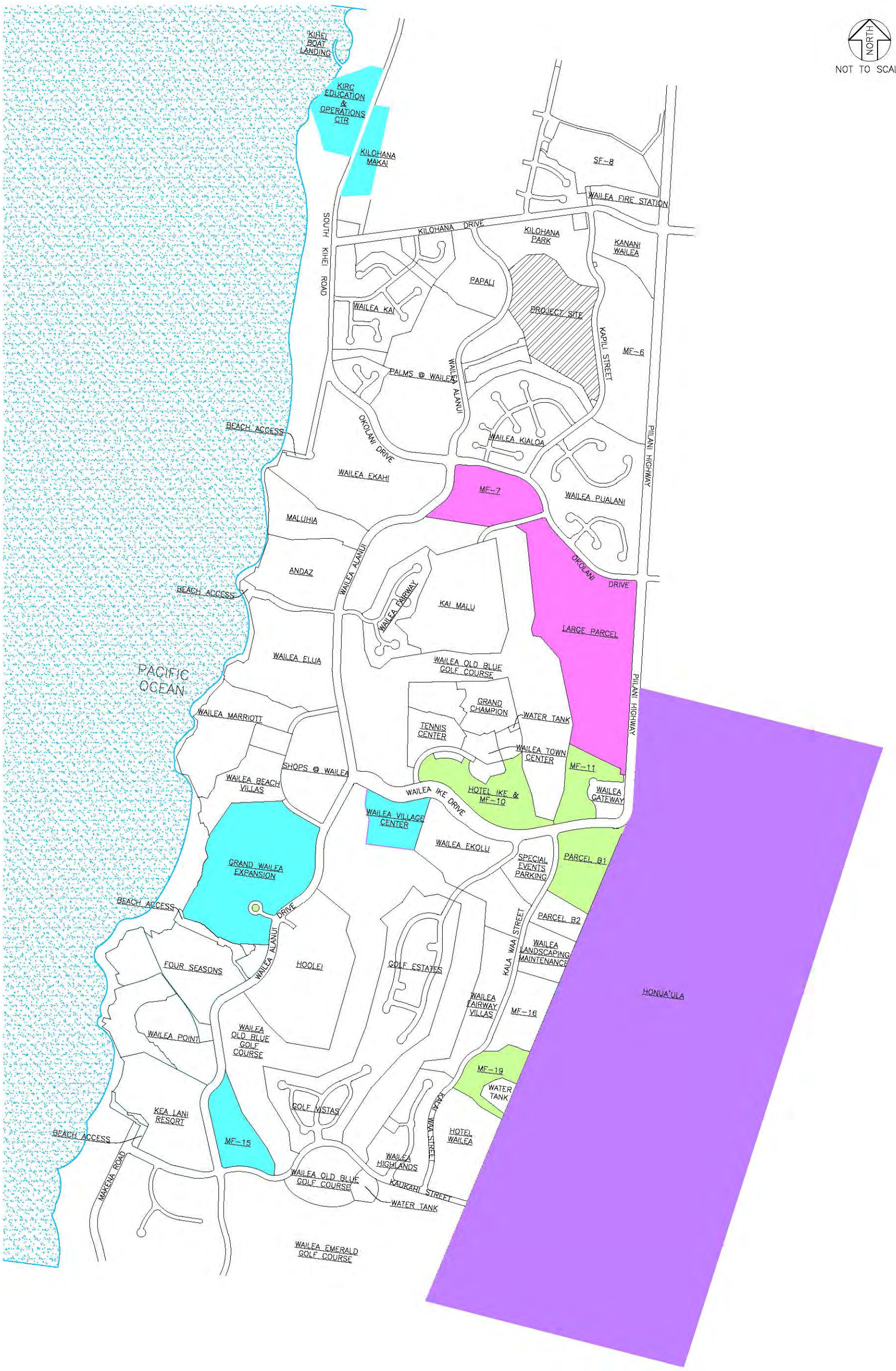


FIGURE 4.2

WAILEA BACKGROUND PROJECTS

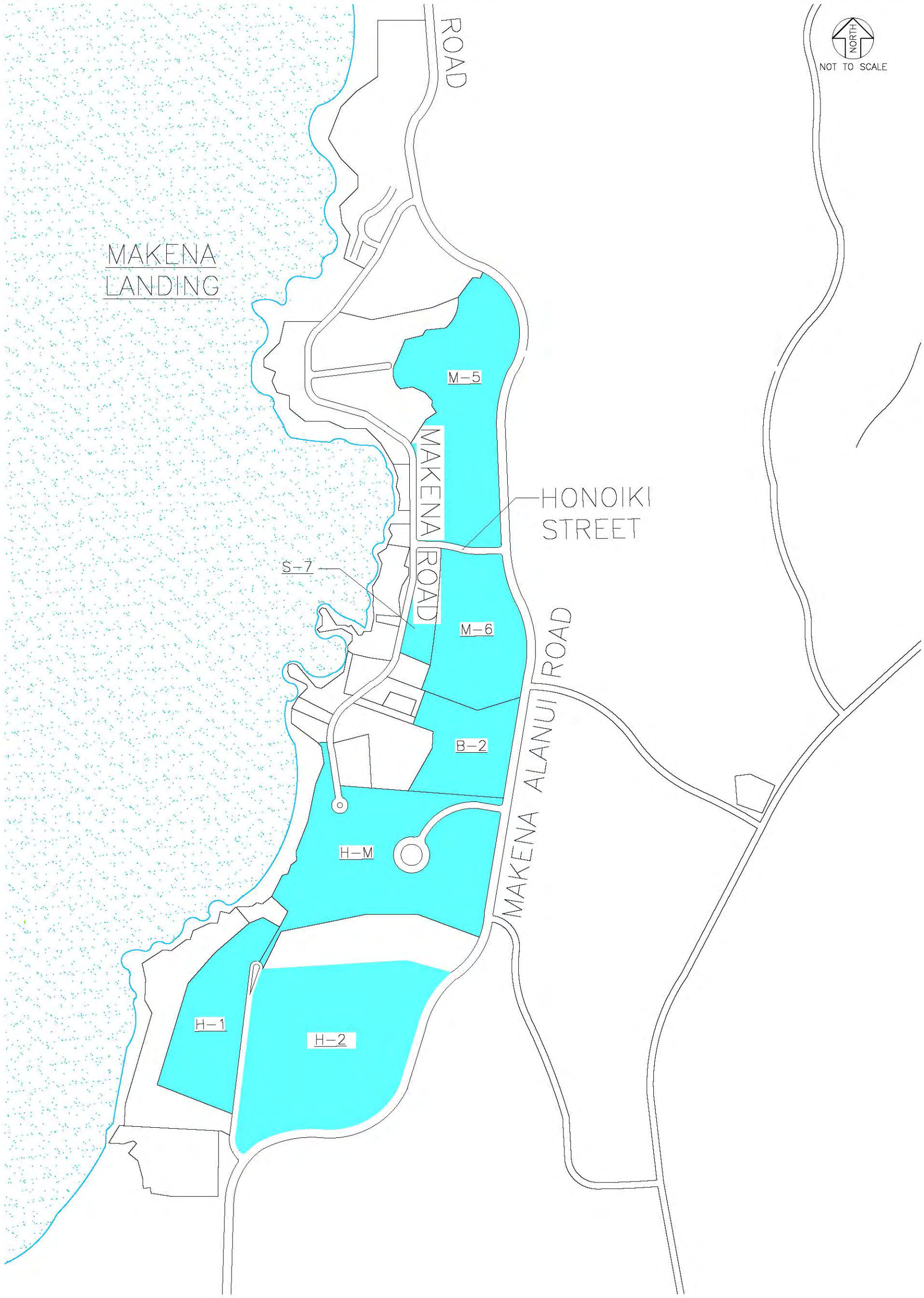


FIGURE 4.3

MAKENA BACKGROUND PROJECTS

Table 4.1: Trips Generated by Known Developments in Kihei[1]

Project	ITE Code	Independent Variable	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Exit
South Maui Community Park	Obtained from Project's TIAR		57	42	99	80	45	125
Kenolio Apartments	Obtained from Project's TIAR		30	73	103	77	50	127
Kaiwahine Village	Obtained from Project's TIAR		19	47	66	49	31	80
Kamalani (Kihei Residential)	Obtained from Project's TIAR		93	290	383	311	178	489
Kihei High School [2]	Obtained from Project's TIAR		228	108	336	49	55	104
Maui Bay Villas [3]	Obtained from Project's TIAR		110	60	170	210	136	346
Welakahao Village	Obtained from Project's TIAR		33	95	128	109	63	172
Ohukai Affordable Housing	220	40 DU	5	15	20	16	10	26
Kalama Kai	220	40 DU	5	15	20	16	10	26
Krausz Downtown Kihei [4]	Obtained from Project's TIAR		230	133	363	393	416	809

Notes:

1. Table 4.1 shows total trips generated by known developments in the vicinity of the Project. Not all traffic generated by these developments travel through the study area of this TIAR, since some traffic will be routed to various roadways and intersections that were not included in this TIAR.
2. Assumes the high school will serve approximately 800 students by the Year 2024. Majority of these trips are existing traffic heading to Maui High School. As a result, only a small fraction of these trips pass through the project study area.
3. Phase 1 and 2 of Maui Bay Villas anticipated to be completed by Year 2024; 71% of the total 388 timeshares units complete.
4. By year 2024, approximately 50% of Krausz may be completed based on current completion dates.

Table 4.2: Trips Generated by Known Developments in Wailea and Makena

Project	ITE Code	Indepen-dent Variable	AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Exit
KIRC	Obtained from Project's TIAR		52	6	58	10	55	65
Kilohana Makai	Obtained from Project's TIAR		6	19	25	19	11	30
MF-7	PB/220	75 DU	7	12	19	15	14	29
Wailea Village Center Expansion	820	22,000 SF	7	5	12	60	66	126
Hotel Ike (MF-10)	330	110 Rooms	25	10	35	20	26	46
Keala O Wailea (MF-11)	PB	70 DU	6	25	31	24	13	37
Parcel B1	820/944	97,600 SF/Gas Station	153	111	264	279	300	579
Grand Wailea Expansion	330	224 rooms	55	21	76	46	61	107
Makalii at Wailea (MF-15)	PB	68 DU	6	9	15	11	12	23
The Ridge at Wailea (MF-19)	PB (SF)	9 DU	2	2	4	2	2	4
Honua'ula Phase 1	210/220	250 DU	31	101	132	102	59	161
Makena M5/M6/S7/B2	Obtained from Project's TIAR		65	61	126	62	70	132
Makena Parcel H-1	PB	6 MF 13 SF	3	4	7	3	4	7
Makena Resort H-M	210/PB	65 DU	54	25	79	46	47	93
Large Parcel (SF-7a, MF-12, MF-13)	PB/210	266 DU/23 Rooms	33	45	78	61	54	115
Makena H-2	210/PB	53 DU	17	15	32	14	14	28

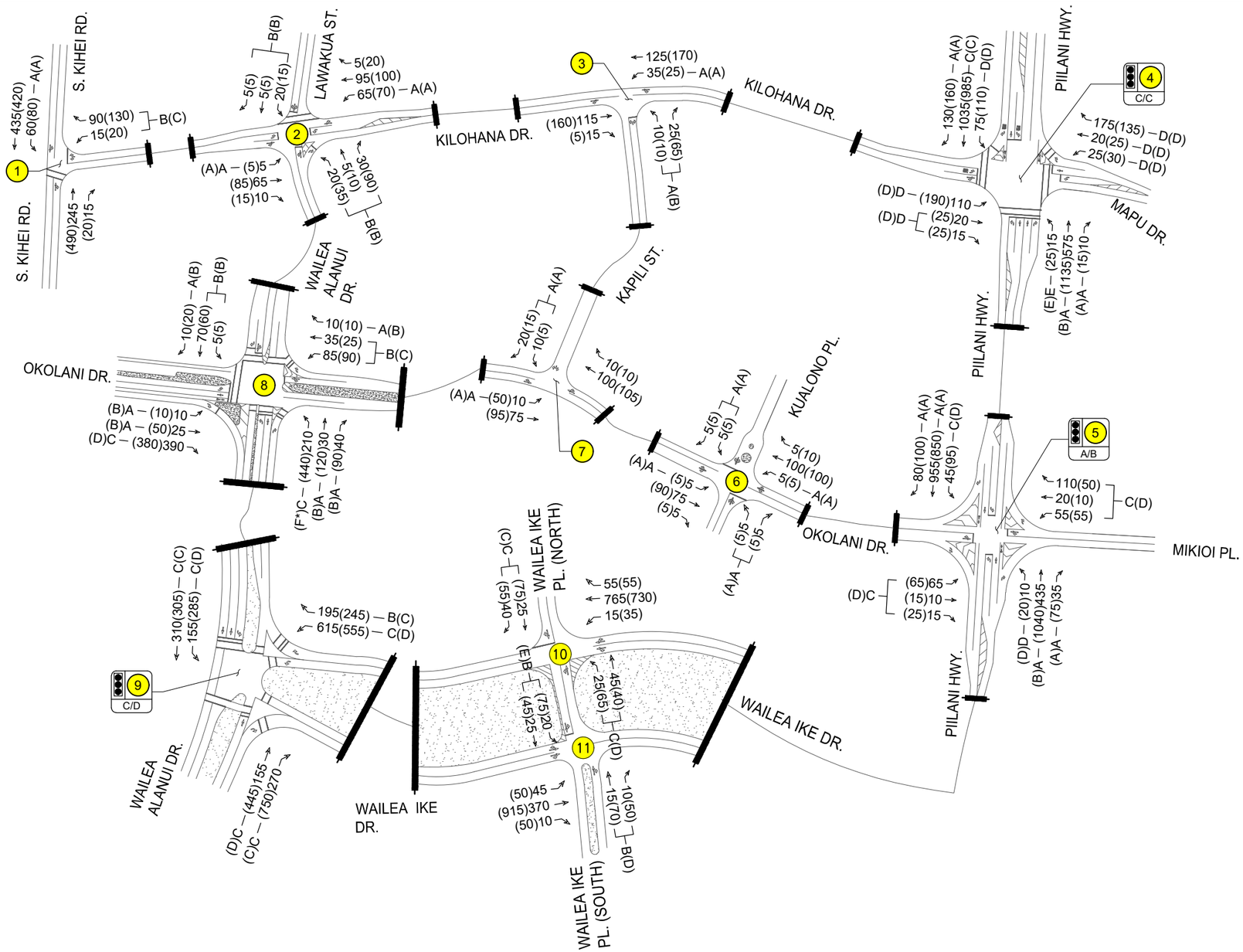
Notes:

1. Table 4.2 shows total trips generated by known developments in the vicinity of the Project. Not all traffic generated by these developments travel through the study area of this TIAR, since some traffic will be routed to various roadways and intersections that were not included in this TIAR.

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors

NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

N
NOT TO SCALE



LEGEND

##(##)	- AM(PM) VEHICLE VOLUMES
X	- UNSIGNALIZED INTERSECTION X
Y X/X	- SIGNALIZED INTERSECTION Y, OVERALL AM/PM LOS
X(X)	- AM(PM) LOS

BASE YEAR 2024 LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS

Table 4.3: Existing and Base Year 2024 Level of Service Summary

Intersection	Existing Conditions						Base Year 2024					
	AM			PM			AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: S Kihei Rd & Kilohana Dr												
WB LT/RT	11.5	0.15	B	15.0	0.30	C	13.6	0.22	B	22.5	0.45	C
SB LT	8.0	0.05	A	8.6	0.07	A	8.3	0.06	A	9.4	0.10	A
Overall	2.4	-	-	3.4	-	-	2.2	-	-	3.6	-	-
2: Wailea Alanui Dr & Kilohana Dr												
NB LT/TH/RT	10.1	0.07	B	10.7	0.18	B	10.5	0.08	B	11.2	0.20	B
WB LT	7.5	0.05	A	7.6	0.05	A	7.6	0.05	A	7.6	0.05	A
SB LT/TH/RT	11.2	0.04	B	12.6	0.03	B	11.6	0.06	B	12.6	0.05	B
Overall	4.1	-	-	4.9	-	-	4.4	-	-	5.3	-	-
3: Kapili St & Kilohana Dr												
NB LT/RT	9.5	0.04	A	9.7	0.09	A	9.7	0.05	A	10.0	0.10	B
WB LT	7.5	0.02	A	7.6	0.02	A	7.6	0.03	A	7.6	0.02	A
Overall	1.8	-	-	2.1	-	-	1.9	-	-	2.2	-	-
4: Piilani Hwy & Kilohana Dr/Mapu Dr												
NB LT	37.7	0.44	D	55.1	0.50	E	55.5	0.51	E	57.5	0.59	E
NB TH	-	-	-	-	-	-	9.1	0.28	A	16.0	0.60	B
NB TH/RT	7.7	0.38	A	19.3	0.82	B	-	-	-	-	-	-
NB RT	-	-	-	-	-	-	7.5	0.01	A	10.0	0.01	A
EB LT	28.5	0.40	C	43.2	0.65	D	42.9	0.48	D	48.2	0.68	D
EB TH/RT	26.5	0.10	C	36.8	0.10	D	43.6	0.13	D	42.7	0.12	D
WB LT	-	-	-	-	-	-	46.5	0.16	D	48.8	0.19	D
WB TH	-	-	-	-	-	-	50.0	0.28	D	53.0	0.34	D
WB LT/TH/RT	28.4	0.39	C	37.6	0.20	D	-	-	-	-	-	-
WB RT	-	-	-	-	-	-	48.1	0.02	D	50.5	0.02	D
SB LT	35.2	0.75	D	50.9	0.80	D	53.1	0.78	D	53.5	0.81	D
SB TH	10.6	0.75	B	11.0	0.61	B	24.0	0.91	C	27.2	0.91	C
SB RT	4.9	0.09	A	6.5	0.12	A	6.4	0.10	A	8.2	0.13	A
Overall	13.3	-	B	20.5	-	C	21.9	-	C	25.0	-	C
5: Piilani Hwy & Okolani Dr												
NB LT	9.7	0.00	A	9.1	0.01	A	38.7	0.44	D	47.0	0.51	D
NB TH	-	-	-	-	-	-	5.4	0.40	A	13.3	0.89	B
NB RT	-	-	-	-	-	-	3.9	0.02	A	4.2	0.05	A
EB LT/TH/RT	45.9	0.45	E	207.1	1.01	F*	25.1	0.32	C	36.8	0.42	D
WB LT/TH/RT	15.7	0.32	C	40.8	0.43	E	25.2	0.33	C	36.0	0.34	D
SB LT	7.9	0.03	A	10.3	0.12	B	31.8	0.58	C	45.2	0.78	D
SB TH	-	-	-	-	-	-	8.9	0.84	A	6.3	0.68	A
SB RT	-	-	-	-	-	-	3.4	0.06	A	3.1	0.07	A
Overall	4.2	-	-	10.6	-	-	10.0	-	A	13.2	-	B
6: Okolani Dr & Kualono Pl												
NB LT/TH/RT	-	-	-	-	-	-	9.4	0.01	A	9.5	0.01	A
EB LT	7.4	0.00	A	7.4	0.00	A	7.5	0.00	A	7.5	0.00	A
WB LT	-	-	-	-	-	-	7.4	0.00	A	7.4	0.00	A
SB LT/TH/RT	-	-	-	-	-	-	9.4	0.01	A	9.5	0.01	A
SB LT/RT	9.1	0.01	A	8.9	0.01	A	-	-	-	-	-	-
Overall	0.5	-	-	0.4	-	-	1.2	-	-	1.1	-	-

Table 4.3: Existing and Base Year 2024 Level of Service Summary Cont'd

Intersection	Existing Conditions						Base Year 2024					
	AM			PM			AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
7: Okolani Dr & Kapili St												
EB LT	7.5	0.01	A	7.5	0.04	A	7.5	0.01	A	7.6	0.04	A
SB LT/RT	9.2	0.03	A	9.2	0.02	A	9.4	0.04	A	9.5	0.03	A
Overall	1.6	-	-	2.2	-	-	1.6	-	-	2.0	-	-
8: Wailea Alanui Dr & Okolani Dr												
NB LT	11.1	0.22	B	17.3	0.56	C	16.0	0.46	C	76.1	1.01	F*
NB TH	9.1	0.05	A	10.5	0.22	B	9.9	0.06	A	12.5	0.26	B
NB RT	8.4	0.05	A	9.0	0.13	A	9.3	0.07	A	10.6	0.18	B
EB LT	9.0	0.01	A	10.1	0.02	B	9.8	0.02	A	11.3	0.03	B
EB TH	8.6	0.03	A	9.9	0.07	A	9.5	0.05	A	11.5	0.12	B
EB RT	11.4	0.42	B	12.7	0.40	B	19.2	0.67	C	33.1	0.81	D
WB LT/TH	10.8	0.20	B	12.2	0.21	B	12.9	0.27	B	15.8	0.31	C
WB RT	8.2	0.01	A	9.2	0.02	A	9.2	0.02	A	10.9	0.02	B
SB LT/TH	10.0	0.13	A	10.9	0.13	B	11.6	0.17	B	13.4	0.18	B
SB RT	8.4	0.01	A	9.3	0.02	A	9.5	0.02	A	11.3	0.05	B
Overall	10.7	-	B	13.1	-	B	15.7	-	C	40.2	-	E
9: Wailea Alanui Drive & Wailea Ike Drive												
NB TH	16.7	0.18	B	20.5	0.56	C	26.7	0.39	C	44.6	0.84	D
NB RT	16.3	0.10	B	18.0	0.34	B	25.1	0.19	C	33.4	0.63	C
WB LT	16.9	0.65	B	28.4	0.70	C	25.5	0.82	C	52.6	0.93	D
WB RT	11.6	0.10	B	19.9	0.10	B	12.8	0.17	B	22.7	0.19	C
SB LT	25.1	0.46	C	29.6	0.58	C	34.2	0.59	C	53.2	0.83	D
SB TH	16.5	0.25	B	12.2	0.15	B	23.1	0.34	C	22.2	0.25	C
Overall	16.8	-	B	21.2	-	C	24.4	-	C	39.3	-	D
10: Wailea Ike Drive & Wailea Ike Place (North)												
NB LT/TH	14.2	0.11	B	13.6	0.12	B	20.6	0.25	C	25.2	0.39	D
SB TH/RT	12.4	0.11	B	13.2	0.20	B	15.8	0.18	C	21.7	0.40	C
Overall	1.9	-	-	3.1	-	-	2.5	-	-	5.2	-	-
11: Wailea Ike Place (South) & Wailea Ike Drive												
NB TH/RT	10.2	0.03	B	14.6	0.12	B	11.8	0.05	B	30.5	0.49	D
SB LT/TH	10.8	0.06	B	15.6	0.20	C	12.7	0.10	B	45.8	0.62	E
Overall	1.9	-	-	2.4	-	-	1.8	-	-	7.3	-	-

Notes

* Denotes over-capacity conditions

5. FUTURE YEAR 2024 TRAFFIC CONDITIONS

The Future Year 2024 scenario represents the traffic conditions within the Project study area with the full build-out and occupancy of the Project.

5.1 Background

The Project proposes to develop 57 single-family residential units on a currently undeveloped 23.1-acre lot south of Kilohana Drive. Access to the SF-S parcel will be provided by one (1) driveway via Kapili Street. An emergency access will be provided via Wailea Alanui Drive with possible emergency egress at two locations along Kapili Street.

5.2 Travel Demand Estimations

5.2.1 Trip Generation

Vehicular trips for the Project were generated based on two (2) publications. The Project assumes approximately 90% of the single-family residential units will consist of part-time residents, while the remaining 10% are full-time residents. Therefore, local resort residential trip rates obtained from the Resort Residential Trip Generation Rate Development, prepared by Parsons Brinkerhoff (PB) in October 2006 were used for this roughly 90% single-family resort residential units. These trip rates were derived from a local Maui study that calculated AM and PM peak hour trip rates for single-family resort residential units within the Wailea Resort area. These rates were accepted by HDOT.

Trips generated by the remaining 10% of resort residential units (full-time residents) was calculated based on the national Institute of Transportation Engineers (ITE) trip rates, which publishes a book based on empirical data compiled from a body of more than 4,250 trip generation studies submitted by public agencies, developers, consulting firms, and associations. This publication, titled Trip Generation Manual, 10th Edition, provides trip rates and/or formulae based on graphs that correlate vehicular trips with independent variables. The independent variables can range from Dwelling Units (DU) for single and multi-family attached homes to Square-foot Gross Leasable Area (SF GLA) for commercial development.

See Tables 5.1 and 5.2 for Trip Generation formulae and projections for the Project.

Table 5.1: Project Trip Generation Rates

Land Use (ITE Code)	Independent Variable	Weekday AM Peak Hour		Weekday PM Peak Hour	
		Trip Rate	% Enter	Trip Rate	% Enter
Resort Single-Family Residential (PB Calculated)	DU	0.46	58%	0.46	50%
Single-Family Detached Housing (210)	DU	[a]	25%	[b]	63%

Notes
DU = Dwelling Unit
[a] (T) = 0.71(X) + 4.80 [b] Ln(T) = 0.96 Ln(X) + 0.20

Table 5.2: Project-Generated Trips

Land Use Type (ITE Code)	Independent Variable	Weekday AM Peak Hour			Weekday PM Peak Hour		
		Enter (vph)	Exit (vph)	Total (vph)	Enter (vph)	Exit (vph)	Total (vph)
Resort Single-Family (PB Calculated)	52 DU	14	10	24	12	12	24
Single-Family Detached Housing (210)	5 DU	2	6	8	4	2	6
TOTAL		**16**	**16**	**32**	**16**	**14**	**30**

5.2.2 Trip Distribution & Assignment

Trips generated by the Project were assigned throughout the study area generally based upon existing and projected Base Year 2024 travel patterns. The traffic generated by the Project was added to the forecast Base Year 2024 traffic volumes within the vicinity of the Project to constitute the traffic volumes for the Future Year 2024 traffic conditions. Figure 5.1 illustrates the Project-generated trip distribution.

5.3 Future Year 2024 Analysis

The Project is forecast to generate approximately 32(30) new vehicle trips during the AM(PM) peak hours of traffic, respectively. Upon completion of the Project, all study intersections are forecast to operate with similar LOS as Base Year 2024 traffic conditions. Regionally along Piilani Highway, traffic generated by the Project will increase by approximately 1-8 vehicles in each direction per peak hour, which translates to a 0.6% increase in traffic. Similarly along South Kihei Road, traffic will only increase by approximately 4 vehicles in each direction per peak hour, which translates to a 0.8% increase in traffic. Due to generally low traffic increases as a result of the Project the majority of movements will operate with the same LOS as Base Year 2024 condition. All movements that operated at LOS E/F with Base Year 2024 conditions will continue operating at LOS E/F for Future Year 2024.

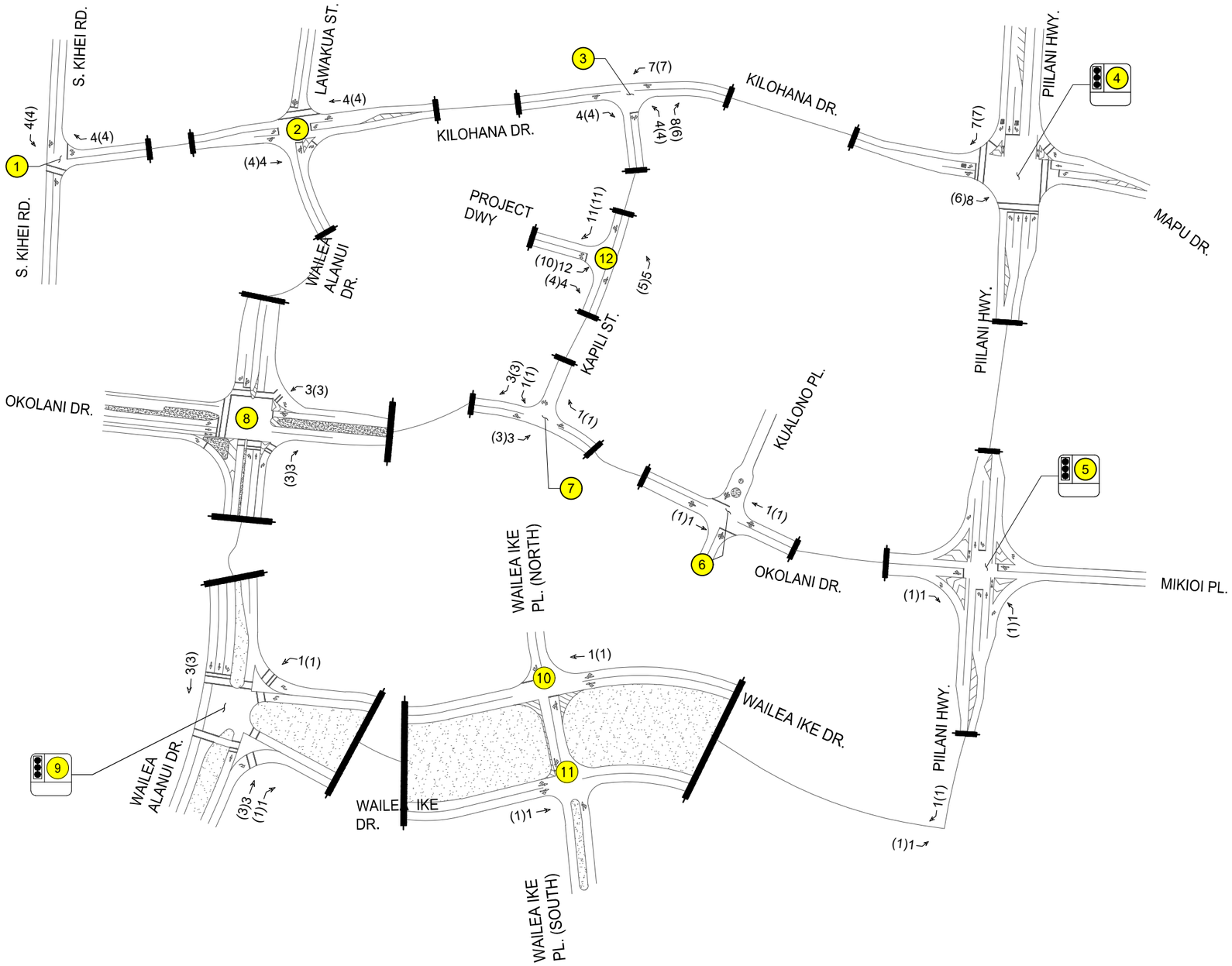
As discussed in Section 4.4, the Wailea Alanui Drive/Okolani Drive intersection is forecast to operate at overall LOS E and the northbound left-turn will operate over-capacity at LOS F during the PM peak hour for Base Year 2024. Since there are no planned improvements at the Wailea Alanui Drive/Okolani Drive intersection, it was analyzed as a 4-way stop for Future Year 2024. A traffic signal is likely not warranted.

See Figure 5.2 for the Future Year 2024 with Project traffic volumes and LOS. Table 5.3 summarizes the Existing, Base Year 2024, and Future Year 2024 with Project LOS at the study intersections. LOS worksheets are provided in Appendix C. Signal warrant figures are shown in Appendix D.

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors

NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

N
NOT TO SCALE



LEGEND

##(##)	- AM(PM) VEHICLE VOLUMES
X	- UNSIGNALIZED INTERSECTION X
Y	- SIGNALIZED INTERSECTION Y

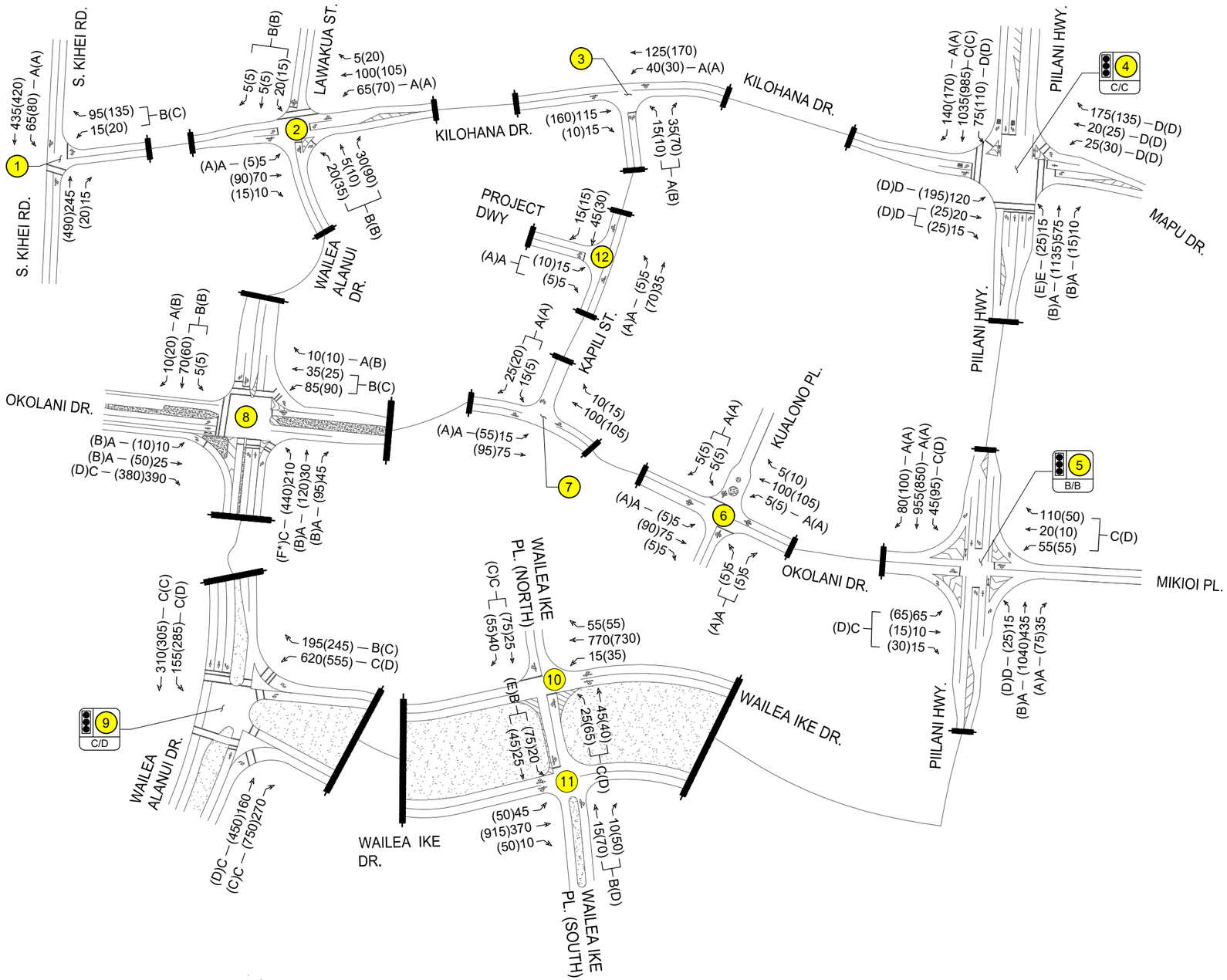
FIGURE 5.1

PROJECT GENERATED TRIPS

AustinTsutsumi & ASSOCIATES, INC.
Engineers & Surveyors

NOTE:
THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

N
NOT TO SCALE



LEGEND

##(##)	- AM(PM) VEHICLE VOLUMES
X	- UNSIGNALIZED INTERSECTION X
Y (X/X)	- SIGNALIZED INTERSECTION Y, OVERALL AM/PM LOS
X(X)	- AM(PM) LOS

FIGURE 5.2

FY 2024 CONDITIONS LANE CONFIGURATIONS, TRAFFIC VOLUMES AND LOS

Table 5.3: Existing, Base Year 2024 and Future Year 2024 Level of Service Summary

Intersection	Existing Conditions						Base Year 2024 Without Project						Future Year 2024 With Project					
	AM			PM			AM			PM			AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
1: S Kihei Rd & Kilohana Dr																		
WB LT/RT	11.5	0.15	B	15.0	0.30	C	13.6	0.22	B	22.5	0.45	C	13.7	0.22	B	22.8	0.46	C
SB LT	8.0	0.05	A	8.6	0.07	A	8.3	0.06	A	9.4	0.10	A	8.3	0.06	A	9.4	0.10	A
Overall	2.4	-	-	3.4	-	-	2.2	-	-	3.6	-	-	2.4	-	-	3.7	-	-
2: Wailea Alanui Dr & Kilohana Dr																		
NB LT/TH/RT	10.1	0.07	B	10.7	0.18	B	10.5	0.08	B	11.2	0.20	B	10.6	0.09	B	11.3	0.20	B
WB LT	7.5	0.05	A	7.6	0.05	A	7.6	0.05	A	7.6	0.05	A	7.6	0.05	A	7.6	0.05	A
SB LT/TH/RT	11.2	0.04	B	12.6	0.03	B	11.6	0.06	B	12.6	0.05	B	11.7	0.06	B	12.7	0.06	B
Overall	4.1	-	-	4.9	-	-	4.4	-	-	5.3	-	-	4.3	-	-	5.2	-	-
3: Kapili St & Kilohana Dr																		
NB LT/RT	9.5	0.04	A	9.7	0.09	A	9.7	0.05	A	10.0	0.10	B	9.9	0.07	A	10.0	0.11	B
WB LT	7.5	0.02	A	7.6	0.02	A	7.6	0.03	A	7.6	0.02	A	7.6	0.03	A	7.7	0.02	A
Overall	1.8	-	-	2.1	-	-	1.9	-	-	2.2	-	-	2.3	-	-	2.3	-	-
4: Piilani Hwy & Kilohana Dr/Mapu Dr																		
NB LT	37.7	0.44	D	55.1	0.50	E	55.5	0.51	E	57.5	0.59	E	56.1	0.51	E	57.6	0.59	E
NB TH	-	-	-	-	-	-	9.1	0.28	A	16.0	0.60	B	9.4	0.28	A	16.0	0.60	B
NB TH/RT	7.7	0.38	A	19.3	0.82	B	-	-	-	-	-	-	-	-	-	-	-	-
NB RT	-	-	-	-	-	-	7.5	0.01	A	10.0	0.01	A	7.7	0.01	A	10.0	0.01	B
EB LT	28.5	0.40	C	43.2	0.65	D	42.9	0.48	D	48.2	0.68	D	43.2	0.50	D	49.1	0.69	D
EB TH/RT	26.5	0.10	C	36.8	0.10	D	43.6	0.13	D	42.7	0.12	D	43.5	0.12	D	42.7	0.12	D
WB LT	-	-	-	-	-	-	46.5	0.16	D	48.8	0.19	D	47.1	0.16	D	48.8	0.19	D
WB TH	-	-	-	-	-	-	50.0	0.28	D	53.0	0.34	D	50.6	0.28	D	53.0	0.34	D
WB LT/TH/RT	28.4	0.39	C	37.6	0.20	D	-	-	-	-	-	-	-	-	-	-	-	-
WB RT	-	-	-	-	-	-	48.1	0.02	D	50.5	0.02	D	48.7	0.02	D	50.5	0.02	D
SB LT	35.2	0.75	D	50.9	0.80	D	53.1	0.78	D	53.5	0.81	D	53.7	0.78	D	53.5	0.81	D
SB TH	10.6	0.75	B	11.0	0.61	B	24.0	0.91	C	27.2	0.91	C	24.9	0.91	C	27.2	0.91	C
SB RT	4.9	0.09	A	6.5	0.12	A	6.4	0.10	A	8.2	0.13	A	6.6	0.11	A	8.3	0.14	A
Overall	13.3	-	B	20.5	-	C	21.9	-	C	25.0	-	C	22.6	-	C	25.1	-	C
5: Piilani Hwy & Okolani Dr																		
NB LT	9.7	0.00	A	9.1	0.01	A	38.7	0.44	D	47.0	0.51	D	36.2	0.46	D	46.3	0.54	D
NB TH	-	-	-	-	-	-	5.4	0.40	A	13.3	0.89	B	5.4	0.40	A	13.3	0.89	B
NB RT	-	-	-	-	-	-	3.9	0.02	A	4.2	0.05	A	3.9	0.02	A	4.2	0.05	A
EB LT/TH/RT	45.9	0.45	E	207.1	1.01	F*	25.1	0.32	C	36.8	0.42	D	25.5	0.32	C	36.8	0.42	D
WB LT/TH/RT	15.7	0.32	C	40.8	0.43	E	25.2	0.33	C	36.0	0.34	D	25.6	0.33	C	36.0	0.34	D
SB LT	7.9	0.03	A	10.3	0.12	B	31.8	0.58	C	45.2	0.78	D	32.3	0.58	C	45.2	0.78	D
SB TH	-	-	-	-	-	-	8.9	0.84	A	6.3	0.68	A	9.1	0.84	A	6.5	0.68	A
SB RT	-	-	-	-	-	-	3.4	0.06	A	3.1	0.07	A	3.4	0.06	A	3.2	0.07	A
Overall	4.2	-	-	10.6	-	-	10.0	-	A	13.2	-	B	10.2	-	B	13.4	-	B
6: Okolani Dr & Kualono Pl																		
NB LT/TH/RT	-	-	-	-	-	-	9.4	0.01	A	9.5	0.01	A	9.4	0.01	A	9.5	0.01	A
EB LT	7.4	0.00	A	7.4	0.00	A	7.5	0.00	A	7.5	0.00	A	7.5	0.00	A	7.5	0.00	A
WB LT	-	-	-	-	-	-	7.4	0.00	A	7.4	0.00	A	7.4	0.00	A	7.4	0.00	A
SB LT/TH/RT	-	-	-	-	-	-	9.4	0.01	A	9.5	0.01	A	9.4	0.01	A	9.6	0.01	A
SB LT/RT	9.1	0.01	A	8.9	0.01	A	-	-	-	-	-	-	-	-	-	-	-	-
Overall	0.5	-	-	0.4	-	-	1.2	-	-	1.1	-	-	1.2	-	-	1.1	-	-

Table 5.3: Existing, Base Year 2024 and Future Year 2024 Level of Service Summary Cont'd

Intersection	Existing Conditions						Base Year 2024 Without Project						Future Year 2024 With Project					
	AM			PM			AM			PM			AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
7: Okolani Dr & Kapili St																		
EB LT	7.5	0.01	A	7.5	0.04	A	7.5	0.01	A	7.6	0.04	A	7.5	0.01	A	7.6	0.04	A
SB LT/RT	9.2	0.03	A	9.2	0.02	A	9.4	0.04	A	9.5	0.03	A	9.6	0.05	A	9.5	0.03	A
Overall	1.6	-	-	2.2	-	-	1.6	-	-	2.0	-	-	2.1	-	-	2.2	-	-
8: Wailea Alanui Dr & Okolani Dr																		
NB LT	11.1	0.22	B	17.3	0.56	C	16.0	0.46	C	76.1	1.01	F*	16.0	0.46	C	76.3	1.01	F*
NB TH	9.1	0.05	A	10.5	0.22	B	9.9	0.06	A	12.5	0.26	B	9.9	0.06	A	12.5	0.26	B
NB RT	8.4	0.05	A	9.0	0.13	A	9.3	0.07	A	10.6	0.18	B	9.3	0.08	A	10.7	0.19	B
EB LT	9.0	0.01	A	10.1	0.02	B	9.8	0.02	A	11.3	0.03	B	9.8	0.02	A	11.3	0.03	B
EB TH	8.6	0.03	A	9.9	0.07	A	9.5	0.05	A	11.5	0.12	B	9.5	0.05	A	11.6	0.12	B
EB RT	11.4	0.42	B	12.7	0.40	B	19.2	0.67	C	33.1	0.81	D	19.4	0.67	C	32.0	0.81	D
WB LT/TH	10.8	0.20	B	12.2	0.21	B	12.9	0.27	B	15.8	0.31	C	12.9	0.27	B	15.8	0.31	C
WB RT	8.2	0.01	A	9.2	0.02	A	9.2	0.02	A	10.9	0.02	B	9.2	0.02	A	10.9	0.02	B
SB LT/TH	10.0	0.13	A	10.9	0.13	B	11.6	0.17	B	13.4	0.18	B	11.6	0.17	B	13.4	0.18	B
SB RT	8.4	0.01	A	9.3	0.02	A	9.5	0.02	A	11.3	0.05	B	9.5	0.02	A	11.2	0.05	B
Overall	10.7	-	B	13.1	-	B	15.7	-	C	40.2	-	E	15.8	-	C	39.8	-	E
9: Wailea Alanui Drive & Wailea Ike Drive																		
NB TH	16.7	0.18	B	20.5	0.56	C	26.7	0.39	C	44.6	0.84	D	26.8	0.40	C	45.3	0.85	D
NB RT	16.3	0.10	B	18.0	0.34	B	25.1	0.19	C	33.4	0.63	C	25.0	0.19	C	33.4	0.63	C
WB LT	16.9	0.65	B	28.4	0.70	C	25.5	0.82	C	52.6	0.93	D	26.3	0.83	C	52.7	0.93	D
WB RT	11.6	0.10	B	19.9	0.10	B	12.8	0.17	B	22.7	0.19	C	12.9	0.17	B	22.8	0.19	C
SB LT	25.1	0.46	C	29.6	0.58	C	34.2	0.59	C	53.2	0.83	D	34.5	0.59	C	53.8	0.83	D
SB TH	16.5	0.25	B	12.2	0.15	B	23.1	0.34	C	22.2	0.25	C	23.1	0.34	C	22.2	0.25	C
Overall	16.8	-	B	21.2	-	C	24.4	-	C	39.3	-	D	24.8	-	C	39.5	-	D
10: Wailea Ike Drive & Wailea Ike Place (North)																		
NB LT/TH	14.2	0.11	B	13.6	0.12	B	20.6	0.25	C	25.2	0.39	D	20.8	0.25	C	25.2	0.39	D
SB TH/RT	12.4	0.11	B	13.2	0.20	B	15.8	0.18	C	21.7	0.40	C	15.9	0.18	C	21.7	0.40	C
Overall	1.9	-	-	3.1	-	-	2.5	-	-	5.2	-	-	2.6	-	-	5.2	-	-
11: Wailea Ike Place (South) & Wailea Ike Drive																		
NB TH/RT	10.2	0.03	B	14.6	0.12	B	11.8	0.05	B	30.5	0.49	D	11.8	0.05	B	30.5	0.49	D
SB LT/TH	10.8	0.06	B	15.6	0.20	C	12.7	0.10	B	45.8	0.62	E	12.7	0.10	B	45.8	0.62	E
Overall	1.9	-	-	2.4	-	-	1.8	-	-	7.3	-	-	1.8	-	-	7.3	-	-
12: Kapili St & Project Dwy																		
NB LT	-	-	-	-	-	-	-	-	-	-	-	-	7.4	0.00	A	7.3	0.00	A
EB LT/TH	-	-	-	-	-	-	-	-	-	-	-	-	9.0	0.02	A	9.0	0.02	A
Overall	-	-	-	-	-	-	-	-	-	-	-	-	1.8	-	-	1.3	-	-

Notes
* Denotes over-capacity conditions

6. CONCLUSION

The Project proposes to develop 57 single-family units on approximately 23.1 acres of land. Access to the SF-S parcel will be provided by one (1) driveway via Kapili Street. An emergency access will be provided via Wailea Alanui Drive. The Project is anticipated to be completed and fully occupied by the Year 2024.

6.1 Existing Conditions

The majority of movements at the study intersections operated adequately at LOS D or better and under-capacity conditions during the peak hours of traffic with the exception of the following:

Piilani Highway & Kilohana Drive –During the AM peak hour, traffic analysis indicates the intersection operates at an overall LOS B with all movements operating at LOS D or better.

During the PM peak hour of traffic, northbound through volumes were observed to queue for about a 30-35 minute period extending as far south to Okolani Drive. By 4:50 PM, vehicle queues were observed to clear without heavy congestion. Traffic analysis indicates the intersection operates at overall LOS C with all movements operating at LOS D or better, with the exception of the northbound left-turn movement, which operates at LOS E.

Piilani Highway & Okolani Drive –During the AM peak hour, all approaches operate relatively smoothly with minor movements experiencing moderate delay with traffic analysis indicating that the northbound and southbound left-turn movements operate at LOS A and the eastbound and westbound left-turn/through movements operating at LOS E and LOS C, respectively.

During the PM peak hour, higher volumes along Piilani Highway result in longer delays to the minor street movements. The northbound and southbound left-turn movements operate at LOS A/B and the eastbound/westbound approaches operate at LOS E/F, with eastbound approach operating over-capacity. A traffic signal is currently being designed and will be implemented at the Piilani Highway/Okolani Drive/Mikioi Place intersection as part of the mitigation for the Kai Malu Wailea residential development.

Okolani Drive & Wailea Alanui Drive – This intersection provides stop-control for all approaches and currently operates adequately at overall LOS B during the AM and PM peak hours of traffic. During both peaks, the eastbound right-turn and northbound left-turn movements were heavier, providing regional flows between South Kihei Road and Wailea Alanui Drive. Both movements are stop controlled, but since the eastbound right-turn movement is provided with a dedicated receiving lane, most eastbound right-turners were observed to operate similar to a free or yield right-turn movement. As a result, no lengthy queues formed.

During the PM peak hour, the longest observed queue consisted of 7 vehicles, which completely cleared within 40 seconds. All other movements operate at LOS B or better during the PM peak hour of traffic.

6.2 Base Year 2024

Based on a comparison with existing conditions, regional traffic along Piilani Highway is anticipated to increase by 215-300 vehicles per direction (average 28 percent increase) and along South Kihei Road by 110-170 vehicles per direction (average 42 percent increase) from ambient growth and various background projects included in the analysis.

6.2.1 Planned Roadway Improvements

The following roadway improvements are assumed to be implemented by Year 2024:

- Piilani Highway/Okolani Drive/Mikioi Place Intersection:
  - Installation of a traffic signal.
    - The construction of a traffic control signal by Armstrong Builders is currently being designed as part of the roadway improvements for the Kai Malu at Wailea residential development.
- Piilani Highway/Kilohana Drive/Mapu Place Intersection:
  - Widening of Piilani Highway to provide an additional northbound through lane and an exclusive northbound right-turn lane at the Piilani Highway/Kilohana Drive/Mapu Place intersection.
  - In addition, widening of the westbound Mapu Drive approach to provide an exclusive left-turn, through and right-turn lane.

6.2.2 Base Year 2024 Analysis

The majority of study intersections will continue operating adequately, similar to existing conditions, with the exception of the following:

Piilani Highway/Kilohana Drive/Mapu Place – With the proposed widening improvement, the intersection will operate adequately with an overall LOS C for AM and PM peak hours of traffic. The northbound left-turn movement is anticipated to operate at LOS E due to longer signal cycles which favors through movements along the highway. Mainline through movements will operate adequately at LOS C or better and below capacity.

Wailea Alanui Drive/Okolani Drive – At this four-way stop intersection, the AM peak traffic will operate adequately with all movements operating at LOS C or higher and LOS overall. During the PM peak hour, the overall intersection will operate at LOS E with the northbound left-turn movement forecast to operate at-capacity and LOS F conditions. The northbound left-turn and eastbound right-turn movements provide for heavier flows that service regional traffic between Kihei and the Wailea/Makena regions. All remaining movements at this intersection are relatively low, with peak volumes generally below 100 vehicles per movement. Based on the MUTCD four-hour signal warrant, a signal will likely not be warranted by Year 2024.

Wailea Ike Drive/Wailea Ike Place (South) – The southbound left-turn/through movement is anticipated to operate at LOS E conditions, however should operate well below capacity. Existing observations also showed minimal southbound queues ranging from only 1-2 vehicles. Based on MUTCD, a signal will likely not be warranted by Year 2024.

6.3 Future Year 2024

The Project is forecast to generate approximately 32(30) new vehicle trips during the AM(PM) peak hours of traffic, respectively. Upon completion of the Project, all study intersections are forecast to operate with similar LOS as Base Year 2024 traffic conditions. Regionally along Piilani Highway, traffic generated by the Project will increase by approximately 1-8 vehicles in each direction per peak hour, which translates to a 0.6% increase in traffic. Similarly along South Kihei Road, traffic will only increase by approximately 4 vehicles in each direction per peak hour, which translates to a 0.8% increase in traffic. Due to generally low traffic increases

as a result of the Project the majority of movements will operate with the same LOS as Base Year 2024 condition. All movements that operated at LOS E/F with Base Year 2024 conditions will continue operating at LOS E/F for Future Year 2024.

As discussed in Section 4.4, the Wailea Alanui Drive/Okolani Drive intersection is forecast to operate at overall LOS E and the northbound left-turn will operate over-capacity at LOS F during the PM peak hour for Base Year 2024. Since there are no planned improvements at the Wailea Alanui Drive/Okolani Drive intersection, it was analyzed as a 4-way stop for Future Year 2024. A traffic signal is likely not warranted.

7. REFERENCES

1. Austin, Tsutsumi & Associates, Hotel Ike TIAR, 2018.
2. Austin, Tsutsumi & Associates, Kihei Residential TIAR, 2013.
3. Austin, Tsutsumi & Associates, KIRC TIAR, 2018.
4. Austin, Tsutsumi & Associates, Krausz Downtown Kihei TIAR, 2014.
5. Austin, Tsutsumi & Associates, Maui Bay Villas TIAR, 2015.
6. Austin, Tsutsumi & Associates, Wailea Resort Master Plan TIAR, 2014.
7. Austin, Tsutsumi & Associates, Welakahao Village TIAR, 2019.
8. Federal Highway Administration, Manual on Uniform Traffic Control Devices, 2009.
9. Institute of Transportation Engineers, Trip Generation, 10th Edition, 2017.
10. Phillip Rowell and Associates, Traffic Impact Analysis Report For South Maui Park at Piilani, December 2, 2005.
11. Phillip Rowell and Associates, Traffic Impact Assessment Report for Kenolio Apartments, February 2015.
12. Phillip Rowell & Associates, Traffic Impact Assessment Report for Wailea MF-11, June 22, 2012.
13. Transportation Research Board, Highway Capacity Manual, 6th Edition, 2016.
14. Wilson Okamoto Corporation, Traffic Impact Report for Kihei High School, September 2011.

A P P E N D I C E S

APPENDIX A

TRAFFIC COUNT DATA

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : S Kihei Rd - Kilohana Dr
Site Code : 19-518 SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

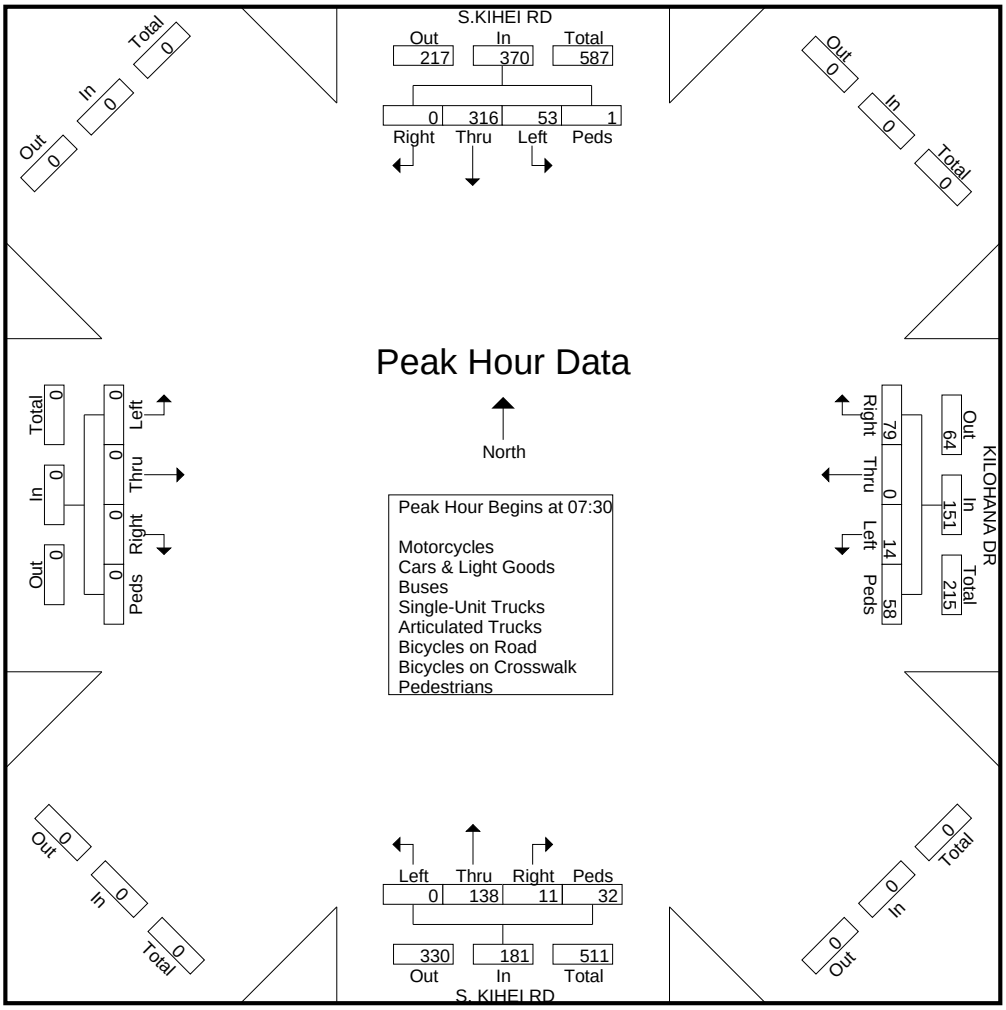
	S.KIHEI RD SOUTHBOUND				KILOHANA DR WESTBOUND				S. KIHEI RD NORTHBOUND				EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	17	38	0	1	5	0	5	24	0	30	2	4	0	0	0	0	126
06:45	8	61	0	3	7	0	5	35	0	18	1	3	0	0	0	0	141
Total	25	99	0	4	12	0	10	59	0	48	3	7	0	0	0	0	267
07:00	15	65	0	2	3	0	12	4	0	27	0	4	0	0	0	0	132
07:15	7	59	0	0	5	0	12	6	0	28	1	4	0	0	0	0	122
07:30	9	89	0	0	2	0	18	16	0	36	1	4	0	0	0	0	175
07:45	15	85	0	0	3	0	23	16	0	30	5	7	0	0	0	0	184
Total	46	298	0	2	13	0	65	42	0	121	7	19	0	0	0	0	613
08:00	11	66	0	0	3	0	24	20	0	42	1	7	0	0	0	0	174
08:15	18	76	0	1	6	0	14	6	0	30	4	14	0	0	0	0	169
Grand Total	100	539	0	7	34	0	113	127	0	241	15	47	0	0	0	0	1223
Apprch %	15.5	83.4	0	1.1	12.4	0	41.2	46.4	0	79.5	5	15.5	0	0	0	0	
Total %	8.2	44.1	0	0.6	2.8	0	9.2	10.4	0	19.7	1.2	3.8	0	0	0	0	
Motorcycles	1	8	0	0	0	0	2	0	0	2	0	0	0	0	0	0	13
% Motorcycles	1	1.5	0	0	0	0	1.8	0	0	0.8	0	0	0	0	0	0	1.1
Cars & Light Goods	97	500	0	0	31	0	108	0	0	221	14	0	0	0	0	0	971
% Cars & Light Goods	97	92.8	0	0	91.2	0	95.6	0	0	91.7	93.3	0	0	0	0	0	79.4
Buses	1	9	0	0	0	0	2	0	0	5	0	0	0	0	0	0	17
% Buses	1	1.7	0	0	0	0	1.8	0	0	2.1	0	0	0	0	0	0	1.4
Single-Unit Trucks	1	6	0	0	2	0	1	0	0	1	0	0	0	0	0	0	11
% Single-Unit Trucks	1	1.1	0	0	5.9	0	0.9	0	0	0.4	0	0	0	0	0	0	0.9
Articulated Trucks	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	3
% Articulated Trucks	0	0	0	0	2.9	0	0	0	0	0.4	6.7	0	0	0	0	0	0.2
Bicycles on Road	0	16	0	0	0	0	0	0	0	11	0	0	0	0	0	0	27
% Bicycles on Road	0	3	0	0	0	0	0	0	0	4.6	0	0	0	0	0	0	2.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0	0.1
Pedestrians	0	0	0	7	0	0	0	126	0	0	0	47	0	0	0	0	180
% Pedestrians	0	0	0	100	0	0	0	99.2	0	0	0	100	0	0	0	0	14.7

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : S Kihei Rd - Kilohana Dr
Site Code : 19-518 SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	S.KIHEI RD SOUTHBOUND					KILOHANA DR WESTBOUND					S. KIHEI RD NORTHBOUND					EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	9	**89**	0	0	98	2	0	18	16	36	0	36	1	4	41	0	0	0	0	0	175
07:45	15	85	0	0	**100**	3	0	23	16	42	0	30	**5**	7	42	0	0	0	0	0	**184**
08:00	11	66	0	0	77	3	0	**24**	**20**	**47**	0	**42**	1	7	**50**	0	0	0	0	0	174
08:15	**18**	76	0	**1**	95	**6**	0	14	6	26	0	30	4	**14**	48	0	0	0	0	0	169
Total Volume	53	316	0	1	370	14	0	79	58	151	0	138	11	32	181	0	0	0	0	0	702
% App. Total	14.3	85.4	0	0.3		9.3	0	52.3	38.4		0	76.2	6.1	17.7		0	0	0	0		
PHF	.736	.888	.000	.250	.925	.583	.000	.823	.725	.803	.000	.821	.550	.571	.905	.000	.000	.000	.000	.000	.954



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : S Kihei Rd - Kilohana Dr
Site Code : 19-518 SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

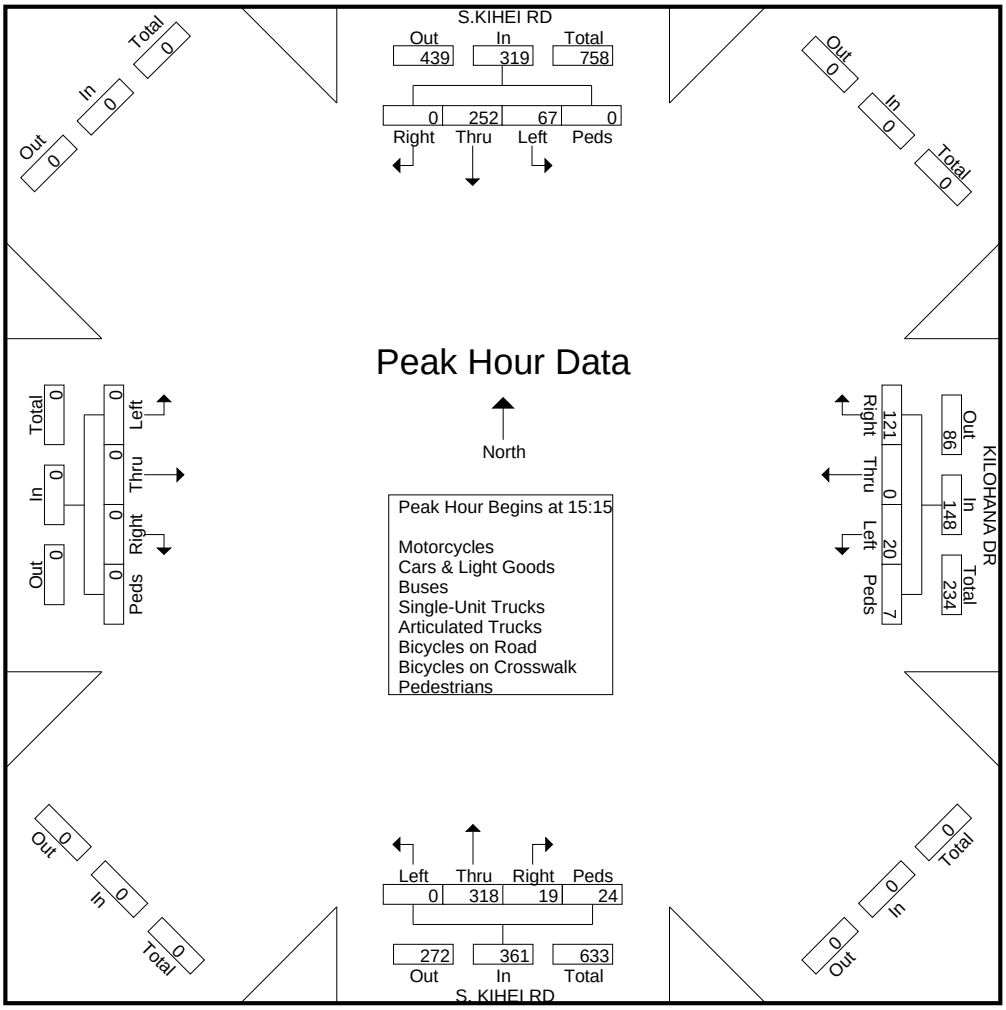
	S.KIHEI RD SOUTHBOUND				KILOHANA DR WESTBOUND				S. KIHEI RD NORTHBOUND				EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	13	56	0	0	1	0	22	0	0	70	8	3	0	0	0	0	173
15:15	9	65	0	0	3	0	41	5	0	81	5	3	0	0	0	0	212
15:30	20	61	0	0	5	0	32	1	0	72	6	6	0	0	0	0	203
15:45	18	74	0	0	7	0	27	1	0	83	6	9	0	0	0	0	225
Total	60	256	0	0	16	0	122	7	0	306	25	21	0	0	0	0	813
16:00	20	52	0	0	5	0	21	0	0	82	2	6	0	0	0	0	188
16:15	15	60	0	2	1	0	17	0	0	76	5	10	0	0	0	0	186
16:30	17	64	0	0	11	0	22	2	0	62	5	8	0	0	0	0	191
16:45	23	60	0	2	5	0	22	8	0	61	3	8	0	0	0	0	192
Total	75	236	0	4	22	0	82	10	0	281	15	32	0	0	0	0	757
Grand Total	135	492	0	4	38	0	204	17	0	587	40	53	0	0	0	0	1570
Apprch %	21.4	78	0	0.6	14.7	0	78.8	6.6	0	86.3	5.9	7.8	0	0	0	0	
Total %	8.6	31.3	0	0.3	2.4	0	13	1.1	0	37.4	2.5	3.4	0	0	0	0	
Motorcycles	3	15	0	0	0	0	0	0	0	7	0	0	0	0	0	0	25
% Motorcycles	2.2	3	0	0	0	0	0	0	0	1.2	0	0	0	0	0	0	1.6
Cars & Light Goods	132	463	0	0	38	0	204	0	0	565	40	0	0	0	0	0	1442
% Cars & Light Goods	97.8	94.1	0	0	100	0	100	0	0	96.3	100	0	0	0	0	0	91.8
Buses	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	6
% Buses	0	0.6	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0.4
Single-Unit Trucks	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	6
% Single-Unit Trucks	0	0.2	0	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0.4
Articulated Trucks	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
% Articulated Trucks	0	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2
Bicycles on Road	0	7	0	0	0	0	0	0	0	7	0	0	0	0	0	0	14
% Bicycles on Road	0	1.4	0	0	0	0	0	0	0	1.2	0	0	0	0	0	0	0.9
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	1.9	0	0	0	0	0.1
Pedestrians	0	0	0	4	0	0	0	17	0	0	0	52	0	0	0	0	73
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	98.1	0	0	0	0	4.6

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : S Kihei Rd - Kilohana Dr
Site Code : 19-518 SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	S.KIHEI RD SOUTHBOUND					KILOHANA DR WESTBOUND					S. KIHEI RD NORTHBOUND					EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:00 to 16:45 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	9	65	0	0	74	3	0	**41**	**5**	**49**	0	81	5	3	89	0	0	0	0	0	212
15:30	**20**	61	0	0	81	5	0	32	1	38	0	72	**6**	6	84	0	0	0	0	0	203
15:45	18	**74**	0	0	**92**	**7**	0	27	1	35	0	**83**	6	**9**	**98**	0	0	0	0	0	**225**
16:00	20	52	0	0	72	5	0	21	0	26	0	82	2	6	90	0	0	0	0	0	188
Total Volume	67	252	0	0	319	20	0	121	7	148	0	318	19	24	361	0	0	0	0	0	828
% App. Total	21	79	0	0		13.5	0	81.8	4.7		0	88.1	5.3	6.6		0	0	0	0		
PHF	.838	.851	.000	.000	.867	.714	.000	.738	.350	.755	.000	.958	.792	.667	.921	.000	.000	.000	.000	.000	.920



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

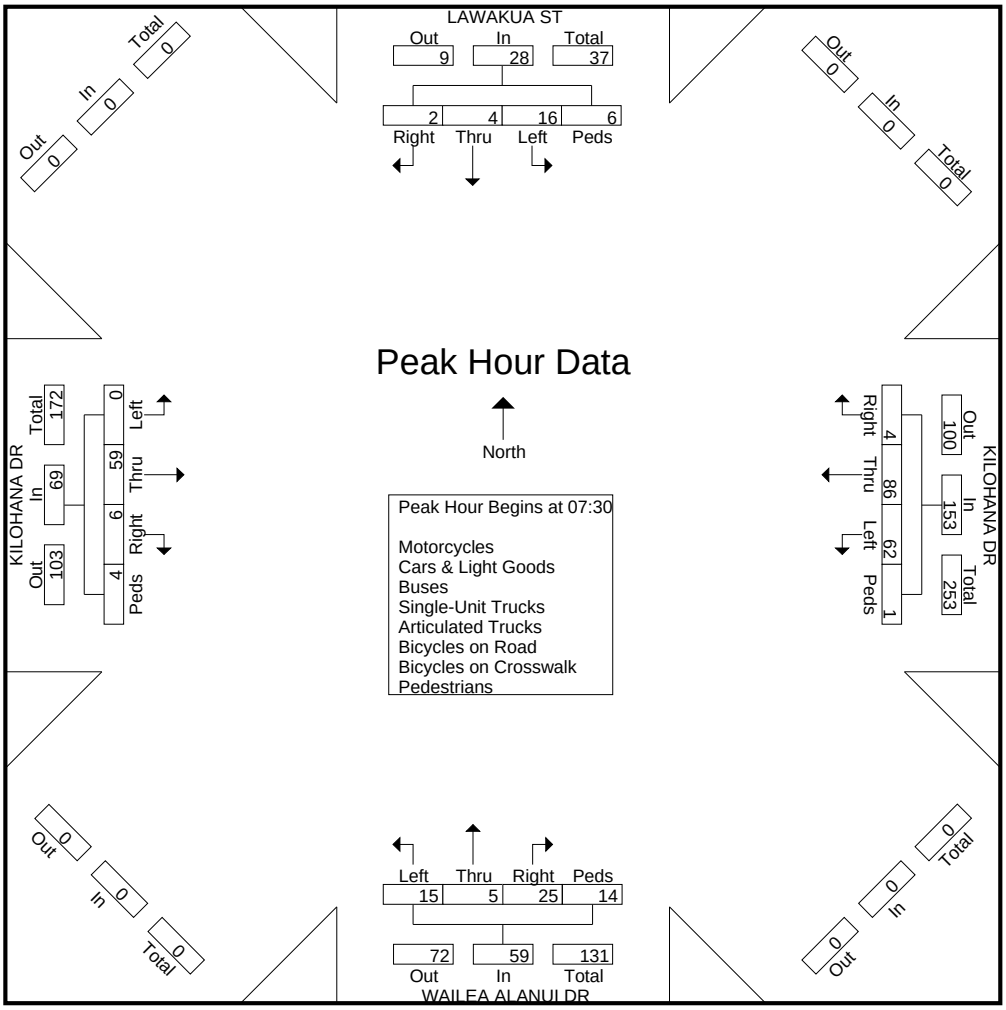
	LAWAKUA ST SOUTHBOUND				KILOHANA DR WESTBOUND				WAILEA ALANUI DR NORTHBOUND				KILOHANA DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	3	0	1	1	10	5	0	0	0	1	7	0	0	11	1	4	44
06:45	4	1	0	0	20	12	1	1	0	0	6	0	0	16	0	4	65
Total	7	1	1	1	30	17	1	1	0	1	13	0	0	27	1	8	109
07:00	1	0	0	0	8	13	0	1	1	0	6	1	0	8	1	0	40
07:15	2	0	0	4	12	16	2	1	3	0	5	6	0	13	0	5	69
07:30	5	2	1	2	23	20	0	0	1	1	6	1	0	15	2	1	80
07:45	3	1	0	2	11	22	1	1	5	1	3	4	0	10	0	1	65
Total	11	3	1	8	54	71	3	3	10	2	20	12	0	46	3	7	254
08:00	1	0	0	0	8	22	2	0	4	2	7	6	0	19	3	0	74
08:15	7	1	1	2	20	22	1	0	5	1	9	3	0	15	1	2	90
Grand Total	26	5	3	11	112	132	7	4	19	6	49	21	0	107	8	17	527
Apprch %	57.8	11.1	6.7	24.4	43.9	51.8	2.7	1.6	20	6.3	51.6	22.1	0	81.1	6.1	12.9	
Total %	4.9	0.9	0.6	2.1	21.3	25	1.3	0.8	3.6	1.1	9.3	4	0	20.3	1.5	3.2	
Motorcycles	0	1	0	0	1	2	0	0	0	1	0	0	0	2	0	0	7
% Motorcycles	0	20	0	0	0.9	1.5	0	0	0	16.7	0	0	0	1.9	0	0	1.3
Cars & Light Goods	26	4	3	0	107	125	7	0	17	4	46	0	0	103	8	0	450
% Cars & Light Goods	100	80	100	0	95.5	94.7	100	0	89.5	66.7	93.9	0	0	96.3	100	0	85.4
Buses	0	0	0	0	1	1	0	0	1	0	0	0	0	1	0	0	4
% Buses	0	0	0	0	0.9	0.8	0	0	5.3	0	0	0	0	0.9	0	0	0.8
Single-Unit Trucks	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
% Single-Unit Trucks	0	0	0	0	0	0.8	0	0	0	0	0	0	0	0.9	0	0	0.4
Articulated Trucks	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
% Articulated Trucks	0	0	0	0	0	2.3	0	0	0	0	0	0	0	0	0	0	0.6
Bicycles on Road	0	0	0	0	3	0	0	0	1	1	3	0	0	0	0	0	8
% Bicycles on Road	0	0	0	0	2.7	0	0	0	5.3	16.7	6.1	0	0	0	0	0	1.5
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	11	0	0	0	4	0	0	0	21	0	0	0	17	53
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	100	10.1

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	LAWAKUA ST SOUTHBOUND					KILOHANA DR WESTBOUND					WAILEA ALANUI DR NORTHBOUND					KILOHANA DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	5	**2**	**1**	**2**	10	**23**	20	0	0	**43**	1	1	6	1	9	0	15	2	1	18	80
07:45	3	1	0	2	6	11	**22**	1	**1**	35	**5**	1	3	4	13	0	10	0	1	11	65
08:00	1	0	0	0	1	8	22	**2**	0	32	4	**2**	7	**6**	**19**	0	**19**	**3**	0	**22**	74
08:15	**7**	1	1	2	**11**	20	22	1	0	43	5	1	**9**	3	18	0	15	1	**2**	18	**90**
Total Volume	16	4	2	6	28	62	86	4	1	153	15	5	25	14	59	0	59	6	4	69	309
% App. Total	57.1	14.3	7.1	21.4		40.5	56.2	2.6	0.7		25.4	8.5	42.4	23.7		0	85.5	8.7	5.8		
PHF	.571	.500	.500	.750	.636	.674	.977	.500	.250	.890	.750	.625	.694	.583	.776	.000	.776	.500	.500	.784	.858



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

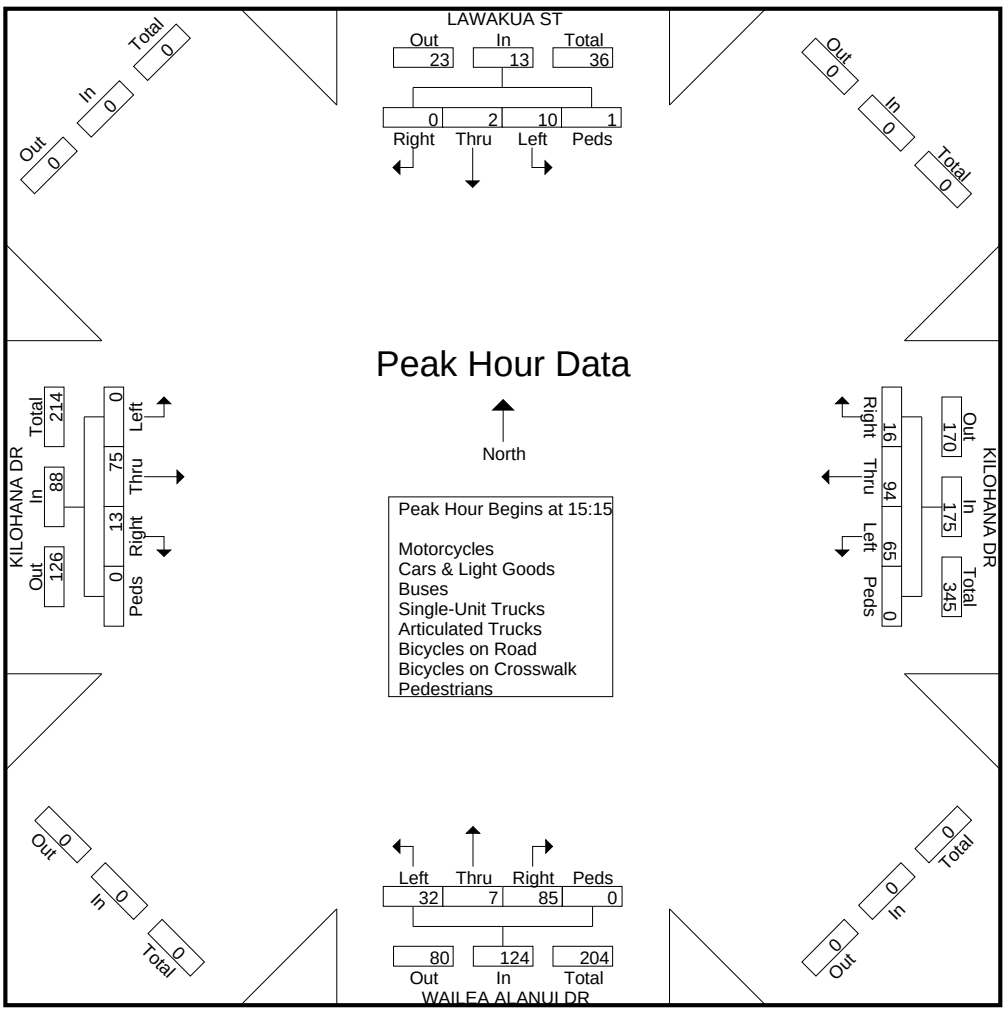
	LAWAKUA ST SOUTHBOUND				KILOHANA DR WESTBOUND				WAILEA ALANUI DR NORTHBOUND				KILOHANA DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	5	0	1	0	22	25	2	0	6	2	20	2	0	29	0	0	114
15:15	3	0	0	0	15	18	3	0	7	0	20	0	0	22	4	0	92
15:30	3	1	0	0	19	19	7	0	6	4	21	0	0	17	4	0	101
15:45	1	1	0	0	23	23	3	0	8	2	27	0	0	20	0	0	108
Total	12	2	1	0	79	85	15	0	27	8	88	2	0	88	8	0	415
16:00	3	0	0	1	8	34	3	0	11	1	17	0	0	16	5	0	99
16:15	6	1	1	0	11	25	3	0	8	1	38	0	0	22	5	0	121
16:30	0	0	0	0	13	26	2	0	7	0	30	0	0	20	1	0	99
16:45	0	1	1	0	17	20	2	0	4	1	27	5	1	17	2	0	98
Total	9	2	2	1	49	105	10	0	30	3	112	5	1	75	13	0	417
Grand Total	21	4	3	1	128	190	25	0	57	11	200	7	1	163	21	0	832
Apprch %	72.4	13.8	10.3	3.4	37.3	55.4	7.3	0	20.7	4	72.7	2.5	0.5	88.1	11.4	0	
Total %	2.5	0.5	0.4	0.1	15.4	22.8	3	0	6.9	1.3	24	0.8	0.1	19.6	2.5	0	
Motorcycles	0	0	0	0	4	2	0	0	0	1	2	0	0	2	0	0	11
% Motorcycles	0	0	0	0	3.1	1.1	0	0	0	9.1	1	0	0	1.2	0	0	1.3
Cars & Light Goods	21	4	3	0	123	187	25	0	57	10	195	0	1	158	21	0	805
% Cars & Light Goods	100	100	100	0	96.1	98.4	100	0	100	90.9	97.5	0	100	96.9	100	0	96.8
Buses	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
% Buses	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0.1
Single-Unit Trucks	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2
% Single-Unit Trucks	0	0	0	0	0	0.5	0	0	0	0	0.5	0	0	0	0	0	0.2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	0	0	0.4
Bicycles on Road	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2
% Bicycles on Road	0	0	0	0	0.8	0	0	0	0	0	0.5	0	0	0	0	0	0.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	28.6	0	0	0	0	0.2
Pedestrians	0	0	0	1	0	0	0	0	0	0	0	5	0	0	0	0	6
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	71.4	0	0	0	0	0.7

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	LAWAKUA ST SOUTHBOUND					KILOHANA DR WESTBOUND					WAILEA ALANUI DR NORTHBOUND					KILOHANA DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	**3**	0	0	0	3	15	18	3	0	36	7	0	20	0	27	0	**22**	4	0	**26**	92
15:30	3	**1**	0	0	**4**	19	19	**7**	0	45	6	**4**	21	0	31	0	17	4	0	21	101
15:45	1	1	0	0	2	**23**	23	3	0	**49**	8	2	**27**	0	**37**	0	20	0	0	20	**108**
16:00	3	0	0	**1**	4	8	**34**	3	0	45	**11**	1	17	0	29	0	16	**5**	0	21	99
Total Volume	10	2	0	1	13	65	94	16	0	175	32	7	85	0	124	0	75	13	0	88	400
% App. Total	76.9	15.4	0	7.7		37.1	53.7	9.1	0		25.8	5.6	68.5	0		0	85.2	14.8	0		
PHF	.833	.500	.000	.250	.813	.707	.691	.571	.000	.893	.727	.438	.787	.000	.838	.000	.852	.650	.000	.846	.926



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

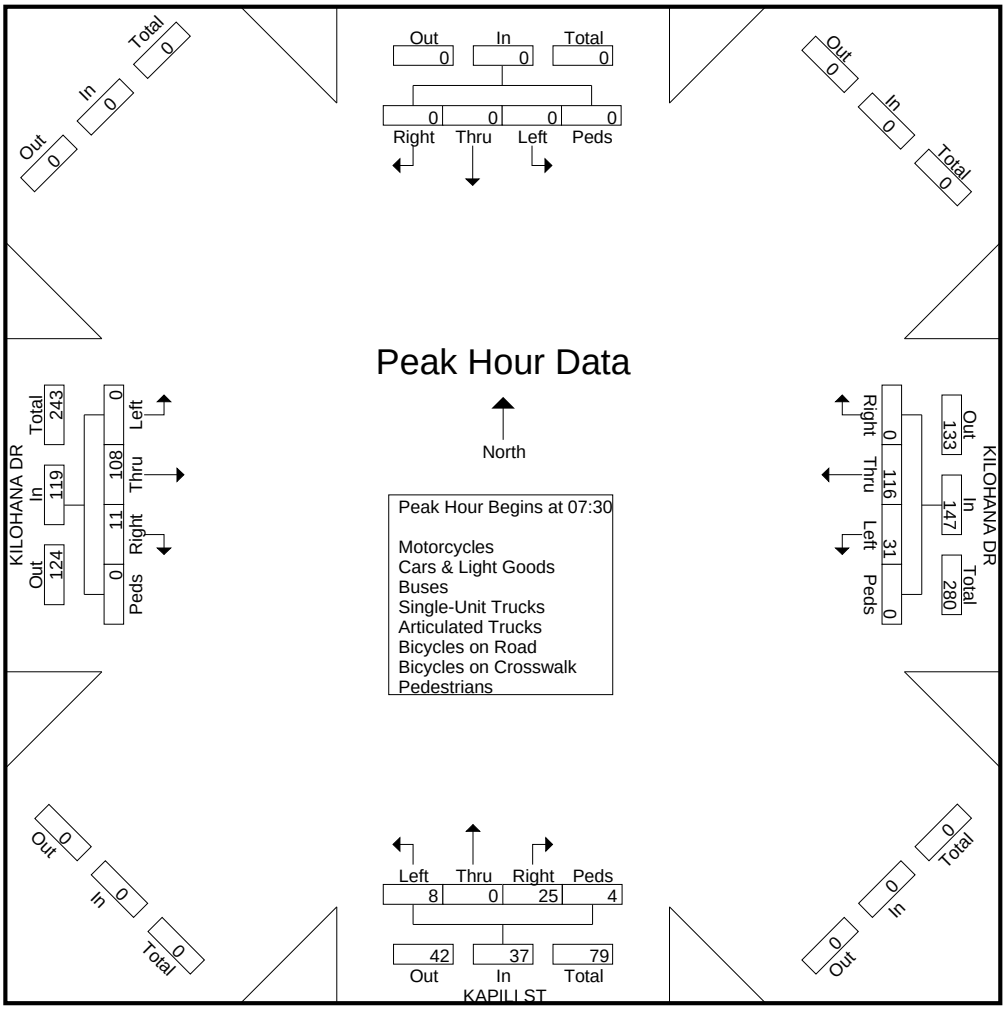
	SOUTHBOUND				KILOHANA DR WESTBOUND				KAPILI ST NORTHBOUND				KILOHANA DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	0	0	0	6	15	0	0	2	0	1	0	0	22	2	0	48
06:45	0	0	0	0	9	23	0	0	0	0	2	0	0	19	0	1	54
Total	0	0	0	0	15	38	0	0	2	0	3	0	0	41	2	1	102
07:00	0	0	0	0	8	16	0	0	0	0	2	0	0	14	4	0	44
07:15	0	0	0	0	9	42	0	0	1	0	13	2	0	24	2	2	95
07:30	0	0	0	0	4	23	0	0	2	0	4	0	0	23	4	0	60
07:45	0	0	0	0	16	30	0	0	3	0	10	0	0	21	3	0	83
Total	0	0	0	0	37	111	0	0	6	0	29	2	0	82	13	2	282
08:00	0	0	0	0	4	30	0	0	0	0	6	1	0	27	2	0	70
08:15	0	0	0	0	7	33	0	0	3	0	5	3	0	37	2	0	90
Grand Total	0	0	0	0	63	212	0	0	11	0	43	6	0	187	19	3	544
Apprch %	0	0	0	0	22.9	77.1	0	0	18.3	0	71.7	10	0	89.5	9.1	1.4	
Total %	0	0	0	0	11.6	39	0	0	2	0	7.9	1.1	0	34.4	3.5	0.6	
Motorcycles	0	0	0	0	0	2	0	0	0	0	0	0	0	1	1	0	4
% Motorcycles	0	0	0	0	0	0.9	0	0	0	0	0	0	0	0.5	5.3	0	0.7
Cars & Light Goods	0	0	0	0	62	203	0	0	10	0	42	0	0	182	17	0	516
% Cars & Light Goods	0	0	0	0	98.4	95.8	0	0	90.9	0	97.7	0	0	97.3	89.5	0	94.9
Buses	0	0	0	0	0	3	0	0	1	0	0	0	0	2	0	0	6
% Buses	0	0	0	0	0	1.4	0	0	9.1	0	0	0	0	1.1	0	0	1.1
Single-Unit Trucks	0	0	0	0	1	2	0	0	0	0	1	0	0	2	1	0	7
% Single-Unit Trucks	0	0	0	0	1.6	0.9	0	0	0	0	2.3	0	0	1.1	5.3	0	1.3
Articulated Trucks	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0	0	0	0	0	0.9	0	0	0	0	0	0	0	0	0	0	0.4
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	3	9
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	1.7

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	SOUTHBOUND					KILOHANA DR WESTBOUND					KAPILI ST NORTHBOUND					KILOHANA DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	0	0	0	0	0	4	23	0	0	27	2	0	4	0	6	0	23	**4**	0	27	60
07:45	0	0	0	0	0	**16**	30	0	0	**46**	**3**	0	**10**	0	**13**	0	21	3	0	24	83
08:00	0	0	0	0	0	4	30	0	0	34	0	0	6	1	7	0	27	2	0	29	70
08:15	0	0	0	0	0	7	**33**	0	0	40	3	0	5	**3**	11	0	**37**	2	0	**39**	**90**
Total Volume	0	0	0	0	0	31	116	0	0	147	8	0	25	4	37	0	108	11	0	119	303
% App. Total	0	0	0	0		21.1	78.9	0	0		21.6	0	67.6	10.8		0	90.8	9.2	0		
PHF	.000	.000	.000	.000	.000	.484	.879	.000	.000	.799	.667	.000	.625	.333	.712	.000	.730	.688	.000	.763	.842



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

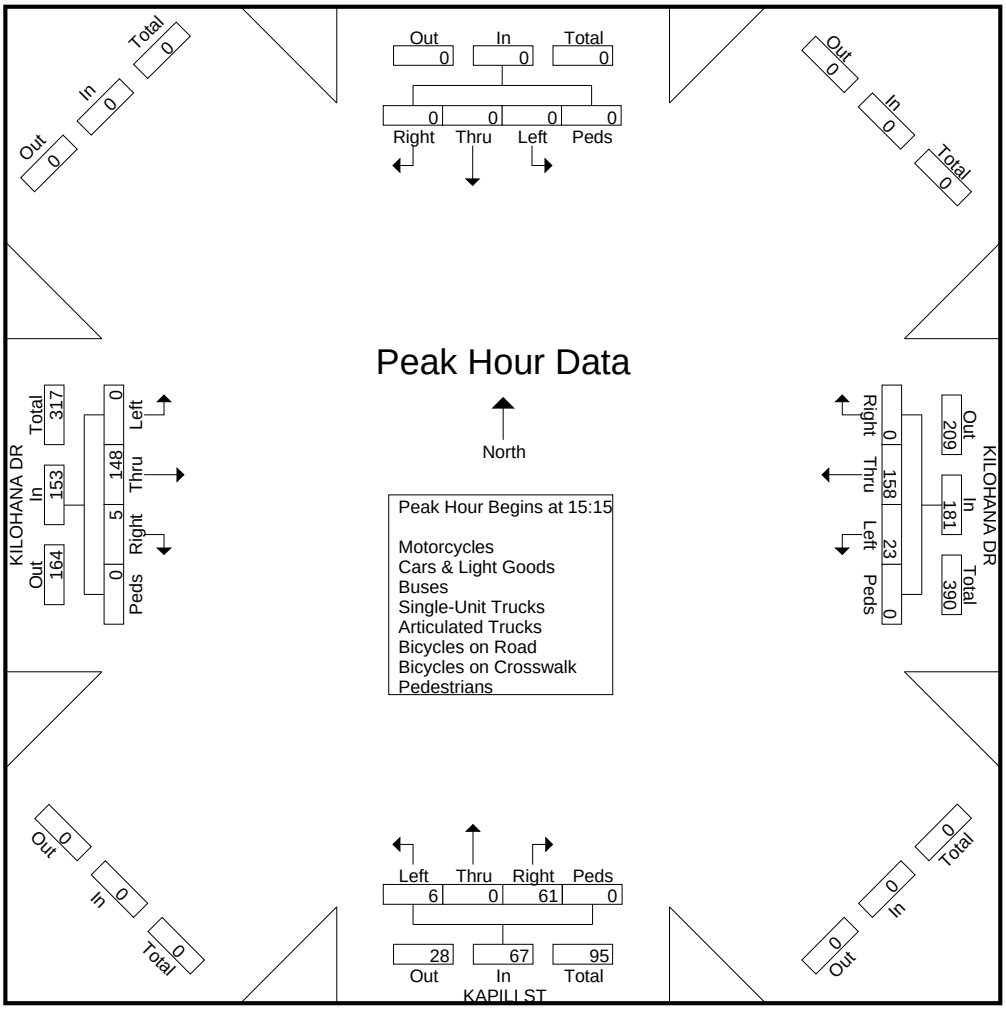
	SOUTHBOUND				KILOHANA DR WESTBOUND				KAPILI ST NORTHBOUND				KILOHANA DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	0	0	0	0	6	43	0	0	2	0	15	0	0	42	2	0	110
15:15	0	0	0	0	6	38	0	0	0	0	17	0	0	38	1	0	100
15:30	0	0	0	0	2	37	0	0	2	0	11	0	0	39	2	0	93
15:45	0	0	0	0	7	40	0	0	1	0	13	0	0	32	2	0	95
Total	0	0	0	0	21	158	0	0	5	0	56	0	0	151	7	0	398
16:00	0	0	0	0	8	43	0	0	3	0	20	0	0	39	0	0	113
16:15	0	0	0	0	3	45	0	0	3	0	26	0	0	40	3	0	120
16:30	0	0	0	0	7	27	0	0	4	0	10	0	0	35	1	0	84
16:45	0	0	0	0	7	28	0	0	3	0	18	2	0	34	4	0	96
Total	0	0	0	0	25	143	0	0	13	0	74	2	0	148	8	0	413
Grand Total	0	0	0	0	46	301	0	0	18	0	130	2	0	299	15	0	811
Apprch %	0	0	0	0	13.3	86.7	0	0	12	0	86.7	1.3	0	95.2	4.8	0	
Total %	0	0	0	0	5.7	37.1	0	0	2.2	0	16	0.2	0	36.9	1.8	0	
Motorcycles	0	0	0	0	0	6	0	0	0	0	0	0	0	2	0	0	8
% Motorcycles	0	0	0	0	0	2	0	0	0	0	0	0	0	0.7	0	0	1
Cars & Light Goods	0	0	0	0	46	294	0	0	18	0	129	0	0	292	15	0	794
% Cars & Light Goods	0	0	0	0	100	97.7	0	0	100	0	99.2	0	0	97.7	100	0	97.9
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	0	0	0	0	0	1	0	0	0	0	1	0	0	4	0	0	6
% Single-Unit Trucks	0	0	0	0	0	0.3	0	0	0	0	0.8	0	0	1.3	0	0	0.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0.2

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	SOUTHBOUND					KILOHANA DR WESTBOUND					KAPILI ST NORTHBOUND					KILOHANA DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	0	0	0	0	0	6	38	0	0	44	0	0	17	0	17	0	38	1	0	39	100
15:30	0	0	0	0	0	2	37	0	0	39	2	0	11	0	13	0	**39**	**2**	0	**41**	93
15:45	0	0	0	0	0	7	40	0	0	47	1	0	13	0	14	0	32	2	0	34	95
16:00	0	0	0	0	0	**8**	**43**	0	0	**51**	**3**	0	**20**	0	**23**	0	39	0	0	39	**113**
Total Volume	0	0	0	0	0	23	158	0	0	181	6	0	61	0	67	0	148	5	0	153	401
% App. Total	0	0	0	0		12.7	87.3	0	0		9	0	91	0		0	96.7	3.3	0		
PHF	.000	.000	.000	.000	.000	.719	.919	.000	.000	.887	.500	.000	.763	.000	.728	.000	.949	.625	.000	.933	.887



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

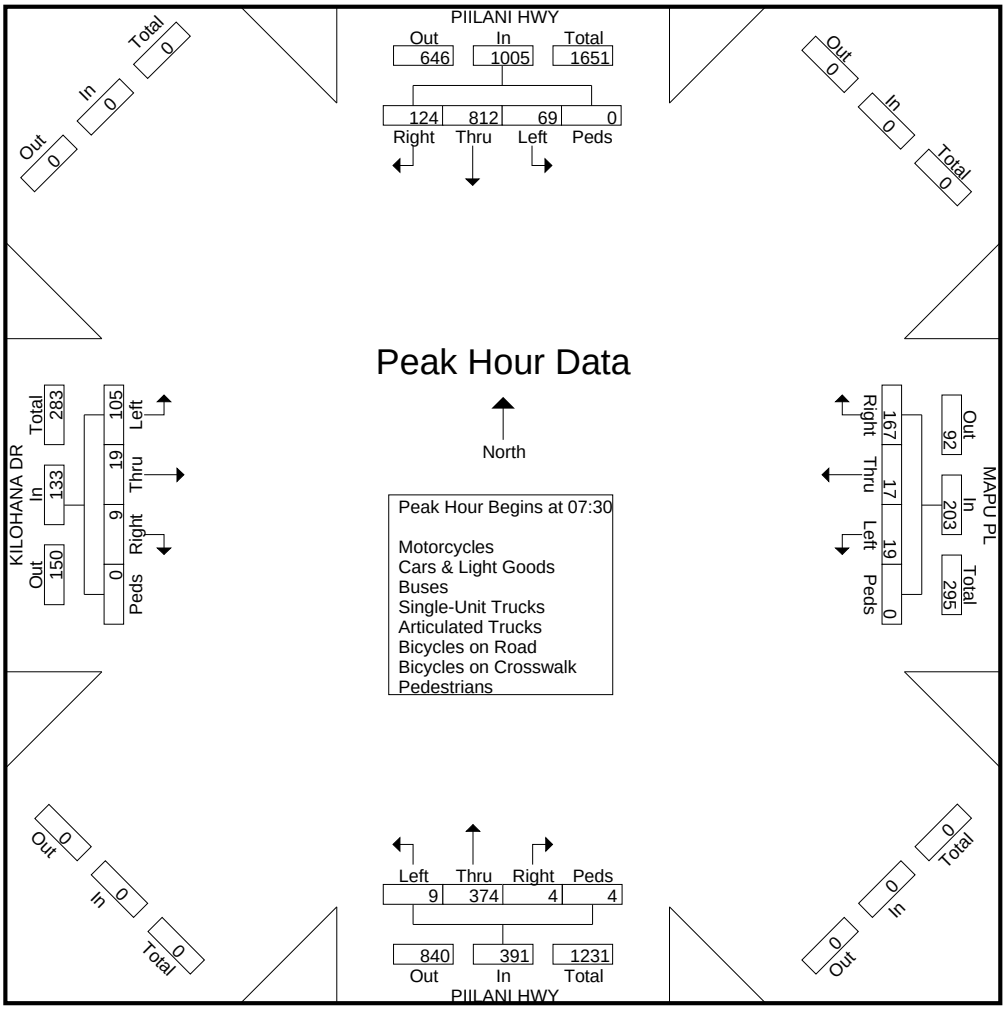
	PIILANI HWY SOUTHBOUND				MAPU PL WESTBOUND				PIILANI HWY NORTHBOUND				KILOHANA DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	2	167	19	0	1	3	25	0	0	69	0	0	19	4	2	0	311
06:45	12	171	31	0	5	2	31	1	1	62	1	1	16	3	1	0	338
Total	14	338	50	0	6	5	56	1	1	131	1	1	35	7	3	0	649
07:00	13	129	21	0	1	2	41	0	1	87	1	1	15	4	0	0	316
07:15	10	195	43	0	2	9	37	0	0	76	0	1	30	4	2	1	410
07:30	17	218	32	0	6	0	43	0	1	93	0	0	26	4	2	0	442
07:45	15	198	32	0	5	5	33	0	1	97	2	1	19	3	2	0	413
Total	55	740	128	0	14	16	154	0	3	353	3	3	90	15	6	1	1581
08:00	18	196	28	0	3	3	35	0	4	90	1	0	23	6	2	0	409
08:15	19	200	32	0	5	9	56	0	3	94	1	3	37	6	3	0	468
Grand Total	106	1474	238	0	28	33	301	1	11	668	6	7	185	34	14	1	3107
Apprch %	5.8	81.1	13.1	0	7.7	9.1	82.9	0.3	1.6	96.5	0.9	1	79.1	14.5	6	0.4	
Total %	3.4	47.4	7.7	0	0.9	1.1	9.7	0	0.4	21.5	0.2	0.2	6	1.1	0.5	0	
Motorcycles	0	3	1	0	0	0	1	0	0	1	0	0	1	0	0	0	7
% Motorcycles	0	0.2	0.4	0	0	0	0.3	0	0	0.1	0	0	0.5	0	0	0	0.2
Cars & Light Goods	102	1434	231	0	26	32	297	0	11	645	4	0	182	33	14	0	3011
% Cars & Light Goods	96.2	97.3	97.1	0	92.9	97	98.7	0	100	96.6	66.7	0	98.4	97.1	100	0	96.9
Buses	1	4	1	0	0	1	1	0	0	15	2	0	1	1	0	0	27
% Buses	0.9	0.3	0.4	0	0	3	0.3	0	0	2.2	33.3	0	0.5	2.9	0	0	0.9
Single-Unit Trucks	3	25	3	0	1	0	1	0	0	3	0	0	1	0	0	0	37
% Single-Unit Trucks	2.8	1.7	1.3	0	3.6	0	0.3	0	0	0.4	0	0	0.5	0	0	0	1.2
Articulated Trucks	0	7	2	0	0	0	0	0	0	3	0	0	0	0	0	0	12
% Articulated Trucks	0	0.5	0.8	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0.4
Bicycles on Road	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	4
% Bicycles on Road	0	0.1	0	0	3.6	0	0.3	0	0	0.1	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	1	0	0	0	7	0	0	0	1	9
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	100	0.3

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	PIILANI HWY SOUTHBOUND					MAPU PL WESTBOUND					PIILANI HWY NORTHBOUND					KILOHANA DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	17	**218**	**32**	0	**267**	**6**	0	43	0	49	1	93	0	0	94	26	4	2	0	32	442
07:45	15	198	32	0	245	5	5	33	0	43	1	**97**	**2**	1	**101**	19	3	2	0	24	413
08:00	18	196	28	0	242	3	3	35	0	41	**4**	90	1	0	95	23	**6**	2	0	31	409
08:15	**19**	200	32	0	251	5	**9**	**56**	0	**70**	3	94	1	**3**	101	**37**	6	**3**	0	**46**	**468**
Total Volume	69	812	124	0	1005	19	17	167	0	203	9	374	4	4	391	105	19	9	0	133	1732
% App. Total	6.9	80.8	12.3	0		9.4	8.4	82.3	0		2.3	95.7	1	1		78.9	14.3	6.8	0		
PHF	.908	.931	.969	.000	.941	.792	.472	.746	.000	.725	.563	.964	.500	.333	.968	.709	.792	.750	.000	.723	.925



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

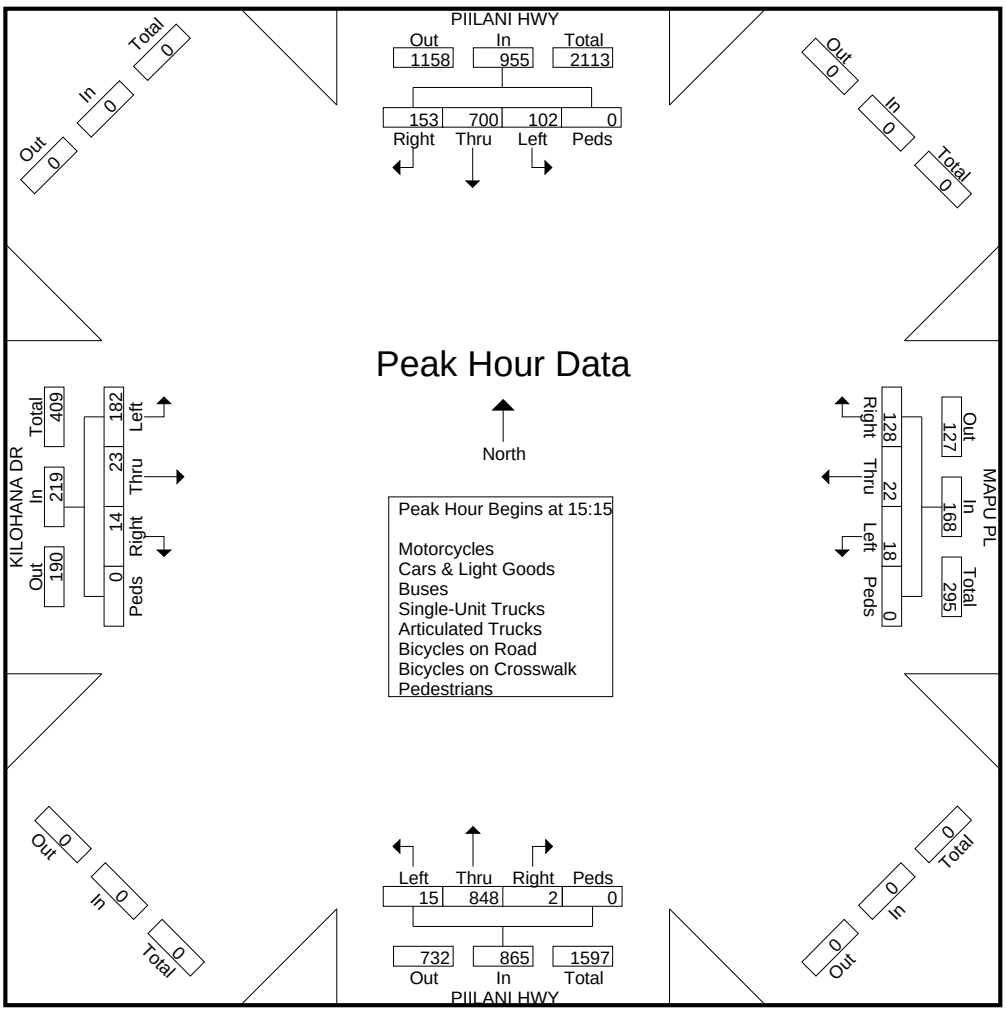
	PIILANI HWY SOUTHBOUND				MAPU PL WESTBOUND				PIILANI HWY NORTHBOUND				KILOHANA DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	30	177	35	0	1	1	35	0	6	204	1	0	47	8	1	0	546
15:15	25	191	39	0	6	6	31	0	5	242	0	0	45	6	4	0	600
15:30	30	163	29	0	4	6	18	0	2	201	0	0	30	6	3	0	492
15:45	26	189	38	0	6	5	50	0	4	219	1	0	50	7	4	0	599
Total	111	720	141	0	17	18	134	0	17	866	2	0	172	27	12	0	2237
16:00	21	157	47	0	2	5	29	0	4	186	1	0	57	4	3	0	516
16:15	29	136	37	0	3	3	26	0	3	228	0	0	51	3	3	0	522
16:30	31	151	25	0	5	6	25	0	3	230	1	1	38	7	5	0	528
16:45	36	154	28	0	2	2	23	0	2	213	0	1	35	11	5	0	512
Total	117	598	137	0	12	16	103	0	12	857	2	2	181	25	16	0	2078
Grand Total	228	1318	278	0	29	34	237	0	29	1723	4	2	353	52	28	0	4315
Apprch %	12.5	72.3	15.2	0	9.7	11.3	79	0	1.6	98	0.2	0.1	81.5	12	6.5	0	
Total %	5.3	30.5	6.4	0	0.7	0.8	5.5	0	0.7	39.9	0.1	0	8.2	1.2	0.6	0	
Motorcycles	0	6	2	0	0	2	1	0	2	9	0	0	0	2	1	0	25
% Motorcycles	0	0.5	0.7	0	0	5.9	0.4	0	6.9	0.5	0	0	0	3.8	3.6	0	0.6
Cars & Light Goods	226	1288	276	0	29	31	231	0	27	1673	4	0	346	50	27	0	4208
% Cars & Light Goods	99.1	97.7	99.3	0	100	91.2	97.5	0	93.1	97.1	100	0	98	96.2	96.4	0	97.5
Buses	1	11	0	0	0	0	0	0	0	11	0	0	1	0	0	0	24
% Buses	0.4	0.8	0	0	0	0	0	0	0	0.6	0	0	0.3	0	0	0	0.6
Single-Unit Trucks	1	10	0	0	0	1	4	0	0	26	0	0	5	0	0	0	47
% Single-Unit Trucks	0.4	0.8	0	0	0	2.9	1.7	0	0	1.5	0	0	1.4	0	0	0	1.1
Articulated Trucks	0	3	0	0	0	0	0	0	0	4	0	0	1	0	0	0	8
% Articulated Trucks	0	0.2	0	0	0	0	0	0	0	0.2	0	0	0.3	0	0	0	0.2
Bicycles on Road	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
% Bicycles on Road	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Kilohana Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	PIILANI HWY SOUTHBOUND					MAPU PL WESTBOUND					PIILANI HWY NORTHBOUND					KILOHANA DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	25	**191**	39	0	**255**	**6**	**6**	31	0	43	**5**	**242**	0	0	**247**	45	6	**4**	0	55	**600**
15:30	**30**	163	29	0	222	4	6	18	0	28	2	201	0	0	203	30	6	3	0	39	492
15:45	26	189	38	0	253	6	5	**50**	0	**61**	4	219	**1**	0	224	50	**7**	4	0	61	599
16:00	21	157	**47**	0	225	2	5	29	0	36	4	186	1	0	191	**57**	4	3	0	**64**	516
Total Volume	102	700	153	0	955	18	22	128	0	168	15	848	2	0	865	182	23	14	0	219	2207
% App. Total	10.7	73.3	16	0		10.7	13.1	76.2	0		1.7	98	0.2	0		83.1	10.5	6.4	0		
PHF	.850	.916	.814	.000	.936	.750	.917	.640	.000	.689	.750	.876	.500	.000	.876	.798	.821	.875	.000	.855	.920



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

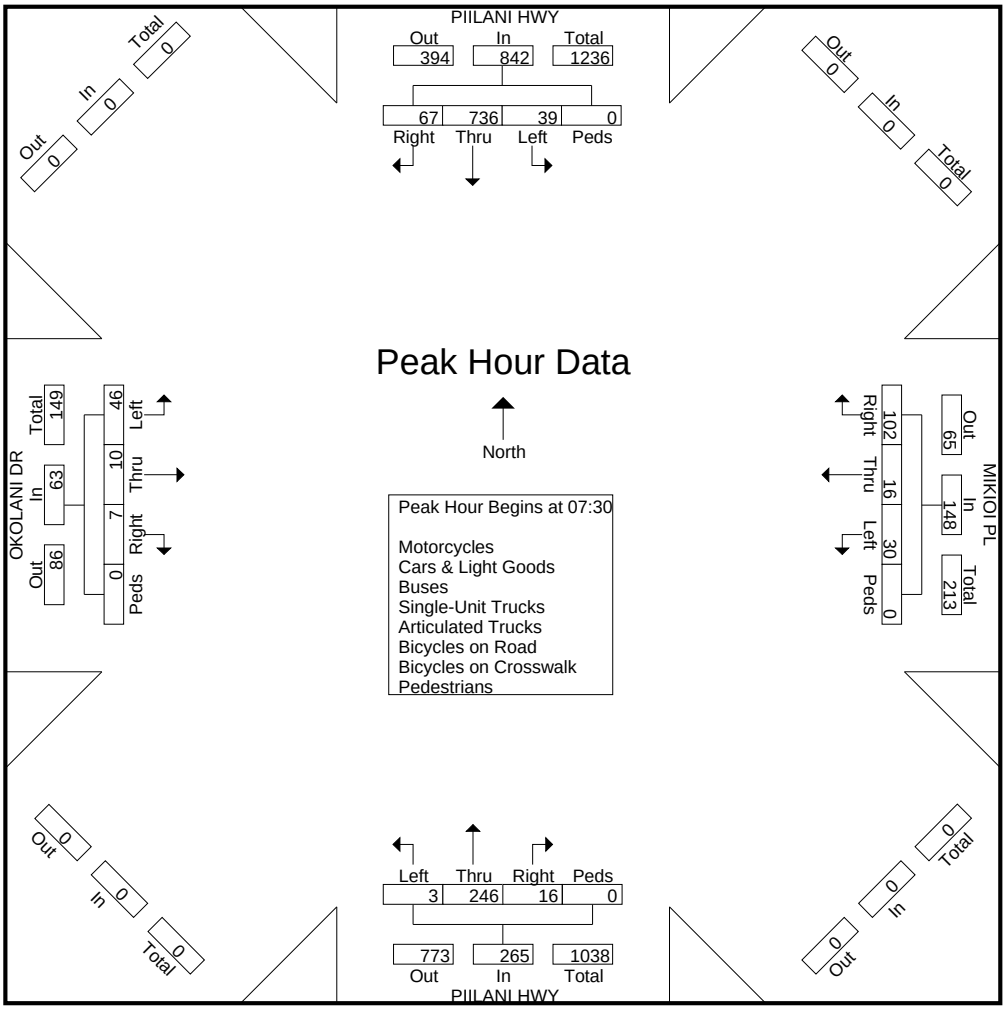
	PIILANI HWY SOUTHBOUND				MIKIOI PL WESTBOUND				PIILANI HWY NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	5	173	13	0	3	7	12	0	0	61	0	0	2	1	2	0	279
06:45	2	165	12	0	8	2	9	0	0	41	0	0	6	2	0	0	247
Total	7	338	25	0	11	9	21	0	0	102	0	0	8	3	2	0	526
07:00	4	135	10	0	7	3	26	0	2	68	1	0	6	1	1	0	264
07:15	7	184	23	1	6	5	22	0	0	37	1	0	7	4	0	0	297
07:30	4	205	8	0	8	4	31	0	1	68	7	0	14	1	3	0	354
07:45	11	183	18	0	10	3	23	0	2	61	1	0	3	2	3	0	320
Total	26	707	59	1	31	15	102	0	5	234	10	0	30	8	7	0	1235
08:00	13	172	17	0	5	4	25	0	0	65	3	0	12	4	1	0	321
08:15	11	176	24	0	7	5	23	0	0	52	5	0	17	3	0	0	323
Grand Total	57	1393	125	1	54	33	171	0	5	453	18	0	67	18	10	0	2405
Apprch %	3.6	88.4	7.9	0.1	20.9	12.8	66.3	0	1.1	95.2	3.8	0	70.5	18.9	10.5	0	
Total %	2.4	57.9	5.2	0	2.2	1.4	7.1	0	0.2	18.8	0.7	0	2.8	0.7	0.4	0	
Motorcycles	0	3	0	0	1	0	0	0	0	0	0	0	1	0	0	0	5
% Motorcycles	0	0.2	0	0	1.9	0	0	0	0	0	0	0	1.5	0	0	0	0.2
Cars & Light Goods	55	1363	125	0	51	31	166	0	4	433	17	0	66	17	8	0	2336
% Cars & Light Goods	96.5	97.8	100	0	94.4	93.9	97.1	0	80	95.6	94.4	0	98.5	94.4	80	0	97.1
Buses	1	3	0	0	1	0	3	0	1	13	0	0	0	0	1	0	23
% Buses	1.8	0.2	0	0	1.9	0	1.8	0	20	2.9	0	0	0	0	10	0	1
Single-Unit Trucks	1	18	0	0	1	0	1	0	0	5	1	0	0	1	1	0	29
% Single-Unit Trucks	1.8	1.3	0	0	1.9	0	0.6	0	0	1.1	5.6	0	0	5.6	10	0	1.2
Articulated Trucks	0	6	0	0	0	0	0	0	0	2	0	0	0	0	0	0	8
% Articulated Trucks	0	0.4	0	0	0	0	0	0	0	0.4	0	0	0	0	0	0	0.3
Bicycles on Road	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	3
% Bicycles on Road	0	0	0	0	0	6.1	0.6	0	0	0	0	0	0	0	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	PIILANI HWY SOUTHBOUND					MIKIOI PL WESTBOUND					PIILANI HWY NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	4	**205**	8	0	**217**	8	4	**31**	0	**43**	1	**68**	**7**	0	**76**	14	1	**3**	0	18	**354**
07:45	11	183	18	0	212	**10**	3	23	0	36	**2**	61	1	0	64	3	2	3	0	8	320
08:00	**13**	172	17	0	202	5	4	25	0	34	0	65	3	0	68	12	**4**	1	0	17	321
08:15	11	176	**24**	0	211	7	**5**	23	0	35	0	52	5	0	57	**17**	3	0	0	**20**	323
Total Volume	39	736	67	0	842	30	16	102	0	148	3	246	16	0	265	46	10	7	0	63	1318
% App. Total	4.6	87.4	8	0		20.3	10.8	68.9	0		1.1	92.8	6	0		73	15.9	11.1	0		
PHF	.750	.898	.698	.000	.970	.750	.800	.823	.000	.860	.375	.904	.571	.000	.872	.676	.625	.583	.000	.788	.931



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

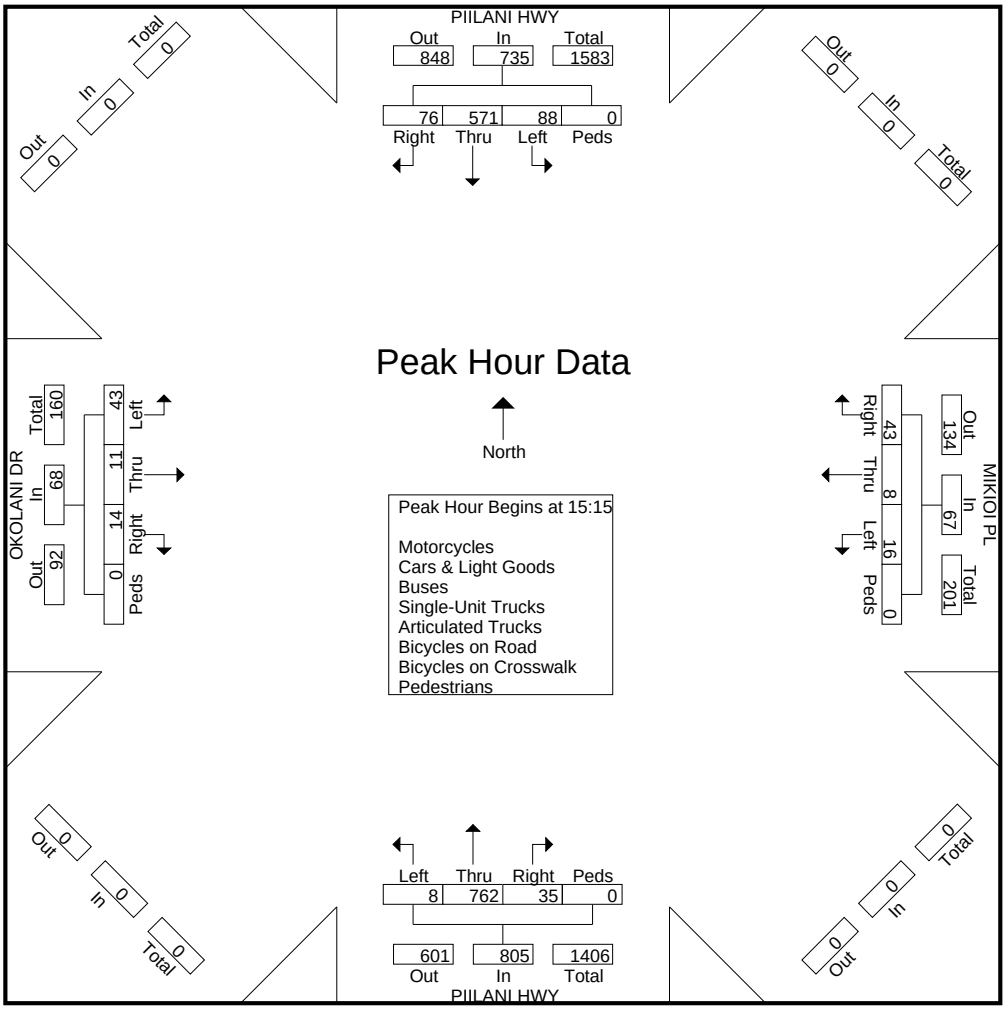
	PIILANI HWY SOUTHBOUND				MIKIOI PL WESTBOUND				PIILANI HWY NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	17	139	17	0	3	4	15	0	2	225	9	0	11	1	4	0	447
15:15	24	149	24	0	2	3	15	0	1	173	11	0	13	1	4	0	420
15:30	22	122	24	0	4	2	10	0	2	213	6	0	11	0	6	0	422
15:45	17	164	15	0	6	1	9	0	2	169	11	0	8	2	3	0	407
Total	80	574	80	0	15	10	49	0	7	780	37	0	43	4	17	0	1696
16:00	25	136	13	0	4	2	9	0	3	207	7	0	11	8	1	0	426
16:15	21	97	18	2	6	5	10	0	11	229	11	0	11	1	1	0	423
16:30	22	124	18	0	4	2	9	0	4	199	16	0	10	1	2	0	411
16:45	37	109	16	0	6	0	12	0	1	178	7	0	14	3	4	0	387
Total	105	466	65	2	20	9	40	0	19	813	41	0	46	13	8	0	1647
Grand Total	185	1040	145	2	35	19	89	0	26	1593	78	0	89	17	25	0	3343
Apprch %	13.5	75.8	10.6	0.1	24.5	13.3	62.2	0	1.5	93.9	4.6	0	67.9	13	19.1	0	
Total %	5.5	31.1	4.3	0.1	1	0.6	2.7	0	0.8	47.7	2.3	0	2.7	0.5	0.7	0	
Motorcycles	1	7	0	0	2	1	0	0	0	0	2	0	1	2	0	0	16
% Motorcycles	0.5	0.7	0	0	5.7	5.3	0	0	0	0	2.6	0	1.1	11.8	0	0	0.5
Cars & Light Goods	183	1012	144	0	32	18	89	0	26	1558	76	0	88	14	25	0	3265
% Cars & Light Goods	98.9	97.3	99.3	0	91.4	94.7	100	0	100	97.8	97.4	0	98.9	82.4	100	0	97.7
Buses	1	8	0	0	0	0	0	0	0	8	0	0	0	0	0	0	17
% Buses	0.5	0.8	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0.5
Single-Unit Trucks	0	10	1	0	0	0	0	0	0	24	0	0	0	0	0	0	35
% Single-Unit Trucks	0	1	0.7	0	0	0	0	0	0	1.5	0	0	0	0	0	0	1
Articulated Trucks	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	6
% Articulated Trucks	0	0.3	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0.2
Bicycles on Road	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2
% Bicycles on Road	0	0	0	0	2.9	0	0	0	0	0	0	0	0	5.9	0	0	0.1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0.1

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Piilani Hwy - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	PIILANI HWY SOUTHBOUND					MIKIOI PL WESTBOUND					PIILANI HWY NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	24	149	**24**	0	**197**	2	**3**	**15**	0	**20**	1	173	**11**	0	185	**13**	1	4	0	18	420
15:30	22	122	24	0	168	4	2	10	0	16	2	**213**	6	0	**221**	11	0	**6**	0	17	422
15:45	17	**164**	15	0	196	**6**	1	9	0	16	2	169	11	0	182	8	2	3	0	13	407
16:00	**25**	136	13	0	174	4	2	9	0	15	**3**	207	7	0	217	11	**8**	1	0	**20**	**426**
Total Volume	88	571	76	0	735	16	8	43	0	67	8	762	35	0	805	43	11	14	0	68	1675
% App. Total	12	77.7	10.3	0		23.9	11.9	64.2	0		1	94.7	4.3	0		63.2	16.2	20.6	0		
PHF	.880	.870	.792	.000	.933	.667	.667	.717	.000	.838	.667	.894	.795	.000	.911	.827	.344	.583	.000	.850	.983



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kualono Pl - Okolani Dr
Site Code : 00000000
Start Date : 5/8/2019
Page No : 1

Groups Printed- Class 1

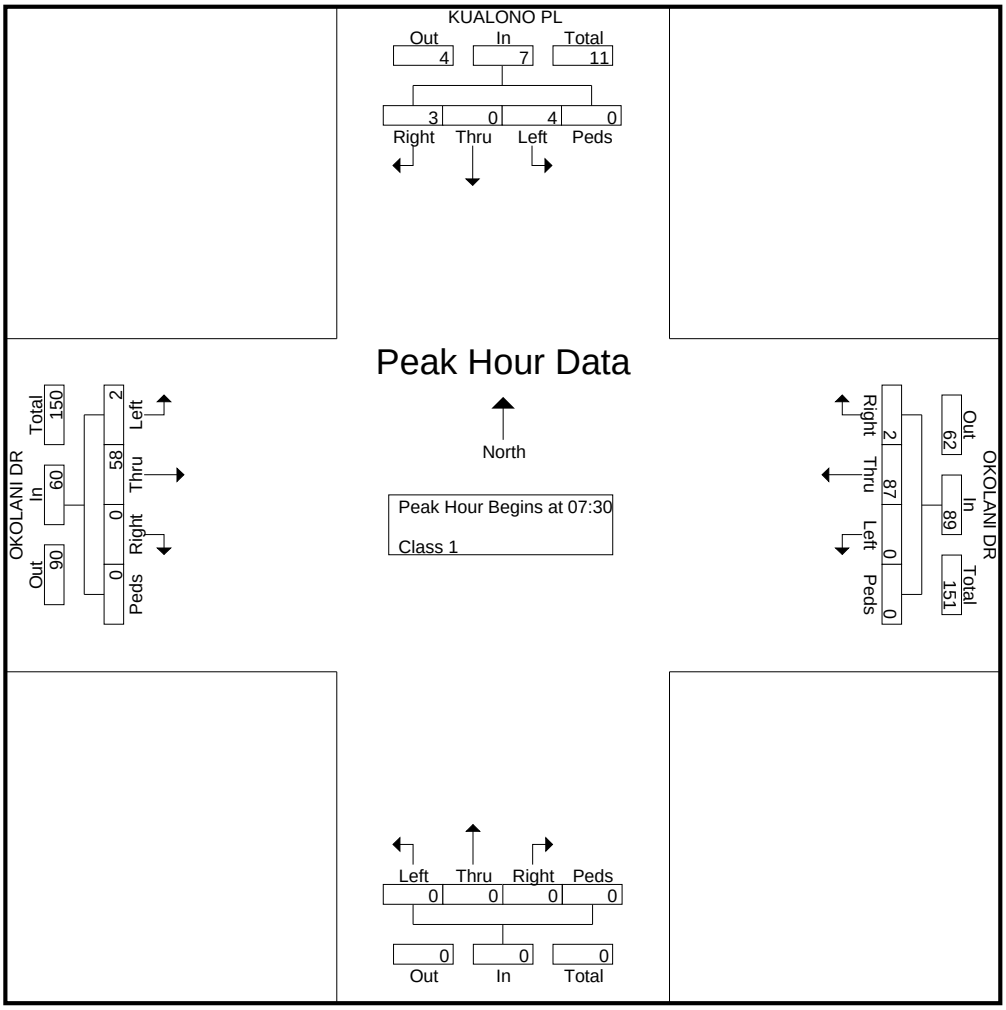
	KUALONO PL SOUTHBOUND				OKOLANI DR WESTBOUND				NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	1	0	0	0	0	20	0	0	0	0	0	0	0	4	0	0	25
06:45	0	0	0	0	0	15	0	0	0	0	0	0	1	8	0	0	24
Total	1	0	0	0	0	35	0	0	0	0	0	0	1	12	0	0	49
07:00	1	0	0	0	0	15	0	0	0	0	0	0	2	7	0	0	25
07:15	2	0	1	0	0	27	0	0	0	0	0	0	0	11	0	0	41
07:30	1	0	2	0	0	19	0	0	0	0	0	0	0	15	0	0	37
07:45	1	0	0	0	0	23	0	0	0	0	0	0	1	8	0	0	33
Total	5	0	3	0	0	84	0	0	0	0	0	0	3	41	0	0	136
08:00	1	0	1	0	0	20	1	0	0	0	0	0	0	18	0	0	41
08:15	1	0	0	0	0	25	1	0	0	0	0	0	1	17	0	0	45
Grand Total	8	0	4	0	0	164	2	0	0	0	0	0	5	88	0	0	271
Apprch %	66.7	0	33.3	0	0	98.8	1.2	0	0	0	0	0	5.4	94.6	0	0	
Total %	3	0	1.5	0	0	60.5	0.7	0	0	0	0	0	1.8	32.5	0	0	

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kualono Pl - Okolani Dr
Site Code : 00000000
Start Date : 5/8/2019
Page No : 2

	KUALONO PL SOUTHBOUND					OKOLANI DR WESTBOUND					NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	**1**	0	**2**	0	**3**	0	19	0	0	19	0	0	0	0	0	0	15	0	0	15	37
07:45	1	0	0	0	1	0	23	0	0	23	0	0	0	0	0	**1**	8	0	0	9	33
08:00	1	0	1	0	2	0	20	**1**	0	21	0	0	0	0	0	0	**18**	0	0	**18**	41
08:15	1	0	0	0	1	0	**25**	1	0	**26**	0	0	0	0	0	1	17	0	0	18	**45**
Total Volume	4	0	3	0	7	0	87	2	0	89	0	0	0	0	0	2	58	0	0	60	156
% App. Total	57.1	0	42.9	0		0	97.8	2.2	0		0	0	0	0		3.3	96.7	0	0		
PHF	1.00	.000	.375	.000	.583	.000	.870	.500	.000	.856	.000	.000	.000	.000	.000	.500	.806	.000	.000	.833	.867



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : PM_Kualono Pl - Okolani Dr
Site Code : 00000000
Start Date : 5/8/2019
Page No : 1

Groups Printed- Class 1

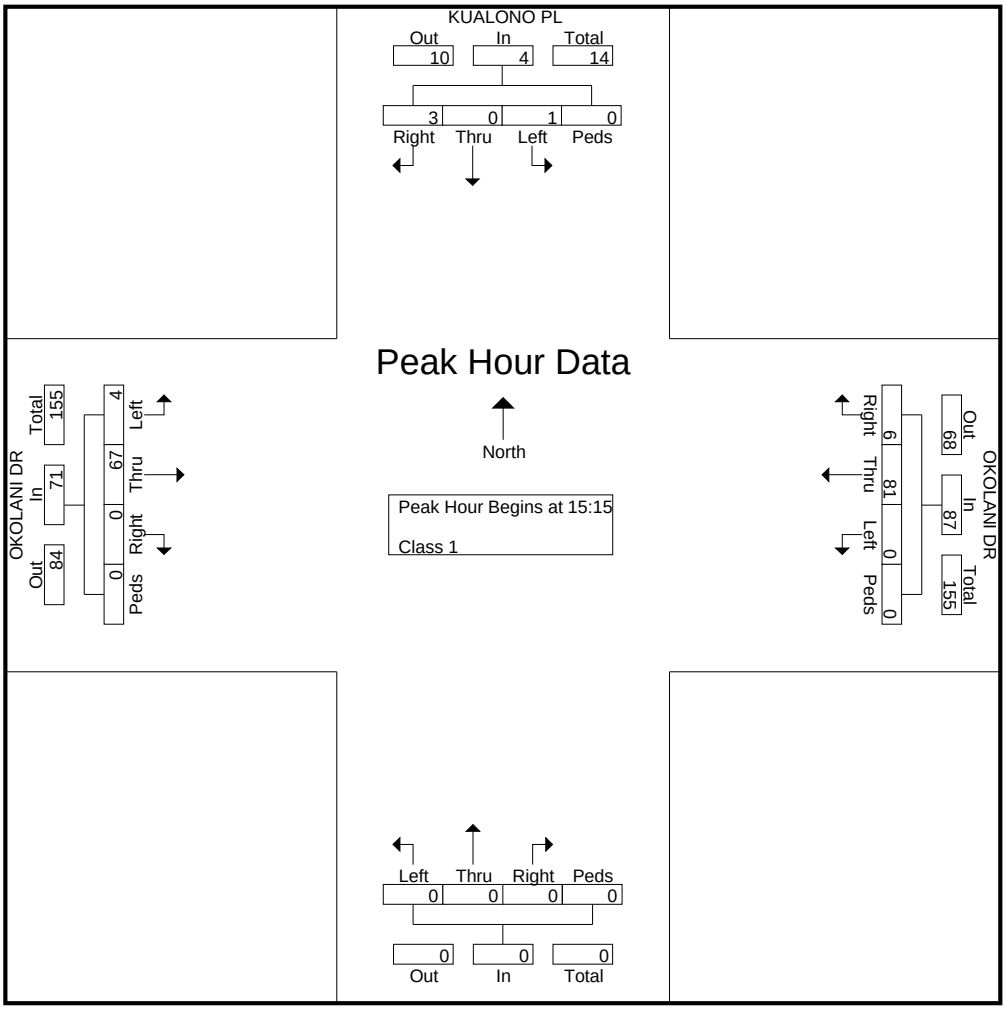
	KUALONO PL SOUTHBOUND				OKOLANI DR WESTBOUND				NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	0	0	0	0	0	24	0	0	0	0	0	0	0	15	0	0	39
15:15	0	0	1	0	0	27	1	0	0	0	0	0	0	19	0	0	48
15:30	0	0	1	0	0	26	1	0	0	0	0	0	2	18	0	0	48
15:45	0	0	1	0	0	13	3	0	0	0	0	0	1	9	0	0	27
Total	0	0	3	0	0	90	5	0	0	0	0	0	3	61	0	0	162
16:00	1	0	0	0	0	15	1	0	0	0	0	0	1	21	0	0	39
16:15	1	0	2	0	0	37	0	0	0	0	0	0	4	11	0	0	55
16:30	1	0	0	0	0	23	0	0	0	0	0	0	0	16	0	0	40
16:45	1	0	2	0	0	16	1	0	0	0	0	0	1	17	0	0	38
Total	4	0	4	0	0	91	2	0	0	0	0	0	6	65	0	0	172
Grand Total	4	0	7	0	0	181	7	0	0	0	0	0	9	126	0	0	334
Apprch %	36.4	0	63.6	0	0	96.3	3.7	0	0	0	0	0	6.7	93.3	0	0	
Total %	1.2	0	2.1	0	0	54.2	2.1	0	0	0	0	0	2.7	37.7	0	0	

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : PM_Kualono Pl - Okolani Dr
Site Code : 00000000
Start Date : 5/8/2019
Page No : 2

	KUALONO PL SOUTHBOUND					OKOLANI DR WESTBOUND					NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	0	0	**1**	0	**1**	0	**27**	1	0	**28**	0	0	0	0	0	0	19	0	0	19	**48**
15:30	0	0	1	0	1	0	26	1	0	27	0	0	0	0	0	**2**	18	0	0	20	48
15:45	0	0	1	0	1	0	13	**3**	0	16	0	0	0	0	0	1	9	0	0	10	27
16:00	**1**	0	0	0	1	0	15	1	0	16	0	0	0	0	0	1	**21**	0	0	**22**	39
Total Volume	1	0	3	0	4	0	81	6	0	87	0	0	0	0	0	4	67	0	0	71	162
% App. Total	25	0	75	0		0	93.1	6.9	0		0	0	0	0		5.6	94.4	0	0		
PHF	.250	.000	.750	.000	1.00	.000	.750	.500	.000	.777	.000	.000	.000	.000	.000	.500	.798	.000	.000	.807	.844



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Okalani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

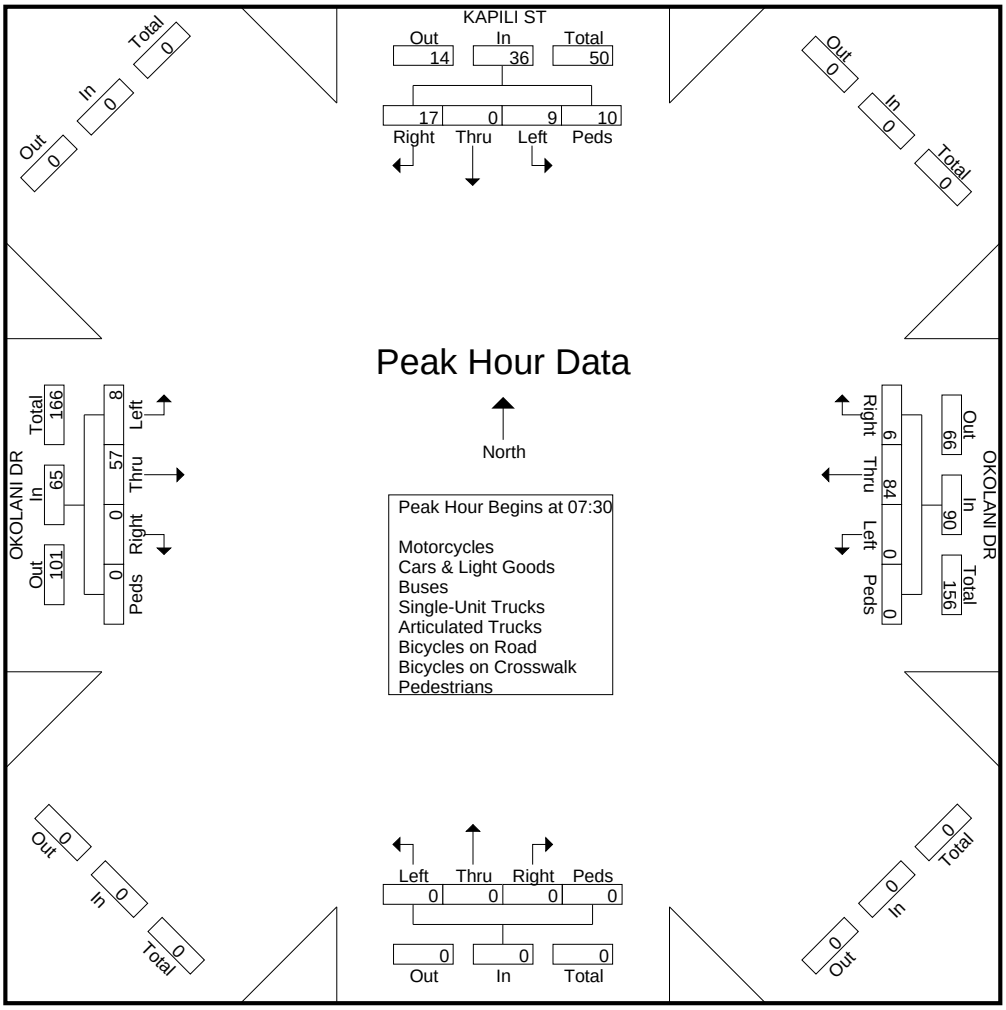
	KAPILI ST SOUTHBOUND				OKOLANI DR WESTBOUND				NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	2	0	4	2	0	16	3	0	0	0	0	0	0	9	0	0	36
06:45	1	0	8	2	0	22	2	0	0	0	0	0	4	9	0	0	48
Total	3	0	12	4	0	38	5	0	0	0	0	0	4	18	0	0	84
07:00	3	0	5	2	0	24	2	0	0	0	0	0	1	12	0	0	49
07:15	3	0	8	1	0	18	3	0	0	0	0	0	0	8	0	0	41
07:30	2	0	4	6	0	19	1	0	0	0	0	0	2	13	0	0	47
07:45	4	0	5	0	0	18	3	0	0	0	0	0	1	18	0	0	49
Total	12	0	22	9	0	79	9	0	0	0	0	0	4	51	0	0	186
08:00	2	0	2	1	0	24	0	0	0	0	0	0	2	14	0	0	45
08:15	1	0	6	3	0	23	2	0	0	0	0	0	3	12	0	0	50
Grand Total	18	0	42	17	0	164	16	0	0	0	0	0	13	95	0	0	365
Apprch %	23.4	0	54.5	22.1	0	91.1	8.9	0	0	0	0	0	12	88	0	0	
Total %	4.9	0	11.5	4.7	0	44.9	4.4	0	0	0	0	0	3.6	26	0	0	
Motorcycles	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
% Motorcycles	0	0	0	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0.5
Cars & Light Goods	16	0	38	0	0	159	14	0	0	0	0	0	13	93	0	0	333
% Cars & Light Goods	88.9	0	90.5	0	0	97	87.5	0	0	0	0	0	100	97.9	0	0	91.2
Buses	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
% Buses	0	0	0	0	0	0.6	0	0	0	0	0	0	0	1.1	0	0	0.5
Single-Unit Trucks	1	0	4	0	0	1	2	0	0	0	0	0	0	1	0	0	9
% Single-Unit Trucks	5.6	0	9.5	0	0	0.6	12.5	0	0	0	0	0	0	1.1	0	0	2.5
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
% Bicycles on Road	5.6	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0	0	0.5
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	17
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	4.7

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Okalani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	KAPILI ST SOUTHBOUND					OKOLANI DR WESTBOUND					NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	2	0	4	**6**	**12**	0	19	1	0	20	0	0	0	0	0	2	13	0	0	15	47
07:45	**4**	0	5	0	9	0	18	**3**	0	21	0	0	0	0	0	1	**18**	0	0	**19**	49
08:00	2	0	2	1	5	0	**24**	0	0	24	0	0	0	0	0	2	14	0	0	16	45
08:15	1	0	**6**	3	10	0	23	2	0	**25**	0	0	0	0	0	**3**	12	0	0	15	**50**
Total Volume	9	0	17	10	36	0	84	6	0	90	0	0	0	0	0	8	57	0	0	65	191
% App. Total	25	0	47.2	27.8		0	93.3	6.7	0		0	0	0	0		12.3	87.7	0	0		
PHF	.563	.000	.708	.417	.750	.000	.875	.500	.000	.900	.000	.000	.000	.000	.000	.667	.792	.000	.000	.855	.955



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Okalani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

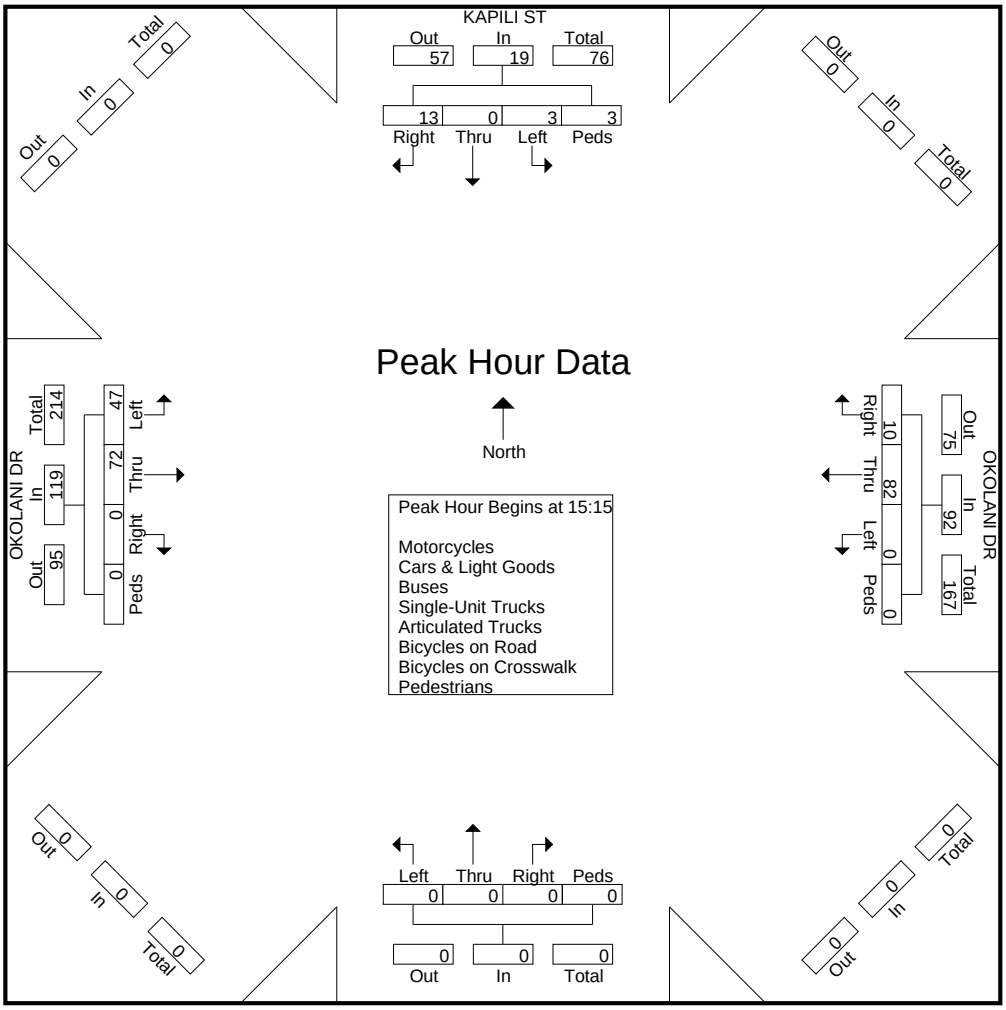
	KAPILI ST SOUTHBOUND				OKOLANI DR WESTBOUND				NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	0	0	4	0	0	21	3	0	0	0	0	0	12	12	0	0	52
15:15	0	0	3	1	0	27	3	0	0	0	0	0	10	17	0	0	61
15:30	2	0	1	0	0	26	3	0	0	0	0	0	9	21	0	0	62
15:45	1	0	7	0	0	17	2	0	0	0	0	0	10	9	0	0	46
Total	3	0	15	1	0	91	11	0	0	0	0	0	41	59	0	0	221
16:00	0	0	2	2	0	12	2	0	0	0	0	0	18	25	0	0	61
16:15	1	0	3	0	0	35	2	0	0	0	0	0	16	13	0	0	70
16:30	0	0	4	0	0	17	2	0	0	0	0	0	10	16	0	0	49
16:45	0	0	4	0	0	18	3	0	0	0	0	0	8	22	0	0	55
Total	1	0	13	2	0	82	9	0	0	0	0	0	52	76	0	0	235
Grand Total	4	0	28	3	0	173	20	0	0	0	0	0	93	135	0	0	456
Apprch %	11.4	0	80	8.6	0	89.6	10.4	0	0	0	0	0	40.8	59.2	0	0	
Total %	0.9	0	6.1	0.7	0	37.9	4.4	0	0	0	0	0	20.4	29.6	0	0	
Motorcycles	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3
% Motorcycles	0	0	0	0	0	0.6	0	0	0	0	0	0	0	1.5	0	0	0.7
Cars & Light Goods	3	0	28	0	0	171	18	0	0	0	0	0	92	133	0	0	445
% Cars & Light Goods	75	0	100	0	0	98.8	90	0	0	0	0	0	98.9	98.5	0	0	97.6
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single-Unit Trucks	1	0	0	0	0	1	2	0	0	0	0	0	1	0	0	0	5
% Single-Unit Trucks	25	0	0	0	0	0.6	10	0	0	0	0	0	1.1	0	0	0	1.1
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0.7

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Kapili St - Okalani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	KAPILI ST SOUTHBOUND					OKOLANI DR WESTBOUND					NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	0	0	3	1	4	0	**27**	**3**	0	**30**	0	0	0	0	0	10	17	0	0	27	61
15:30	**2**	0	1	0	3	0	26	3	0	29	0	0	0	0	0	9	21	0	0	30	**62**
15:45	1	0	**7**	0	**8**	0	17	2	0	19	0	0	0	0	0	10	9	0	0	19	46
16:00	0	0	2	**2**	4	0	12	2	0	14	0	0	0	0	0	**18**	**25**	0	0	**43**	61
Total Volume	3	0	13	3	19	0	82	10	0	92	0	0	0	0	0	47	72	0	0	119	230
% App. Total	15.8	0	68.4	15.8		0	89.1	10.9	0		0	0	0	0		39.5	60.5	0	0		
PHF	.375	.000	.464	.375	.594	.000	.759	.833	.000	.767	.000	.000	.000	.000	.000	.653	.720	.000	.000	.692	.927



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

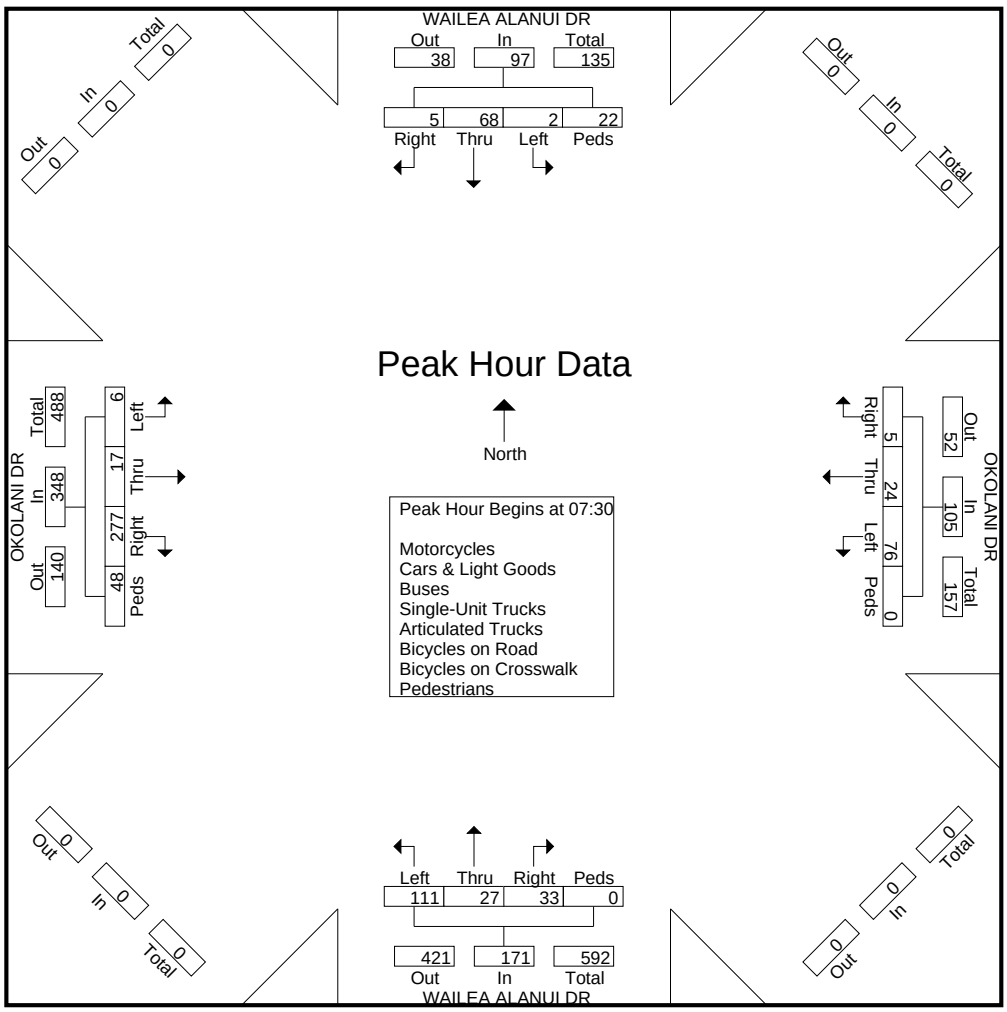
	WAILEA ALANUI DR SOUTHBOUND				OKOLANI DR WESTBOUND				WAILEA ALANUI DR NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	1	10	3	1	23	6	0	0	19	3	1	0	1	0	34	9	111
06:45	0	21	2	2	21	1	1	0	14	7	5	0	3	5	41	12	135
Total	1	31	5	3	44	7	1	0	33	10	6	0	4	5	75	21	246
07:00	0	6	3	6	18	3	2	0	17	4	3	0	3	5	56	5	131
07:15	0	19	1	4	28	7	1	0	16	4	7	0	1	7	58	14	167
07:30	0	15	2	3	17	8	1	0	30	5	8	0	0	3	73	14	179
07:45	0	17	0	6	18	3	1	0	22	6	1	0	2	4	71	14	165
Total	0	57	6	19	81	21	5	0	85	19	19	0	6	19	258	47	642
08:00	0	12	2	8	16	9	1	0	34	9	17	0	3	4	60	8	183
08:15	2	24	1	5	25	4	2	0	25	7	7	0	1	6	73	12	194
Grand Total	3	124	14	35	166	41	9	0	177	45	49	0	14	34	466	88	1265
Apprch %	1.7	70.5	8	19.9	76.9	19	4.2	0	65.3	16.6	18.1	0	2.3	5.6	77.4	14.6	
Total %	0.2	9.8	1.1	2.8	13.1	3.2	0.7	0	14	3.6	3.9	0	1.1	2.7	36.8	7	
Motorcycles	0	2	0	0	0	1	0	0	1	2	0	0	0	0	5	0	11
% Motorcycles	0	1.6	0	0	0	2.4	0	0	0.6	4.4	0	0	0	0	1.1	0	0.9
Cars & Light Goods	2	118	14	0	165	40	7	0	164	38	47	0	13	33	433	0	1074
% Cars & Light Goods	66.7	95.2	100	0	99.4	97.6	77.8	0	92.7	84.4	95.9	0	92.9	97.1	92.9	0	84.9
Buses	1	0	0	0	0	0	1	0	4	0	0	0	0	1	9	0	16
% Buses	33.3	0	0	0	0	0	11.1	0	2.3	0	0	0	0	2.9	1.9	0	1.3
Single-Unit Trucks	0	0	0	0	0	0	1	0	2	0	2	0	0	0	6	0	11
% Single-Unit Trucks	0	0	0	0	0	0	11.1	0	1.1	0	4.1	0	0	0	1.3	0	0.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0	0.2
Bicycles on Road	0	4	0	0	1	0	0	0	6	5	0	0	1	0	11	0	28
% Bicycles on Road	0	3.2	0	0	0.6	0	0	0	3.4	11.1	0	0	7.1	0	2.4	0	2.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	0.2
Pedestrians	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	86	121
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	97.7	9.6

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	WAILEA ALANUI DR SOUTHBOUND					OKOLANI DR WESTBOUND					WAILEA ALANUI DR NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	0	15	**2**	3	20	17	8	1	0	26	30	5	8	0	43	0	3	**73**	**14**	90	179
07:45	0	17	0	6	23	18	3	1	0	22	22	6	1	0	29	2	4	71	14	91	165
08:00	0	12	2	**8**	22	16	**9**	1	0	26	**34**	**9**	**17**	0	**60**	**3**	4	60	8	75	183
08:15	**2**	**24**	1	5	**32**	**25**	4	**2**	0	**31**	25	7	7	0	39	1	**6**	73	12	**92**	**194**
Total Volume	2	68	5	22	97	76	24	5	0	105	111	27	33	0	171	6	17	277	48	348	721
% App. Total	2.1	70.1	5.2	22.7		72.4	22.9	4.8	0		64.9	15.8	19.3	0		1.7	4.9	79.6	13.8		
PHF	.250	.708	.625	.688	.758	.760	.667	.625	.000	.847	.816	.750	.485	.000	.713	.500	.708	.949	.857	.946	.929



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

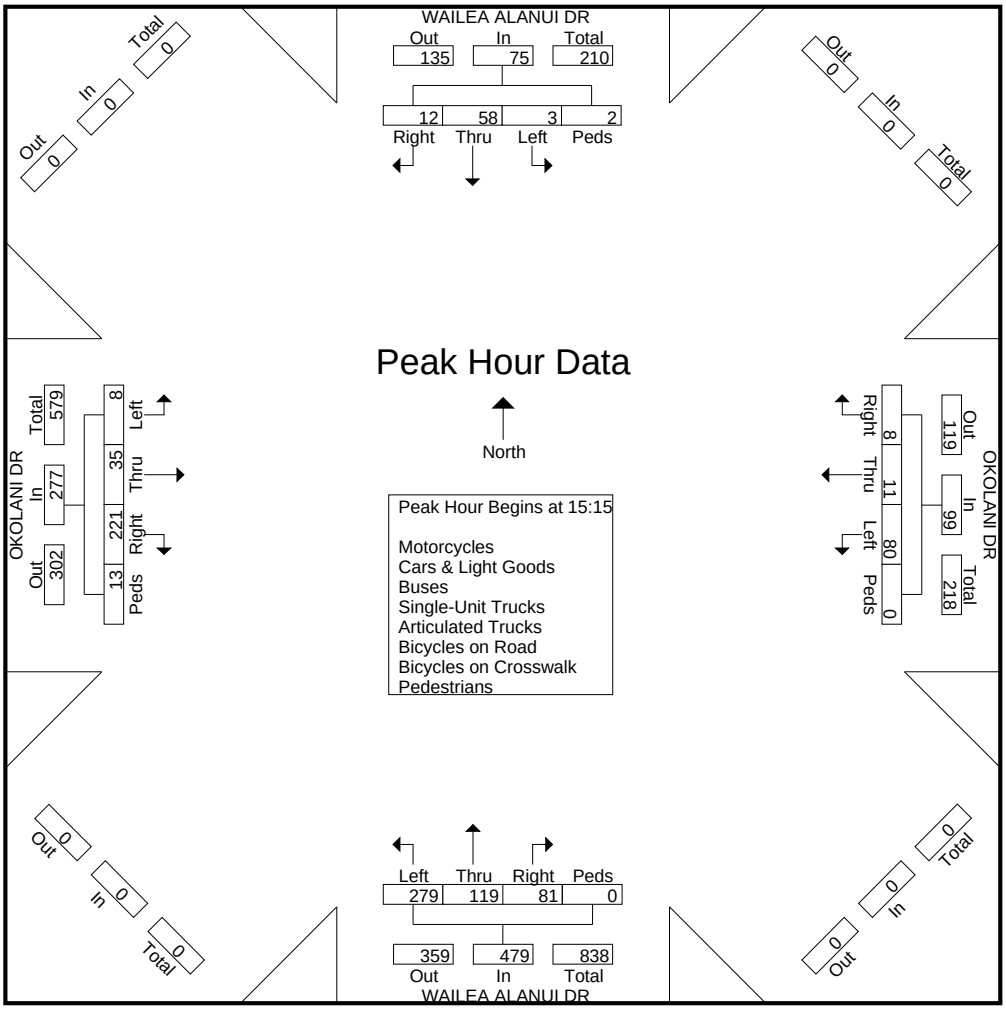
	WAILEA ALANUI DR SOUTHBOUND				OKOLANI DR WESTBOUND				WAILEA ALANUI DR NORTHBOUND				OKOLANI DR EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	0	19	3	1	20	3	1	0	65	30	19	0	3	6	60	3	233
15:15	0	16	6	0	24	2	1	0	68	24	16	0	1	9	64	6	237
15:30	2	19	4	0	23	4	1	0	71	32	19	0	2	10	50	1	238
15:45	1	14	1	0	21	5	0	0	70	28	15	0	2	6	65	1	229
Total	3	68	14	1	88	14	3	0	274	114	69	0	8	31	239	11	937
16:00	0	9	1	2	12	0	6	0	70	35	31	0	3	10	42	5	226
16:15	3	13	2	0	15	18	0	0	68	37	26	0	2	7	71	2	264
16:30	0	10	0	0	15	3	0	0	78	31	21	0	4	3	49	3	217
16:45	0	23	4	1	19	3	1	0	57	24	24	0	3	2	55	2	218
Total	3	55	7	3	61	24	7	0	273	127	102	0	12	22	217	12	925
Grand Total	6	123	21	4	149	38	10	0	547	241	171	0	20	53	456	23	1862
Apprch %	3.9	79.9	13.6	2.6	75.6	19.3	5.1	0	57	25.1	17.8	0	3.6	9.6	82.6	4.2	
Total %	0.3	6.6	1.1	0.2	8	2	0.5	0	29.4	12.9	9.2	0	1.1	2.8	24.5	1.2	
Motorcycles	0	2	0	0	0	1	0	0	7	2	0	0	0	2	5	0	19
% Motorcycles	0	1.6	0	0	0	2.6	0	0	1.3	0.8	0	0	0	3.8	1.1	0	1
Cars & Light Goods	6	120	21	0	147	37	10	0	524	235	168	0	20	51	445	0	1784
% Cars & Light Goods	100	97.6	100	0	98.7	97.4	100	0	95.8	97.5	98.2	0	100	96.2	97.6	0	95.8
Buses	0	0	0	0	1	0	0	0	5	1	0	0	0	0	1	0	8
% Buses	0	0	0	0	0.7	0	0	0	0.9	0.4	0	0	0	0	0.2	0	0.4
Single-Unit Trucks	0	0	0	0	0	0	0	0	7	1	3	0	0	0	2	0	13
% Single-Unit Trucks	0	0	0	0	0	0	0	0	1.3	0.4	1.8	0	0	0	0.4	0	0.7
Articulated Trucks	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
% Articulated Trucks	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0.1
Bicycles on Road	0	1	0	0	1	0	0	0	3	2	0	0	0	0	3	0	10
% Bicycles on Road	0	0.8	0	0	0.7	0	0	0	0.5	0.8	0	0	0	0	0.7	0	0.5
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.3	0.1
Pedestrians	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	22	26
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	95.7	1.4

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Okolani Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	WAILEA ALANUI DR SOUTHBOUND					OKOLANI DR WESTBOUND					WAILEA ALANUI DR NORTHBOUND					OKOLANI DR EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	0	16	**6**	0	22	**24**	2	1	0	27	68	24	16	0	108	1	9	64	**6**	**80**	237
15:30	**2**	**19**	4	0	**25**	23	4	1	0	**28**	**71**	32	19	0	122	2	**10**	50	1	63	**238**
15:45	1	14	1	0	16	21	**5**	0	0	26	70	28	15	0	113	2	6	**65**	1	74	229
16:00	0	9	1	**2**	12	12	0	**6**	0	18	70	**35**	**31**	0	**136**	**3**	10	42	5	60	226
Total Volume	3	58	12	2	75	80	11	8	0	99	279	119	81	0	479	8	35	221	13	277	930
% App. Total	4	77.3	16	2.7		80.8	11.1	8.1	0		58.2	24.8	16.9	0		2.9	12.6	79.8	4.7		
PHF	.375	.763	.500	.250	.750	.833	.550	.333	.000	.884	.982	.850	.653	.000	.881	.667	.875	.850	.542	.866	.977



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Wailea Ike Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

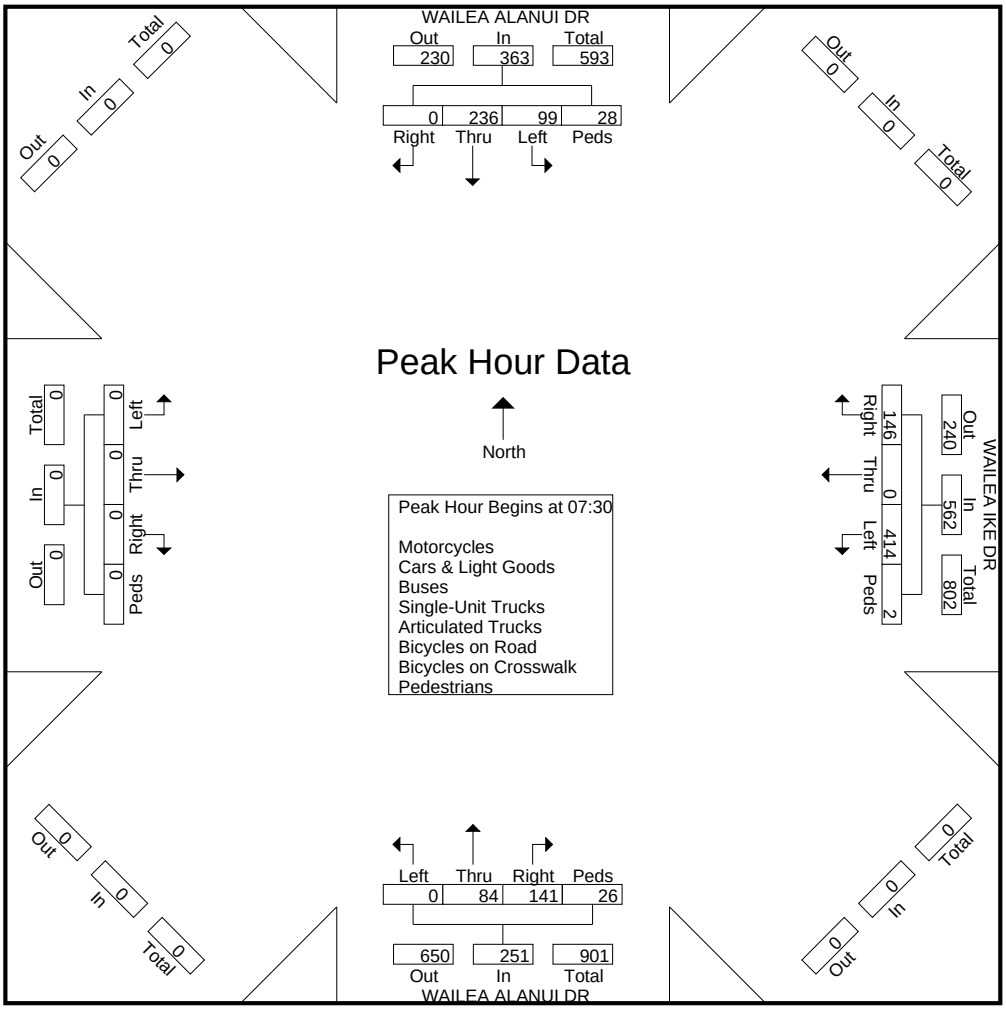
	WAILEA ALANUI DR SOUTHBOUND				WAILEA IKE DR WESTBOUND				WAILEA ALANUI DR NORTHBOUND				EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	26	32	0	1	97	0	19	0	0	18	46	5	0	0	0	0	244
06:45	11	56	0	6	131	0	16	0	0	15	21	4	0	0	0	0	260
Total	37	88	0	7	228	0	35	0	0	33	67	9	0	0	0	0	504
07:00	15	47	0	5	73	0	16	0	0	26	36	1	0	0	0	0	219
07:15	23	63	0	3	113	0	23	0	0	20	26	7	0	0	0	0	278
07:30	28	64	0	7	104	0	38	0	0	16	30	6	0	0	0	0	293
07:45	23	61	0	2	107	0	35	2	0	27	44	10	0	0	0	0	311
Total	89	235	0	17	397	0	112	2	0	89	136	24	0	0	0	0	1101
08:00	18	57	0	13	84	0	37	0	0	23	33	2	0	0	0	0	267
08:15	30	54	0	6	119	0	36	0	0	18	34	8	0	0	0	0	305
Grand Total	174	434	0	43	828	0	220	2	0	163	270	43	0	0	0	0	2177
Apprch %	26.7	66.7	0	6.6	78.9	0	21	0.2	0	34.2	56.7	9	0	0	0	0	
Total %	8	19.9	0	2	38	0	10.1	0.1	0	7.5	12.4	2	0	0	0	0	
Motorcycles	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Motorcycles	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Cars & Light Goods	165	399	0	0	807	0	208	0	0	140	254	0	0	0	0	0	1973
% Cars & Light Goods	94.8	91.9	0	0	97.5	0	94.5	0	0	85.9	94.1	0	0	0	0	0	90.6
Buses	2	20	0	0	3	0	2	0	0	14	10	0	0	0	0	0	51
% Buses	1.1	4.6	0	0	0.4	0	0.9	0	0	8.6	3.7	0	0	0	0	0	2.3
Single-Unit Trucks	5	8	0	0	14	0	8	0	0	2	5	0	0	0	0	0	42
% Single-Unit Trucks	2.9	1.8	0	0	1.7	0	3.6	0	0	1.2	1.9	0	0	0	0	0	1.9
Articulated Trucks	0	0	0	0	4	0	0	0	0	1	1	0	0	0	0	0	6
% Articulated Trucks	0	0	0	0	0.5	0	0	0	0	0.6	0.4	0	0	0	0	0	0.3
Bicycles on Road	0	7	0	0	0	0	2	0	0	6	0	0	0	0	0	0	15
% Bicycles on Road	0	1.6	0	0	0	0	0.9	0	0	3.7	0	0	0	0	0	0	0.7
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	43	0	0	0	2	0	0	0	43	0	0	0	0	88
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	0	4

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Wailea Ike Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	WAILEA ALANUI DR SOUTHBOUND					WAILEA IKE DR WESTBOUND					WAILEA ALANUI DR NORTHBOUND					EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	28	**64**	0	7	**99**	104	0	**38**	0	142	0	16	30	6	52	0	0	0	0	0	293
07:45	23	61	0	2	86	107	0	35	**2**	144	0	**27**	**44**	**10**	**81**	0	0	0	0	0	**311**
08:00	18	57	0	**13**	88	84	0	37	0	121	0	23	33	2	58	0	0	0	0	0	267
08:15	**30**	54	0	6	90	**119**	0	36	0	**155**	0	18	34	8	60	0	0	0	0	0	305
Total Volume	99	236	0	28	363	414	0	146	2	562	0	84	141	26	251	0	0	0	0	0	1176
% App. Total	27.3	65	0	7.7		73.7	0	26	0.4		0	33.5	56.2	10.4		0	0	0	0		
PHF	.825	.922	.000	.538	.917	.870	.000	.961	.250	.906	.000	.778	.801	.650	.775	.000	.000	.000	.000	.000	.945



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Wailea Ike Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

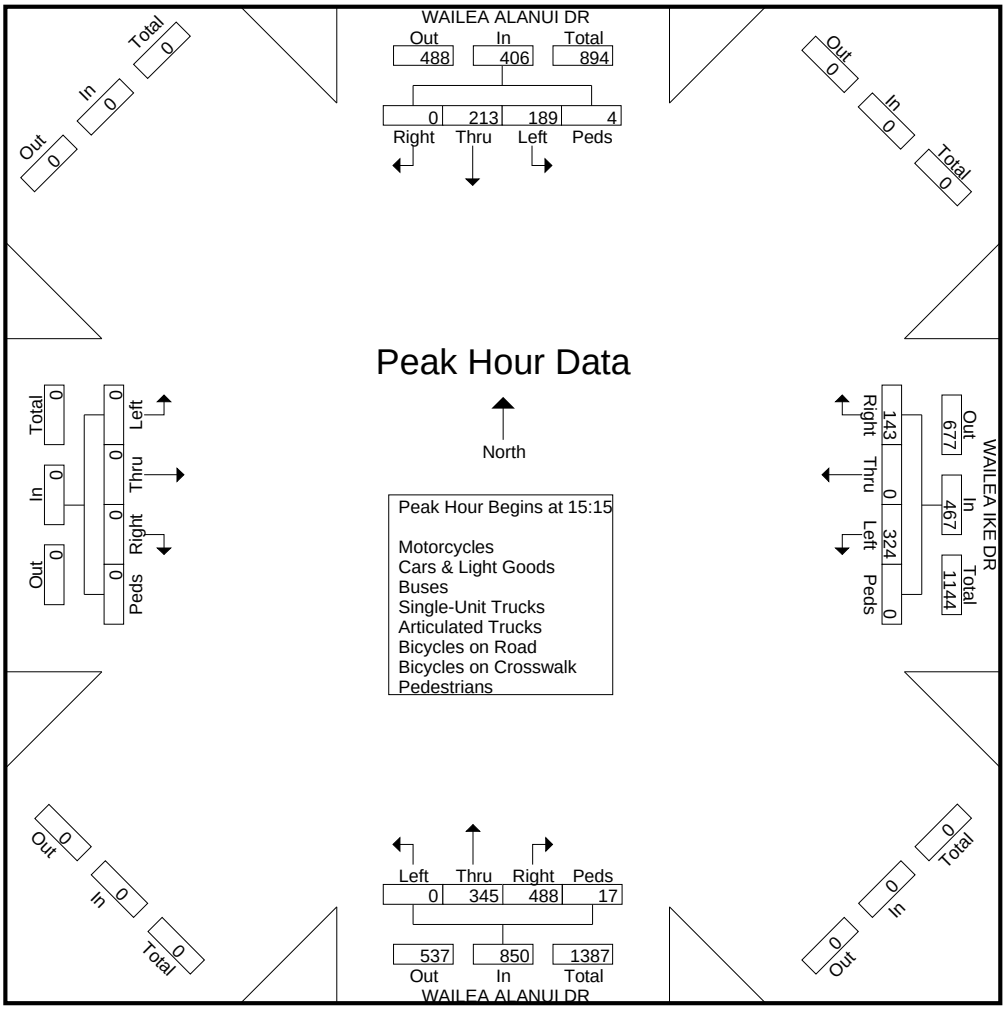
	WAILEA ALANUI DR SOUTHBOUND				WAILEA IKE DR WESTBOUND				WAILEA ALANUI DR NORTHBOUND				EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	32	43	0	0	69	0	26	0	0	60	108	0	0	0	0	0	338
15:15	54	52	0	0	71	0	35	0	0	88	124	5	0	0	0	0	429
15:30	41	60	0	3	85	0	31	0	0	90	130	6	0	0	0	0	446
15:45	44	61	0	1	104	0	36	0	0	80	111	3	0	0	0	0	440
Total	171	216	0	4	329	0	128	0	0	318	473	14	0	0	0	0	1653
16:00	50	40	0	0	64	0	41	0	0	87	123	3	0	0	0	0	408
16:15	51	65	0	0	64	0	45	0	0	88	137	7	0	0	0	0	457
16:30	41	61	0	0	66	0	48	0	0	88	140	0	0	0	0	0	444
16:45	45	58	0	0	70	0	53	0	0	67	85	1	0	0	0	0	379
Total	187	224	0	0	264	0	187	0	0	330	485	11	0	0	0	0	1688
Grand Total	358	440	0	4	593	0	315	0	0	648	958	25	0	0	0	0	3341
Apprch %	44.6	54.9	0	0.5	65.3	0	34.7	0	0	39.7	58.7	1.5	0	0	0	0	
Total %	10.7	13.2	0	0.1	17.7	0	9.4	0	0	19.4	28.7	0.7	0	0	0	0	
Motorcycles	1	9	0	0	3	0	0	0	0	5	6	0	0	0	0	0	24
% Motorcycles	0.3	2	0	0	0.5	0	0	0	0	0.8	0.6	0	0	0	0	0	0.7
Cars & Light Goods	348	424	0	0	579	0	308	0	0	632	941	0	0	0	0	0	3232
% Cars & Light Goods	97.2	96.4	0	0	97.6	0	97.8	0	0	97.5	98.2	0	0	0	0	0	96.7
Buses	5	2	0	0	5	0	2	0	0	3	4	0	0	0	0	0	21
% Buses	1.4	0.5	0	0	0.8	0	0.6	0	0	0.5	0.4	0	0	0	0	0	0.6
Single-Unit Trucks	2	3	0	0	6	0	3	0	0	7	7	0	0	0	0	0	28
% Single-Unit Trucks	0.6	0.7	0	0	1	0	1	0	0	1.1	0.7	0	0	0	0	0	0.8
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road	2	2	0	0	0	0	2	0	0	1	0	0	0	0	0	0	7
% Bicycles on Road	0.6	0.5	0	0	0	0	0.6	0	0	0.2	0	0	0	0	0	0	0.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	4	0	0	0	0	0	0	0	25	0	0	0	0	29
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	100	0	0	0	0	0.9

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Alanui Dr - Wailea Ike Dr
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	WAILEA ALANUI DR SOUTHBOUND					WAILEA IKE DR WESTBOUND					WAILEA ALANUI DR NORTHBOUND					EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	**54**	52	0	0	**106**	71	0	35	0	106	0	88	124	5	217	0	0	0	0	0	429
15:30	41	60	0	**3**	104	85	0	31	0	116	0	**90**	**130**	**6**	**226**	0	0	0	0	0	**446**
15:45	44	**61**	0	1	106	**104**	0	36	0	**140**	0	80	111	3	194	0	0	0	0	0	440
16:00	50	40	0	0	90	64	0	**41**	0	105	0	87	123	3	213	0	0	0	0	0	408
Total Volume	189	213	0	4	406	324	0	143	0	467	0	345	488	17	850	0	0	0	0	0	1723
% App. Total	46.6	52.5	0	1		69.4	0	30.6	0		0	40.6	57.4	2		0	0	0	0		
PHF	.875	.873	.000	.333	.958	.779	.000	.872	.000	.834	.000	.958	.938	.708	.940	.000	.000	.000	.000	.000	.966



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Ike Dr - Wailea Ike Pl
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

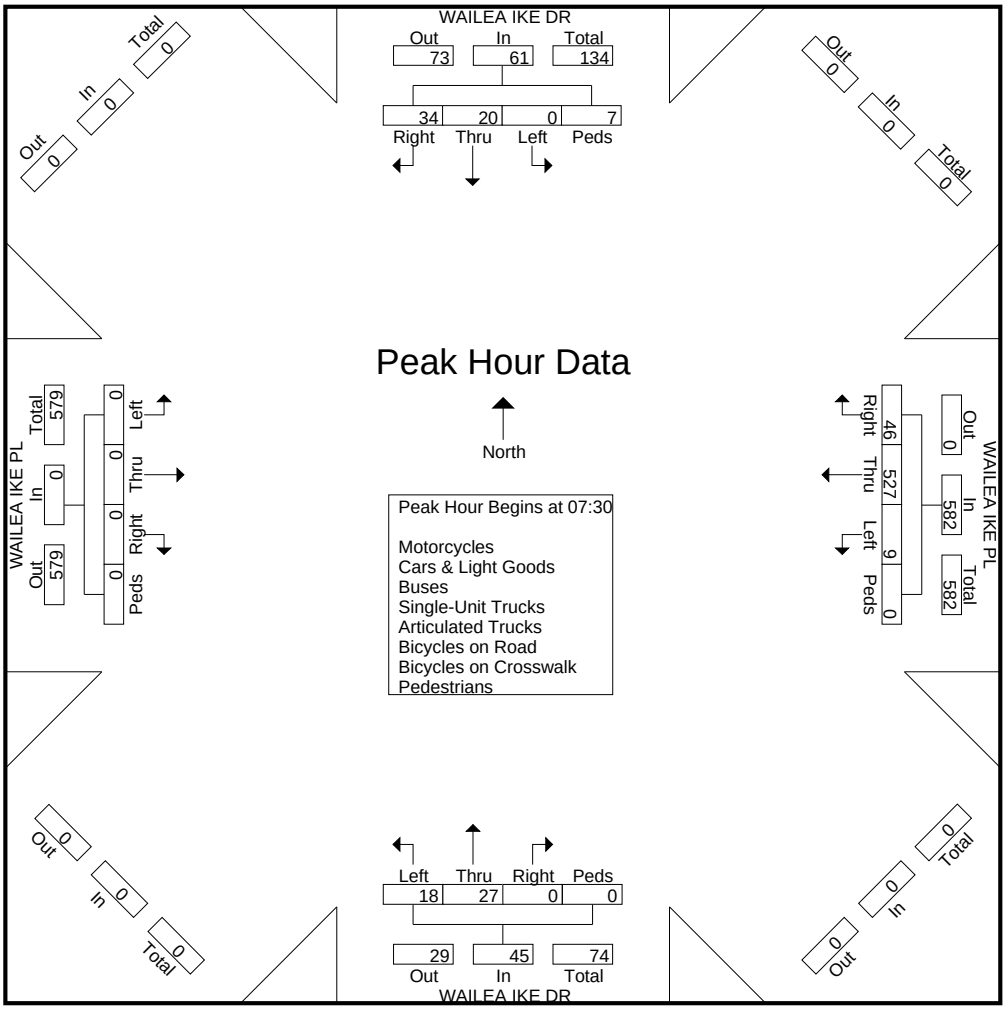
	WAILEA IKE DR SOUTHBOUND				WAILEA IKE PL WESTBOUND				WAILEA IKE DR NORTHBOUND				WAILEA IKE PL EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
06:30	0	1	6	0	0	113	4	0	3	3	0	0	0	0	0	0	130
06:45	0	5	3	0	0	142	8	0	0	3	0	0	0	0	0	0	161
Total	0	6	9	0	0	255	12	0	3	6	0	0	0	0	0	0	291
07:00	0	6	4	1	1	92	1	0	1	1	0	0	0	0	0	0	107
07:15	0	3	2	6	1	134	8	0	4	8	0	0	0	0	0	0	166
07:30	0	6	4	0	1	139	13	0	3	2	0	0	0	0	0	0	168
07:45	0	2	11	0	1	136	22	0	4	8	0	0	0	0	0	0	184
Total	0	17	21	7	4	501	44	0	12	19	0	0	0	0	0	0	625
08:00	0	5	7	5	3	112	5	0	7	6	0	0	0	0	0	0	150
08:15	0	7	12	2	4	140	6	0	4	11	0	0	0	0	0	0	186
Grand Total	0	35	49	14	11	1008	67	0	26	42	0	0	0	0	0	0	1252
Apprch %	0	35.7	50	14.3	1	92.8	6.2	0	38.2	61.8	0	0	0	0	0	0	
Total %	0	2.8	3.9	1.1	0.9	80.5	5.4	0	2.1	3.4	0	0	0	0	0	0	
Motorcycles	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	3
% Motorcycles	0	0	0	0	0	0.2	0	0	0	2.4	0	0	0	0	0	0	0.2
Cars & Light Goods	0	32	47	0	9	979	62	0	24	40	0	0	0	0	0	0	1193
% Cars & Light Goods	0	91.4	95.9	0	81.8	97.1	92.5	0	92.3	95.2	0	0	0	0	0	0	95.3
Buses	0	0	0	0	0	3	0	0	2	0	0	0	0	0	0	0	5
% Buses	0	0	0	0	0	0.3	0	0	7.7	0	0	0	0	0	0	0	0.4
Single-Unit Trucks	0	0	2	0	1	19	2	0	0	1	0	0	0	0	0	0	25
% Single-Unit Trucks	0	0	4.1	0	9.1	1.9	3	0	0	2.4	0	0	0	0	0	0	2
Articulated Trucks	0	3	0	0	1	3	3	0	0	0	0	0	0	0	0	0	10
% Articulated Trucks	0	8.6	0	0	9.1	0.3	4.5	0	0	0	0	0	0	0	0	0	0.8
Bicycles on Road	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
% Bicycles on Road	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0.2
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	14
% Pedestrians	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	1.1

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Ike Dr - Wailea Ike Pl
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/9/2019
Page No : 2

	WAILEA IKE DR SOUTHBOUND					WAILEA IKE PL WESTBOUND					WAILEA IKE DR NORTHBOUND					WAILEA IKE PL EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	0	6	4	0	10	1	139	13	0	153	3	2	0	0	5	0	0	0	0	0	168
07:45	0	2	11	0	13	1	136	**22**	0	**159**	4	8	0	0	12	0	0	0	0	0	184
08:00	0	5	7	**5**	17	3	112	5	0	120	**7**	6	0	0	13	0	0	0	0	0	150
08:15	0	**7**	**12**	2	**21**	**4**	**140**	6	0	150	4	**11**	0	0	**15**	0	0	0	0	0	**186**
Total Volume	0	20	34	7	61	9	527	46	0	582	18	27	0	0	45	0	0	0	0	0	688
% App. Total	0	32.8	55.7	11.5		1.5	90.5	7.9	0		40	60	0	0		0	0	0	0		
PHF	.000	.714	.708	.350	.726	.563	.941	.523	.000	.915	.643	.614	.000	.000	.750	.000	.000	.000	.000	.000	.925



Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Ike Dr - Wailea Ike Pl
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 1

Groups Printed- Motorcycles - Cars & Light Goods - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

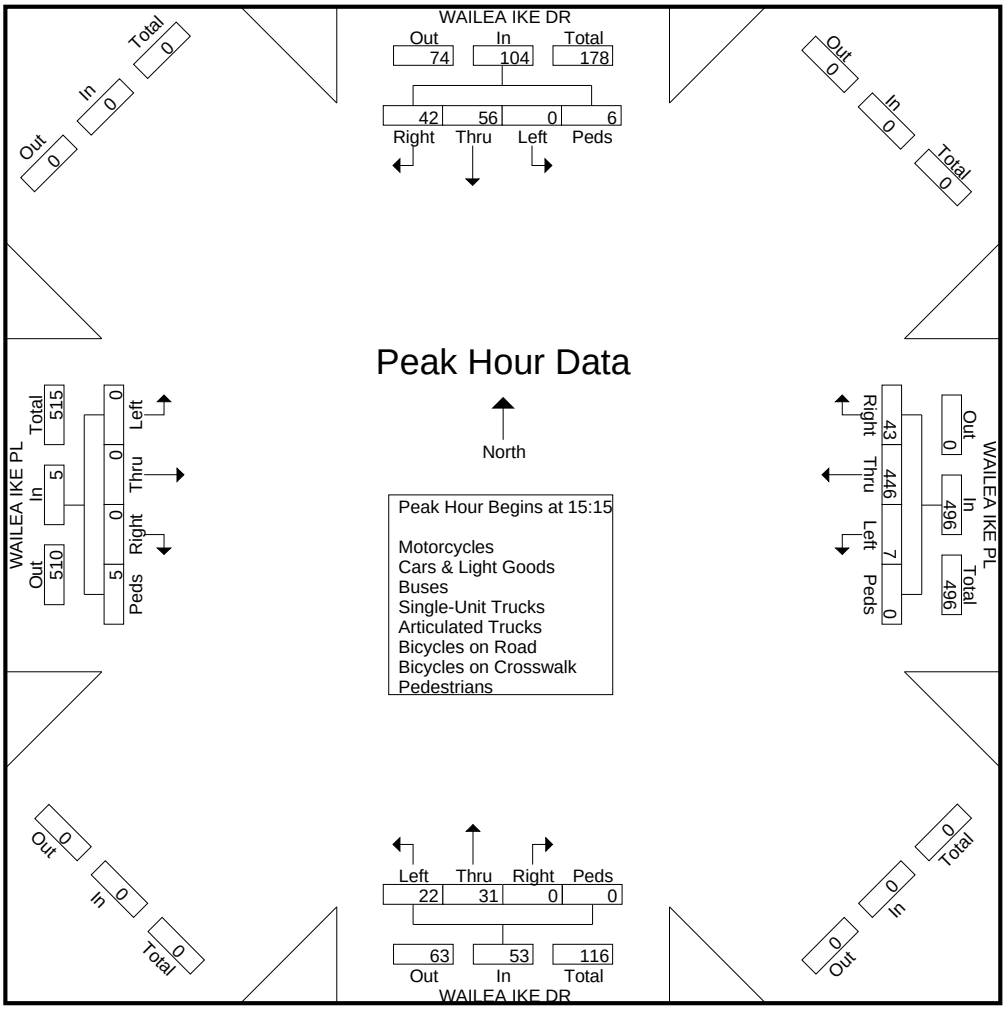
	WAILEA IKE DR SOUTHBOUND				WAILEA IKE PL WESTBOUND				WAILEA IKE DR NORTHBOUND				WAILEA IKE PL EASTBOUND				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
15:00	0	12	9	3	2	118	13	0	11	12	0	0	0	0	0	1	181
15:15	0	17	14	5	1	104	10	0	6	11	0	0	0	0	0	2	170
15:30	0	19	7	0	1	103	11	0	9	8	0	0	0	0	0	0	158
15:45	0	10	10	0	2	137	10	0	4	8	0	0	0	0	0	1	182
Total	0	58	40	8	6	462	44	0	30	39	0	0	0	0	0	4	691
16:00	0	10	11	1	3	102	12	0	3	4	0	0	0	0	0	2	148
16:15	0	18	9	2	0	88	9	0	10	14	0	0	0	0	0	0	150
16:30	0	14	10	0	1	106	4	0	4	4	0	0	0	0	0	2	145
16:45	0	11	4	2	1	105	6	2	6	10	0	0	0	0	0	0	147
Total	0	53	34	5	5	401	31	2	23	32	0	0	0	0	0	4	590
Grand Total	0	111	74	13	11	863	75	2	53	71	0	0	0	0	0	8	1281
Apprch %	0	56.1	37.4	6.6	1.2	90.7	7.9	0.2	42.7	57.3	0	0	0	0	0	100	
Total %	0	8.7	5.8	1	0.9	67.4	5.9	0.2	4.1	5.5	0	0	0	0	0	0.6	
Motorcycles	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
% Motorcycles	0	0.9	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.2
Cars & Light Goods	0	106	72	0	11	838	70	0	51	68	0	0	0	0	0	0	1216
% Cars & Light Goods	0	95.5	97.3	0	100	97.1	93.3	0	96.2	95.8	0	0	0	0	0	0	94.9
Buses	0	0	0	0	0	10	0	0	2	2	0	0	0	0	0	0	14
% Buses	0	0	0	0	0	1.2	0	0	3.8	2.8	0	0	0	0	0	0	1.1
Single-Unit Trucks	0	1	0	0	0	9	4	0	0	0	0	0	0	0	0	0	14
% Single-Unit Trucks	0	0.9	0	0	0	1	5.3	0	0	0	0	0	0	0	0	0	1.1
Articulated Trucks	0	3	0	0	0	2	1	0	0	0	0	0	0	0	0	0	6
% Articulated Trucks	0	2.7	0	0	0	0.2	1.3	0	0	0	0	0	0	0	0	0	0.5
Bicycles on Road	0	0	2	0	0	3	0	0	0	1	0	0	0	0	0	0	6
% Bicycles on Road	0	0	2.7	0	0	0.3	0	0	0	1.4	0	0	0	0	0	0	0.5
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	13	0	0	0	2	0	0	0	0	0	0	0	8	23
% Pedestrians	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	100	1.8

Austin Tsutsumi & Associates

1871 Wili Pa Loop, Suite A
Wailuku, Hawaii 96793
Phone: (808) 224-8044 Fax: (808) 242-9163

File Name : Wailea Ike Dr - Wailea Ike Pl
Site Code : 19-518 Proposed SF-S Parcel
Start Date : 5/8/2019
Page No : 2

	WAILEA IKE DR SOUTHBOUND					WAILEA IKE PL WESTBOUND					WAILEA IKE DR NORTHBOUND					WAILEA IKE PL EASTBOUND					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	0	17	**14**	**5**	**36**	1	104	10	0	115	6	**11**	0	0	**17**	0	0	0	**2**	**2**	170
15:30	0	**19**	7	0	26	1	103	11	0	115	**9**	8	0	0	17	0	0	0	0	0	158
15:45	0	10	10	0	20	2	**137**	10	0	**149**	4	8	0	0	12	0	0	0	1	1	**182**
16:00	0	10	11	1	22	**3**	102	**12**	0	117	3	4	0	0	7	0	0	0	2	2	148
Total Volume	0	56	42	6	104	7	446	43	0	496	22	31	0	0	53	0	0	0	5	5	658
% App. Total	0	53.8	40.4	5.8		1.4	89.9	8.7	0		41.5	58.5	0	0		0	0	0	100		
PHF	.000	.737	.750	.300	.722	.583	.814	.896	.000	.832	.611	.705	.000	.000	.779	.000	.000	.000	.625	.625	.904



Austin Tsutsumi & Associates

501 Sumner Street, Suite 521
Honolulu, HI 96817-5031
Phone: 533-3646 Fax: 526-1267

File Name : Wailea Ike Pl(South) - Wailea Ike Dr
Site Code : 17-537 Wailea Lower Parcel
Start Date : 5/11/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

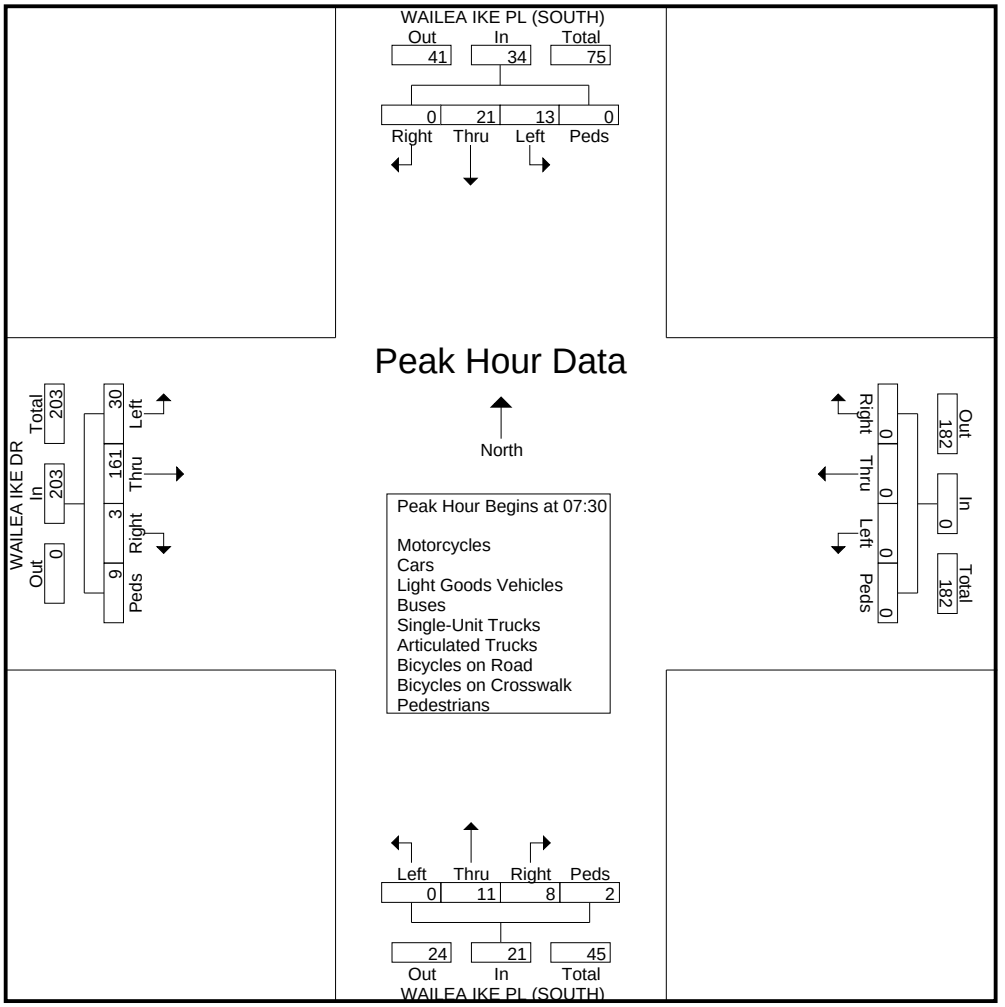
	WAILEA IKE PL (SOUTH) SOUTHBOUND				WESTBOUND				WAILEA IKE PL (SOUTH) NORTHBOUND				WAILEA IKE DR EASBOUND				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
06:30	0	5	4	0	0	0	0	2	1	1	0	1	1	55	2	0	72
06:45	0	1	0	0	0	0	0	0	0	1	0	2	0	43	5	0	52
Total	0	6	4	0	0	0	0	2	1	2	0	3	1	98	7	0	124
07:00	0	0	2	0	0	0	0	0	0	4	0	1	1	46	5	3	62
07:15	0	4	5	0	0	0	0	0	0	2	0	3	0	41	3	2	60
07:30	0	10	1	0	0	0	0	0	1	3	0	1	1	35	8	3	63
07:45	0	1	0	0	0	0	0	0	2	3	0	0	0	41	8	4	59
Total	0	15	8	0	0	0	0	0	3	12	0	5	2	163	24	12	244
08:00	0	7	7	0	0	0	0	0	3	2	0	1	1	41	5	2	69
08:15	0	3	5	0	0	0	0	0	2	3	0	0	1	44	9	0	67
Grand Total	0	31	24	0	0	0	0	2	9	19	0	9	5	346	45	14	504
Apprch %	0	56.4	43.6	0	0	0	0	100	24.3	51.4	0	24.3	1.2	84.4	11	3.4	
Total %	0	6.2	4.8	0	0	0	0	0.4	1.8	3.8	0	1.8	1	68.7	8.9	2.8	
Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
% Motorcycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	2.2	0	0.4
Cars	0	22	21	0	0	0	0	0	8	14	0	0	5	270	36	0	376
% Cars	0	71	87.5	0	0	0	0	0	88.9	73.7	0	0	100	78	80	0	74.6
Light Goods Vehicles	0	5	1	0	0	0	0	0	1	3	0	0	0	58	3	0	71
% Light Goods Vehicles	0	16.1	4.2	0	0	0	0	0	11.1	15.8	0	0	0	16.8	6.7	0	14.1
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	0	9
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4.4	0	1.8
Single-Unit Trucks	0	4	1	0	0	0	0	0	0	2	0	0	0	7	1	0	15
% Single-Unit Trucks	0	12.9	4.2	0	0	0	0	0	0	10.5	0	0	0	2	2.2	0	3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.2
Bicycles on Road	0	0	1	0	0	0	0	0	0	0	0	0	0	2	2	0	5
% Bicycles on Road	0	0	4.2	0	0	0	0	0	0	0	0	0	0	0.6	4.4	0	1
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	11.1	0	0	0	0	0.2
Pedestrians	0	0	0	0	0	0	0	2	0	0	0	8	0	0	0	14	24
% Pedestrians	0	0	0	0	0	0	0	100	0	0	0	88.9	0	0	0	100	4.8

Austin Tsutsumi & Associates

501 Sumner Street, Suite 521
Honolulu, HI 96817-5031
Phone: 533-3646 Fax: 526-1267

File Name : Wailea Ike Pl(South) - Wailea Ike Dr
Site Code : 17-537 Wailea Lower Parcel
Start Date : 5/11/2017
Page No : 2

	WAILEA IKE PL (SOUTH) SOUTHBOUND					WESTBOUND					WAILEA IKE PL (SOUTH) NORTHBOUND					WAILEA IKE DR EASBOUND					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:30 to 08:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30																					
07:30	0	**10**	1	0	11	0	0	0	0	0	1	**3**	0	**1**	5	**1**	35	8	3	47	63
07:45	0	1	0	0	1	0	0	0	0	0	2	3	0	0	5	0	41	8	**4**	53	59
08:00	0	7	**7**	0	**14**	0	0	0	0	0	**3**	2	0	1	**6**	1	41	5	2	49	**69**
08:15	0	3	5	0	8	0	0	0	0	0	2	3	0	0	5	1	**44**	**9**	0	**54**	67
Total Volume	0	21	13	0	34	0	0	0	0	0	8	11	0	2	21	3	161	30	9	203	258
% App. Total	0	61.8	38.2	0		0	0	0	0		38.1	52.4	0	9.5		1.5	79.3	14.8	4.4		
PHF	.000	.525	.464	.000	.607	.000	.000	.000	.000	.000	.667	.917	.000	.500	.875	.750	.915	.833	.563	.940	.935



Austin Tsutsumi & Associates

501 Sumner Street, Suite 521
Honolulu, HI 96817-5031
Phone: 533-3646 Fax: 526-1267

File Name : Wailea Ike Pl(South) - Wailea Ike Dr
Site Code : 17-537 Wailea Lower Parcel
Start Date : 5/11/2017
Page No : 1

Groups Printed- Motorcycles - Cars - Light Goods Vehicles - Buses - Unit Trucks - Articulated Trucks - Bicycles on Road - Bicycles on Crosswalk - Pedestrians

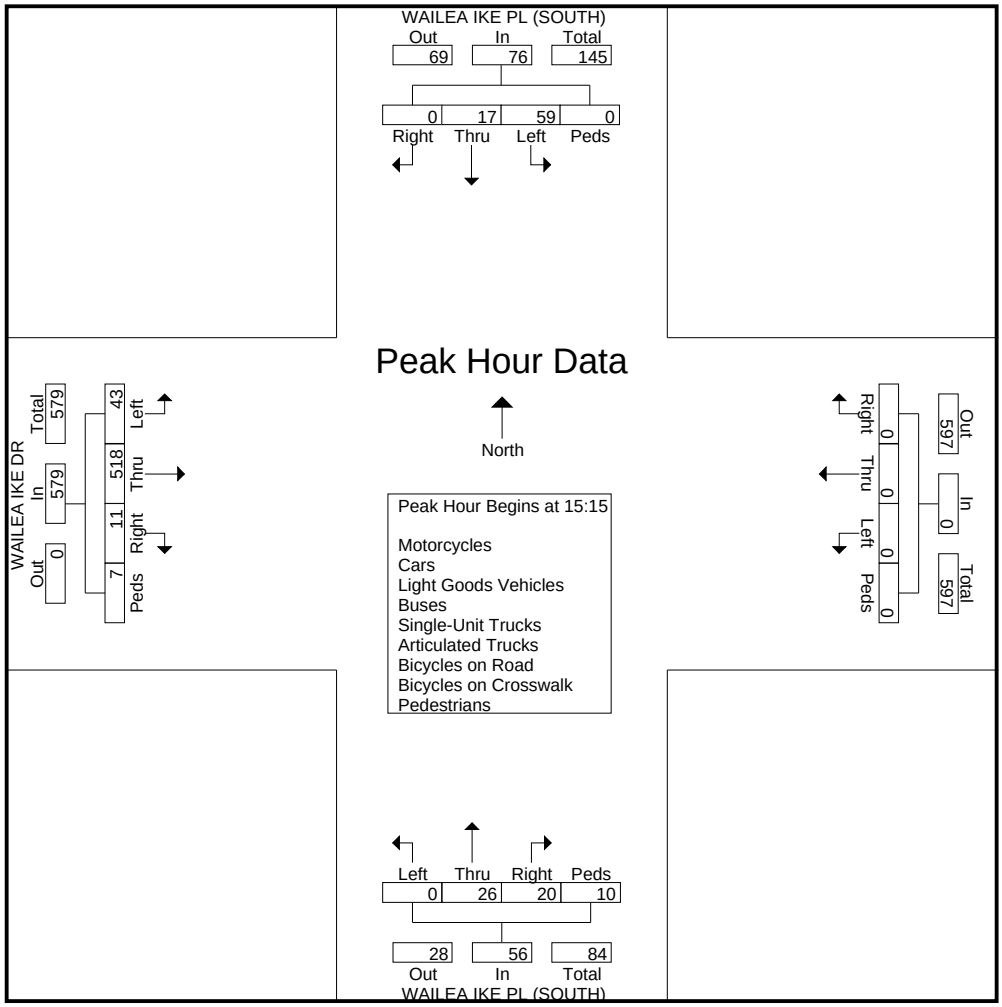
	WAILEA IKE PL (SOUTH) SOUTHBOUND				WESTBOUND				WAILEA IKE PL (SOUTH) NORTHBOUND				WAILEA IKE DR EASBOUND				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
15:00	0	5	18	0	0	0	0	0	7	4	0	0	1	162	10	0	207
15:15	0	2	11	0	0	0	0	0	4	8	0	7	3	126	9	0	170
15:30	0	4	14	0	0	0	0	0	5	8	0	0	5	126	11	6	179
15:45	0	7	17	0	0	0	0	0	7	8	0	3	2	125	13	1	183
Total	0	18	60	0	0	0	0	0	23	28	0	10	11	539	43	7	739
16:00	0	4	17	0	0	0	0	0	4	2	0	0	1	141	10	0	179
16:15	0	3	24	0	0	0	0	0	7	4	0	2	3	142	5	2	192
16:30	0	1	14	0	0	0	0	0	1	7	0	1	1	158	5	0	188
16:45	0	3	10	0	0	0	0	0	1	4	0	3	1	156	14	0	192
Total	0	11	65	0	0	0	0	0	13	17	0	6	6	597	34	2	751
Grand Total	0	29	125	0	0	0	0	0	36	45	0	16	17	1136	77	9	1490
Apprch %	0	18.8	81.2	0	0	0	0	0	37.1	46.4	0	16.5	1.4	91.7	6.2	0.7	
Total %	0	1.9	8.4	0	0	0	0	0	2.4	3	0	1.1	1.1	76.2	5.2	0.6	
Motorcycles	0	0	0	0	0	0	0	0	0	1	0	0	0	2	1	0	4
% Motorcycles	0	0	0	0	0	0	0	0	0	2.2	0	0	0	0.2	1.3	0	0.3
Cars	0	26	103	0	0	0	0	0	28	38	0	0	16	877	66	0	1154
% Cars	0	89.7	82.4	0	0	0	0	0	77.8	84.4	0	0	94.1	77.2	85.7	0	77.4
Light Goods Vehicles	0	3	20	0	0	0	0	0	8	6	0	0	1	234	8	0	280
% Light Goods Vehicles	0	10.3	16	0	0	0	0	0	22.2	13.3	0	0	5.9	20.6	10.4	0	18.8
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	7
% Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	2.6	0	0.5
Single-Unit Trucks	0	0	2	0	0	0	0	0	0	0	0	0	0	16	0	0	18
% Single-Unit Trucks	0	0	1.6	0	0	0	0	0	0	0	0	0	0	1.4	0	0	1.2
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	9	25
% Pedestrians	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	100	1.7

Austin Tsutsumi & Associates

501 Sumner Street, Suite 521
Honolulu, HI 96817-5031
Phone: 533-3646 Fax: 526-1267

File Name : Wailea Ike Pl(South) - Wailea Ike Dr
Site Code : 17-537 Wailea Lower Parcel
Start Date : 5/11/2017
Page No : 2

	WAILEA IKE PL (SOUTH) SOUTHBOUND					WESTBOUND					WAILEA IKE PL (SOUTH) NORTHBOUND					WAILEA IKE DR EASBOUND					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 15:15 to 16:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 15:15																					
15:15	0	2	11	0	13	0	0	0	0	0	4	**8**	0	**7**	**19**	3	126	9	0	138	170
15:30	0	4	14	0	18	0	0	0	0	0	5	8	0	0	13	**5**	126	11	**6**	148	179
15:45	0	**7**	**17**	0	**24**	0	0	0	0	0	**7**	8	0	3	18	2	125	**13**	1	141	**183**
16:00	0	4	17	0	21	0	0	0	0	0	4	2	0	0	6	1	**141**	10	0	**152**	179
Total Volume	0	17	59	0	76	0	0	0	0	0	20	26	0	10	56	11	518	43	7	579	711
% App. Total	0	22.4	77.6	0		0	0	0	0		35.7	46.4	0	17.9		1.9	89.5	7.4	1.2		
PHF	.000	.607	.868	.000	.792	.000	.000	.000	.000	.000	.714	.813	.000	.357	.737	.550	.918	.827	.292	.952	.971



APPENDIX B

LEVEL OF SERVICE CRITERIA

APPENDIX B – LEVEL OF SERVICE (LOS) CRITERIA

VEHICULAR LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS (HCM 6th EDITION)

Level of service for vehicles at signalized intersections is directly related to delay values and is assigned on that basis. Level of Service is a measure of the acceptability of delay values to motorists at a given intersection. The criteria are given in the table below.

Level-of Service Criteria for Signalized Intersections

Level of Service	Control Delay per Vehicle (sec./veh.)
A	< 10.0
B	>10.0 and ≤ 20.0
C	>20.0 and ≤ 35.0
D	>35.0 and ≤ 55.0
E	>55.0 and ≤ 80.0
F	> 80.0

Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group or approach in question.

VEHICULAR LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 6th EDITION)

The level of service criteria for vehicles at unsignalized intersections is defined as the average control delay, in seconds per vehicle.

LOS delay threshold values are lower for two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections than those of signalized intersections. This is because more vehicles pass through signalized intersections, and therefore, drivers expect and tolerate greater delays. While the criteria for level of service for TWSC and AWSC intersections are the same, procedures to calculate the average total delay may differ.

Level of Service Criteria for Two-Way Stop-Controlled Intersections

Level of Service	Average Control Delay (sec/veh)
A	≤ 10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	> 50

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing AM Peak

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	79	138	11	53	316
Future Vol, veh/h	14	79	138	11	53	316
Conflicting Peds, #/hr	32	1	0	58	58	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	86	150	12	58	343

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	705	215	0	0	220	0
Stage 1	214	-	-	-	-	-
Stage 2	491	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	403	825	-	-	1349	-
Stage 1	822	-	-	-	-	-
Stage 2	615	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	349	779	-	-	1274	-
Mov Cap-2 Maneuver	349	-	-	-	-	-
Stage 1	777	-	-	-	-	-
Stage 2	563	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.5	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	657	1274	-
HCM Lane V/C Ratio	-	-	0.154	0.045	-
HCM Control Delay (s)	-	-	11.5	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	59	6	62	86	4	15	5	25	16	4	2
Future Vol, veh/h	0	59	6	62	86	4	15	5	25	16	4	2
Conflicting Peds, #/hr	6	0	14	14	0	6	4	0	1	1	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	195	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	64	7	67	93	4	16	5	27	17	4	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	103	0	0	85	0	0	318	319	83	320	320	105
Stage 1	-	-	-	-	-	-	82	82	-	235	235	-
Stage 2	-	-	-	-	-	-	236	237	-	85	85	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1489	-	-	1512	-	-	635	598	976	633	597	949
Stage 1	-	-	-	-	-	-	926	827	-	768	710	-
Stage 2	-	-	-	-	-	-	767	709	-	923	824	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1480	-	-	1492	-	-	598	560	962	586	559	940
Mov Cap-2 Maneuver	-	-	-	-	-	-	598	560	-	586	559	-
Stage 1	-	-	-	-	-	-	914	816	-	763	674	-
Stage 2	-	-	-	-	-	-	723	673	-	890	813	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.1	10.1	11.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	750	1480	-	-	1492	-	-	601
HCM Lane V/C Ratio	0.065	-	-	-	0.045	-	-	0.04
HCM Control Delay (s)	10.1	0	-	-	7.5	-	-	11.2
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	108	11	31	116	8	25
Future Vol, veh/h	108	11	31	116	8	25
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	117	12	34	126	9	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	133	0	321	127
Stage 1	-	-	-	-	127	-
Stage 2	-	-	-	-	194	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1452	-	673	923
Stage 1	-	-	-	-	899	-
Stage 2	-	-	-	-	839	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1446	-	653	919
Mov Cap-2 Maneuver	-	-	-	-	653	-
Stage 1	-	-	-	-	895	-
Stage 2	-	-	-	-	818	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	836	-	-	1446	-
HCM Lane V/C Ratio	0.043	-	-	0.023	-
HCM Control Delay (s)	9.5	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	19	9	19	17	167	9	374	4	69	812	124
Future Volume (veh/h)	105	19	9	19	17	167	9	374	4	69	812	124
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	0.98		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	114	21	1	21	18	61	10	407	4	75	883	90
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	287	208	10	90	49	115	23	1084	11	100	1178	999
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.01	0.59	0.59	0.06	0.63	0.63
Sat Flow, veh/h	1305	1769	84	207	416	975	1781	1849	18	1781	1870	1585
Grp Volume(v), veh/h	114	0	22	100	0	0	10	0	411	75	883	90
Grp Sat Flow(s),veh/h/ln	1305	0	1853	1599	0	0	1781	0	1867	1781	1870	1585
Q Serve(g_s), s	0.4	0.0	0.7	0.9	0.0	0.0	0.4	0.0	7.8	2.8	22.1	1.5
Cycle Q Clear(g_c), s	4.2	0.0	0.7	3.8	0.0	0.0	0.4	0.0	7.8	2.8	22.1	1.5
Prop In Lane	1.00		0.05	0.21		0.61	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	287	0	218	253	0	0	23	0	1095	100	1178	999
V/C Ratio(X)	0.40	0.00	0.10	0.39	0.00	0.00	0.44	0.00	0.38	0.75	0.75	0.09
Avail Cap(c_a), veh/h	719	0	832	770	0	0	400	0	2236	533	2380	2017
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.8	0.0	26.3	27.7	0.0	0.0	32.7	0.0	7.3	31.1	8.7	4.8
Incr Delay (d2), s/veh	0.7	0.0	0.1	0.7	0.0	0.0	5.0	0.0	0.4	4.1	1.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.3	1.5	0.0	0.0	0.2	0.0	2.3	1.2	6.2	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.5	0.0	26.5	28.4	0.0	0.0	37.7	0.0	7.7	35.2	10.6	4.9
LnGrp LOS	C	A	C	C	A	A	D	A	A	D	B	A
Approach Vol, veh/h		136			100			421			1048	
Approach Delay, s/veh		28.1			28.4			8.5			11.8	
Approach LOS		C			C			A			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.8	45.2		12.9	5.8	48.1		12.9
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	20.0	80.0		30.0	15.0	85.0		30.0
Max Q Clear Time (g_c+I1), s	4.8	9.8		5.8	2.4	24.1		6.2
Green Ext Time (p_c), s	0.1	5.1		0.4	0.0	18.0		0.3

Intersection Summary		
HCM 6th Ctrl Delay		13.3
HCM 6th LOS		B

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	10	7	30	16	102	3	246	16	39	736	67
Future Vol, veh/h	46	10	7	30	16	102	3	246	16	39	736	67
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	240	-	230	435	-	175
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	50	11	8	33	17	111	3	267	17	42	800	73

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1174	1174	800	1199	1230	267	873	0	0	284	0	0
Stage 1	884	884	-	273	273	-	-	-	-	-	-	-
Stage 2	290	290	-	926	957	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	169	192	385	162	178	772	773	-	-	1278	-	-
Stage 1	340	363	-	733	684	-	-	-	-	-	-	-
Stage 2	718	672	-	322	336	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	130	185	385	147	171	772	773	-	-	1278	-	-
Mov Cap-2 Maneuver	130	185	-	147	171	-	-	-	-	-	-	-
Stage 1	339	351	-	730	681	-	-	-	-	-	-	-
Stage 2	597	669	-	296	325	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45.9	15.7	0.1	0.4
HCM LOS	E	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	773	-	-	154	497	1278	-	-
HCM Lane V/C Ratio	0.004	-	-	0.445	0.324	0.033	-	-
HCM Control Delay (s)	9.7	-	-	45.9	15.7	7.9	-	-
HCM Lane LOS	A	-	-	E	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	2	1.4	0.1	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	58	87	2	4	3
Future Vol, veh/h	2	58	87	2	4	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	2	63	95	2	4	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	97	0	-	0	163	96
Stage 1	-	-	-	-	96	-
Stage 2	-	-	-	-	67	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1496	-	-	-	828	960
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1496	-	-	-	827	960
Mov Cap-2 Maneuver	-	-	-	-	827	-
Stage 1	-	-	-	-	927	-
Stage 2	-	-	-	-	956	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1496	-	-	-	879
HCM Lane V/C Ratio	0.001	-	-	-	0.009
HCM Control Delay (s)	7.4	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	57	84	6	9	17
Future Vol, veh/h	8	57	84	6	9	17
Conflicting Peds, #/hr	10	0	0	10	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	62	91	7	10	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	108	0	-	0	185	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	80	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1483	-	-	-	804	949
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	943	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1469	-	-	-	783	940
Mov Cap-2 Maneuver	-	-	-	-	783	-
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	934	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1469	-	-	-	879
HCM Lane V/C Ratio	0.006	-	-	-	0.032
HCM Control Delay (s)	7.5	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Intersection Delay, s/veh	10.7
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	17	277	76	24	5	111	27	33	2	68	5
Future Vol, veh/h	6	17	277	76	24	5	111	27	33	2	68	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	18	301	83	26	5	121	29	36	2	74	5
Number of Lanes	1	1	1	0	1	1	1	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	11.2	10.7	10.3	9.9
HCM LOS	B	B	B	A

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	76%	0%	3%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	24%	0%	97%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	111	27	33	6	17	277	100	5	70	5
LT Vol	111	0	0	6	0	0	76	0	2	0
Through Vol	0	27	0	0	17	0	24	0	68	0
RT Vol	0	0	33	0	0	277	0	5	0	5
Lane Flow Rate	121	29	36	7	18	301	109	5	76	5
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.219	0.049	0.053	0.011	0.03	0.422	0.195	0.008	0.133	0.008
Departure Headway (Hd)	6.535	6.032	5.329	6.252	5.75	5.047	6.473	5.387	6.298	5.578
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	550	594	672	576	626	717	555	664	569	641
Service Time	4.268	3.766	3.062	3.952	3.45	2.747	4.206	3.12	4.035	3.315
HCM Lane V/C Ratio	0.22	0.049	0.054	0.012	0.029	0.42	0.196	0.008	0.134	0.008
HCM Control Delay	11.1	9.1	8.4	9	8.6	11.4	10.8	8.2	10	8.4
HCM Lane LOS	B	A	A	A	A	B	B	A	A	A
HCM 95th-tile Q	0.8	0.2	0.2	0	0.1	2.1	0.7	0	0.5	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	414	146	84	141	99	236
Future Volume (vph)	414	146	84	141	99	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	0.99	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1527	1863	1560	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1527	1863	1560	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	159	91	153	108	257
RTOR Reduction (vph)	0	97	0	111	0	0
Lane Group Flow (vph)	450	62	91	42	108	257
Confl. Peds. (#/hr)		14		4		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	23.3	23.3	16.2	16.2	8.0	17.0
Effective Green, g (s)	23.3	23.3	16.2	16.2	8.0	17.0
Actuated g/C Ratio	0.39	0.39	0.27	0.27	0.13	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	693	597	507	424	237	1011
v/s Ratio Prot	c0.25		0.05		c0.06	c0.07
v/s Ratio Perm		0.04		0.03		
v/c Ratio	0.65	0.10	0.18	0.10	0.46	0.25
Uniform Delay, d1	14.8	11.5	16.6	16.2	23.7	16.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	0.1	0.2	0.1	1.4	0.1
Delay (s)	16.9	11.6	16.7	16.3	25.1	16.5
Level of Service	B	B	B	B	C	B
Approach Delay (s)	15.5		16.5			19.1
Approach LOS	B		B			B

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	59.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	9	527	46	18	27	0	0	20	34
Future Vol, veh/h	0	0	0	9	527	46	18	27	0	0	20	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	10	573	50	20	29	0	0	22	37

Major/Minor	Major2			Minor1		Minor2			
Conflicting Flow All	0	0	0	318	643	-	-	618	312
Stage 1	-	-	-	0	0	-	-	618	-
Stage 2	-	-	-	318	643	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	3.32
Pot Cap-1 Maneuver	-	-	-	611	390	0	0	403	684
Stage 1	-	-	-	-	-	0	0	479	-
Stage 2	-	-	-	668	467	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	554	390	-	-	403	684
Mov Cap-2 Maneuver	-	-	-	554	390	-	-	403	-
Stage 1	-	-	-	-	-	-	-	479	-
Stage 2	-	-	-	603	467	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		14.2	12.4
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	442	-	-	-	544
HCM Lane V/C Ratio	0.111	-	-	-	0.108
HCM Control Delay (s)	14.2	-	-	-	12.4
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0.4

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	204	3	0	0	0	0	11	8	13	21	0
Future Vol, veh/h	30	204	3	0	0	0	0	11	8	13	21	0
Conflicting Peds, #/hr	0	0	2	2	0	0	9	0	0	0	0	9
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	33	222	3	0	0	0	0	12	9	14	23	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	292	115	183	293	-
Stage 1	-	-	-	-	292	-	0	0	-
Stage 2	-	-	-	-	0	-	183	293	-
Critical Hdwy	4.14	-	-	-	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	-	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	-	-	-	0	617	916	761	617	0
Stage 1	-	-	-	0	670	-	-	-	0
Stage 2	-	-	-	0	-	-	801	669	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	616	914	743	616	-
Mov Cap-2 Maneuver	-	-	-	-	616	-	743	616	-
Stage 1	-	-	-	-	669	-	-	-	-
Stage 2	-	-	-	-	-	-	779	668	-

Approach	EB	NB	SB
HCM Control Delay, s		10.2	10.8
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	714	-	-	-	659
HCM Lane V/C Ratio	0.029	-	-	-	0.056
HCM Control Delay (s)	10.2	-	-	-	10.8
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Existing PM Peak

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	121	318	19	67	252
Future Vol, veh/h	20	121	318	19	67	252
Conflicting Peds, #/hr	32	1	0	58	58	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	132	346	21	73	274

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	867	416	0	0	425	0
Stage 1	415	-	-	-	-	-
Stage 2	452	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	323	637	-	-	1134	-
Stage 1	666	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	272	601	-	-	1071	-
Mov Cap-2 Maneuver	272	-	-	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	572	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15	0	1.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	513	1071	-
HCM Lane V/C Ratio	-	-	0.299	0.068	-
HCM Control Delay (s)	-	-	15	8.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.2	0.2	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	75	13	65	94	16	32	7	85	10	2	0
Future Vol, veh/h	0	75	13	65	94	16	32	7	85	10	2	0
Conflicting Peds, #/hr	6	0	14	14	0	6	4	0	1	1	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	195	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	82	14	71	102	17	35	8	92	11	2	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	125	0	0	110	0	0	361	370	104	399	369	121
Stage 1	-	-	-	-	-	-	103	103	-	259	259	-
Stage 2	-	-	-	-	-	-	258	267	-	140	110	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1462	-	-	1480	-	-	595	560	951	561	560	930
Stage 1	-	-	-	-	-	-	903	810	-	746	694	-
Stage 2	-	-	-	-	-	-	747	688	-	863	804	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1454	-	-	1460	-	-	561	522	937	479	522	921
Mov Cap-2 Maneuver	-	-	-	-	-	-	561	522	-	479	522	-
Stage 1	-	-	-	-	-	-	891	799	-	742	656	-
Stage 2	-	-	-	-	-	-	706	650	-	770	794	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2.8	10.7	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	769	1454	-	-	1460	-	-	486
HCM Lane V/C Ratio	0.175	-	-	-	0.048	-	-	0.027
HCM Control Delay (s)	10.7	0	-	-	7.6	-	-	12.6
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	148	5	23	158	6	61
Future Vol, veh/h	148	5	23	158	6	61
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	161	5	25	172	7	66

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	170	0	390	168
Stage 1	-	-	-	-	168	-
Stage 2	-	-	-	-	222	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1407	-	614	876
Stage 1	-	-	-	-	862	-
Stage 2	-	-	-	-	815	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1402	-	599	873
Mov Cap-2 Maneuver	-	-	-	-	599	-
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	799	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	839	-	-	1402	-
HCM Lane V/C Ratio	0.087	-	-	0.018	-
HCM Control Delay (s)	9.7	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	23	14	18	22	128	15	848	2	102	700	153
Future Volume (veh/h)	182	23	14	18	22	128	15	848	2	102	700	153
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	198	25	6	20	24	18	16	922	2	111	761	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	307	242	58	111	128	79	32	1122	2	140	1238	1049
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.02	0.60	0.60	0.08	0.66	0.66
Sat Flow, veh/h	1351	1454	349	393	766	474	1781	1866	4	1781	1870	1585
Grp Volume(v), veh/h	198	0	31	62	0	0	16	0	924	111	761	121
Grp Sat Flow(s),veh/h/ln	1351	0	1803	1632	0	0	1781	0	1870	1781	1870	1585
Q Serve(g_s), s	10.6	0.0	1.5	0.0	0.0	0.0	0.9	0.0	40.5	6.4	24.1	2.9
Cycle Q Clear(g_c), s	13.8	0.0	1.5	3.1	0.0	0.0	0.9	0.0	40.5	6.4	24.1	2.9
Prop In Lane	1.00		0.19	0.32		0.29	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	307	0	300	318	0	0	32	0	1124	140	1238	1049
V/C Ratio(X)	0.65	0.00	0.10	0.20	0.00	0.00	0.50	0.00	0.82	0.80	0.61	0.12
Avail Cap(c_a), veh/h	472	0	520	512	0	0	257	0	2699	514	2700	2288
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.5	0.0	36.7	37.4	0.0	0.0	50.6	0.0	16.3	47.1	10.0	6.4
Incr Delay (d2), s/veh	1.7	0.0	0.1	0.2	0.0	0.0	4.5	0.0	3.0	3.9	1.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	0.7	1.4	0.0	0.0	0.4	0.0	15.5	2.9	8.3	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.2	0.0	36.8	37.6	0.0	0.0	55.1	0.0	19.3	50.9	11.0	6.5
LnGrp LOS	D	A	D	D	A	A	E	A	B	D	B	A
Approach Vol, veh/h		229			62			940			993	
Approach Delay, s/veh		42.3			37.6			20.0			14.9	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.1	68.5		22.3	6.8	74.8		22.3
Change Period (Y+Rc), s	5.0	6.0		5.0	5.0	6.0		5.0
Max Green Setting (Gmax), s	30.0	150.0		30.0	15.0	150.0		30.0
Max Q Clear Time (g_c+I1), s	8.4	42.5		5.1	2.9	26.1		15.8
Green Ext Time (p_c), s	0.1	20.0		0.2	0.0	14.8		0.5

Intersection Summary			
HCM 6th Ctrl Delay			20.5
HCM 6th LOS			C

Intersection	
Int Delay, s/veh	10.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	11	14	16	8	43	8	762	35	88	571	76
Future Vol, veh/h	43	11	14	16	8	43	8	762	35	88	571	76
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	240	-	230	435	-	175
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	12	15	17	9	47	9	828	38	96	621	83

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1683	1697	621	1707	1742	828	704	0	0	866	0	0
Stage 1	813	813	-	846	846	-	-	-	-	-	-	-
Stage 2	870	884	-	861	896	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	75	92	487	72	87	371	894	-	-	777	-	-
Stage 1	372	392	-	357	378	-	-	-	-	-	-	-
Stage 2	346	363	-	350	359	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	54	80	487	56	75	371	894	-	-	777	-	-
Mov Cap-2 Maneuver	54	80	-	56	75	-	-	-	-	-	-	-
Stage 1	368	343	-	353	374	-	-	-	-	-	-	-
Stage 2	292	359	-	287	314	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	207.1	40.8	0.1	1.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	894	-	-	73	171	777	-	-
HCM Lane V/C Ratio	0.01	-	-	1.013	0.426	0.123	-	-
HCM Control Delay (s)	9.1	-	-	207.1	40.8	10.3	-	-
HCM Lane LOS	A	-	-	F	E	B	-	-
HCM 95th %tile Q(veh)	0	-	-	5.3	1.9	0.4	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	67	81	6	1	3
Future Vol, veh/h	4	67	81	6	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	73	88	7	1	3

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	95	0	-	0	173	92
Stage 1	-	-	-	-	92	-
Stage 2	-	-	-	-	81	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1499	-	-	-	817	965
Stage 1	-	-	-	-	932	-
Stage 2	-	-	-	-	942	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1499	-	-	-	815	965
Mov Cap-2 Maneuver	-	-	-	-	815	-
Stage 1	-	-	-	-	929	-
Stage 2	-	-	-	-	942	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1499	-	-	-	923
HCM Lane V/C Ratio	0.003	-	-	-	0.005
HCM Control Delay (s)	7.4	0	-	-	8.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	47	72	82	10	3	13
Future Vol, veh/h	47	72	82	10	3	13
Conflicting Peds, #/hr	10	0	0	10	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	78	89	11	3	14

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	110	0	-	0	285	105
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	180	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1480	-	-	-	705	949
Stage 1	-	-	-	-	919	-
Stage 2	-	-	-	-	851	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1466	-	-	-	666	940
Mov Cap-2 Maneuver	-	-	-	-	666	-
Stage 1	-	-	-	-	877	-
Stage 2	-	-	-	-	842	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1466	-	-	-	873
HCM Lane V/C Ratio	0.035	-	-	-	0.02
HCM Control Delay (s)	7.5	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Intersection Delay, s/veh	13.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	35	221	80	11	8	279	119	81	3	58	12
Future Vol, veh/h	8	35	221	80	11	8	279	119	81	3	58	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	38	240	87	12	9	303	129	88	3	63	13
Number of Lanes	1	1	1	0	1	1	1	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	12.2	12	14.2	10.6
HCM LOS	B	B	B	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	88%	0%	5%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	12%	0%	95%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	279	119	81	8	35	221	91	8	61	12
LT Vol	279	0	0	8	0	0	80	0	3	0
Through Vol	0	119	0	0	35	0	11	0	58	0
RT Vol	0	0	81	0	0	221	0	8	0	12
Lane Flow Rate	303	129	88	9	38	240	99	9	66	13
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.555	0.219	0.132	0.017	0.071	0.398	0.206	0.015	0.13	0.023
Departure Headway (Hd)	6.592	6.089	5.385	7.177	6.673	5.968	7.485	6.332	7.075	6.342
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	546	589	664	497	535	601	478	562	505	561
Service Time	4.34	3.837	3.133	4.939	4.435	3.729	5.256	4.102	4.848	4.115
HCM Lane V/C Ratio	0.555	0.219	0.133	0.018	0.071	0.399	0.207	0.016	0.131	0.023
HCM Control Delay	17.3	10.5	9	10.1	9.9	12.7	12.2	9.2	10.9	9.3
HCM Lane LOS	C	B	A	B	A	B	B	A	B	A
HCM 95th-tile Q	3.4	0.8	0.5	0.1	0.2	1.9	0.8	0	0.4	0.1

HCM Signalized Intersection Capacity Analysis
9: Wailea Alanui Drive & Wailea Ike Drive

09/10/2019

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	324	143	345	488	189	213
Future Volume (vph)	324	143	345	488	189	213
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1520	1863	1559	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1520	1863	1559	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	352	155	375	530	205	232
RTOR Reduction (vph)	0	111	0	341	0	0
Lane Group Flow (vph)	352	44	375	189	205	232
Confl. Peds. (#/hr)		14		4		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	21.2	21.2	26.7	26.7	14.9	33.6
Effective Green, g (s)	21.2	21.2	26.7	26.7	14.9	33.6
Actuated g/C Ratio	0.28	0.28	0.36	0.36	0.20	0.45
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	501	430	665	556	352	1589
v/s Ratio Prot	c0.20		c0.20		c0.12	0.07
v/s Ratio Perm		0.03		0.12		
v/c Ratio	0.70	0.10	0.56	0.34	0.58	0.15
Uniform Delay, d1	24.0	19.8	19.4	17.6	27.1	12.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	0.1	1.1	0.4	2.4	0.0
Delay (s)	28.4	19.9	20.5	18.0	29.6	12.2
Level of Service	C	B	C	B	C	B
Approach Delay (s)	25.8		19.0			20.3
Approach LOS	C		B			C

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	74.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	7	446	43	22	31	0	0	56	42
Future Vol, veh/h	0	0	0	7	446	43	22	31	0	0	56	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	8	485	47	24	34	0	0	61	46

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	289	548	-	-	525	266
Stage 1	-	-	-	0	0	-	-	525	-
Stage 2	-	-	-	289	548	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	3.32
Pot Cap-1 Maneuver	-	-	-	641	442	0	0	456	732
Stage 1	-	-	-	-	-	0	0	528	-
Stage 2	-	-	-	694	515	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	540	442	-	-	456	732
Mov Cap-2 Maneuver	-	-	-	540	442	-	-	456	-
Stage 1	-	-	-	-	-	-	-	528	-
Stage 2	-	-	-	576	515	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		13.6	13.2
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	478	-	-	-	544
HCM Lane V/C Ratio	0.121	-	-	-	0.196
HCM Control Delay (s)	13.6	-	-	-	13.2
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0.7

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	603	11	0	0	0	0	26	20	59	17	0
Future Vol, veh/h	43	603	11	0	0	0	0	26	20	59	17	0
Conflicting Peds, #/hr	0	0	2	2	0	0	9	0	0	0	0	9
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	655	12	0	0	0	0	28	22	64	18	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	757	336	436	763	-
Stage 1	-	-	-	-	757	-	0	0	-
Stage 2	-	-	-	-	0	-	436	763	-
Critical Hdwy	4.14	-	-	-	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	-	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	-	-	-	0	335	660	504	333	0
Stage 1	-	-	-	0	414	-	-	-	0
Stage 2	-	-	-	0	-	-	569	411	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	334	659	456	332	-
Mov Cap-2 Maneuver	-	-	-	-	334	-	456	332	-
Stage 1	-	-	-	-	413	-	-	-	-
Stage 2	-	-	-	-	-	-	513	410	-

Approach	EB	NB	SB
HCM Control Delay, s		14.6	15.6
HCM LOS		B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	425	-	-	-	421
HCM Lane V/C Ratio	0.118	-	-	-	0.196
HCM Control Delay (s)	14.6	-	-	-	15.6
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	0.7

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2024 AM Peak

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	90	245	15	60	435
Future Vol, veh/h	15	90	245	15	60	435
Conflicting Peds, #/hr	32	1	0	58	58	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	98	266	16	65	473

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	967	333	0	0	340	0
Stage 1	332	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	282	709	-	-	1219	-
Stage 1	727	-	-	-	-	-
Stage 2	528	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	239	669	-	-	1152	-
Mov Cap-2 Maneuver	239	-	-	-	-	-
Stage 1	634	-	-	-	-	-
Stage 2	512	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.6	0	1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	532	1152	-
HCM Lane V/C Ratio	-	-	0.215	0.057	-
HCM Control Delay (s)	-	-	13.6	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	65	10	65	95	5	20	5	30	20	5	5
Future Vol, veh/h	5	65	10	65	95	5	20	5	30	20	5	5
Conflicting Peds, #/hr	6	0	14	14	0	6	4	0	1	1	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	195	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	71	11	71	103	5	22	5	33	22	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	114	0	0	96	0	0	358	357	92	361	360	116
Stage 1	-	-	-	-	-	-	101	101	-	254	254	-
Stage 2	-	-	-	-	-	-	257	256	-	107	106	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1475	-	-	1498	-	-	597	569	965	595	567	936
Stage 1	-	-	-	-	-	-	905	811	-	750	697	-
Stage 2	-	-	-	-	-	-	748	696	-	898	807	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1467	-	-	1478	-	-	556	530	951	544	528	927
Mov Cap-2 Maneuver	-	-	-	-	-	-	556	530	-	544	528	-
Stage 1	-	-	-	-	-	-	890	798	-	743	659	-
Stage 2	-	-	-	-	-	-	699	658	-	858	794	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	3	10.5	11.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	715	1467	-	-	1478	-	-	581
HCM Lane V/C Ratio	0.084	0.004	-	-	0.048	-	-	0.056
HCM Control Delay (s)	10.5	7.5	-	-	7.6	-	-	11.6
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	115	15	35	125	10	25
Future Vol, veh/h	115	15	35	125	10	25
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	125	16	38	136	11	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	145	0	349	137
Stage 1	-	-	-	-	137	-
Stage 2	-	-	-	-	212	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1437	-	648	911
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	823	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1432	-	627	908
Mov Cap-2 Maneuver	-	-	-	-	627	-
Stage 1	-	-	-	-	861	-
Stage 2	-	-	-	-	823	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	805	-	-	1432	-
HCM Lane V/C Ratio	0.047	-	-	0.027	-
HCM Control Delay (s)	9.7	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

HCM 6th Signalized Intersection Summary
4: Piilani Hwy & Kilohana Dr/Mapu Dr

10/01/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	20	15	25	20	175	15	580	10	75	1035	130
Future Volume (veh/h)	110	20	15	25	20	175	15	580	10	75	1035	130
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.97		0.96	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	120	22	1	27	22	1	16	630	6	82	1125	105
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	252	170	8	172	79	64	32	2215	988	105	1243	1053
Arrive On Green	0.08	0.10	0.10	0.03	0.04	0.04	0.02	0.62	0.62	0.06	0.66	0.66
Sat Flow, veh/h	1781	1774	81	1781	1870	1519	1781	3554	1585	1781	1870	1585
Grp Volume(v), veh/h	120	0	23	27	22	1	16	630	6	82	1125	105
Grp Sat Flow(s),veh/h/ln	1781	0	1855	1781	1870	1519	1781	1777	1585	1781	1870	1585
Q Serve(g_s), s	6.5	0.0	1.2	1.5	1.2	0.1	0.9	8.5	0.1	4.7	53.0	2.5
Cycle Q Clear(g_c), s	6.5	0.0	1.2	1.5	1.2	0.1	0.9	8.5	0.1	4.7	53.0	2.5
Prop In Lane	1.00		0.04	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	252	0	177	172	79	64	32	2215	988	105	1243	1053
V/C Ratio(X)	0.48	0.00	0.13	0.16	0.28	0.02	0.51	0.28	0.01	0.78	0.91	0.10
Avail Cap(c_a), veh/h	323	0	461	304	429	348	85	2215	988	443	1341	1136
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.5	0.0	43.3	46.1	48.6	48.0	50.9	9.0	7.5	48.5	14.8	6.3
Incr Delay (d2), s/veh	1.4	0.0	0.2	0.4	1.4	0.1	4.6	0.1	0.0	4.6	9.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	0.6	0.7	0.6	0.0	0.4	2.9	0.0	2.2	20.6	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.9	0.0	43.6	46.5	50.0	48.1	55.5	9.2	7.5	53.1	24.0	6.4
LnGrp LOS	D	A	D	D	D	D	E	A	A	D	C	A
Approach Vol, veh/h		143			50			652			1312	
Approach Delay, s/veh		43.0			48.1			10.3			24.4	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	71.2	12.8	9.4	6.9	75.5	7.2	15.0
Change Period (Y+Rc), s	5.0	6.0	4.5	5.0	5.0	6.0	4.5	5.0
Max Green Setting (Gmax), s	26.0	54.0	12.5	24.0	5.0	75.0	10.5	26.0
Max Q Clear Time (g_c+I1), s	6.7	10.5	8.5	3.2	2.9	55.0	3.5	3.2
Green Ext Time (p_c), s	0.1	8.5	0.1	0.0	0.0	14.6	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	21.9
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	10	15	55	20	110	10	435	35	45	955	80
Future Volume (veh/h)	65	10	15	55	20	110	10	435	35	45	955	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	71	11	0	60	22	0	11	473	21	49	1038	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	238	18		213	38		25	1170	992	85	1233	1045
Arrive On Green	0.08	0.08	0.00	0.08	0.08	0.00	0.01	0.63	0.63	0.05	0.66	0.66
Sat Flow, veh/h	1407	218	0	1209	455	0	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	82	0	0	82	0	0	11	473	21	49	1038	62
Grp Sat Flow(s),veh/h/ln	1625	0	0	1664	0	0	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.3	7.0	0.3	1.5	23.5	0.8
Cycle Q Clear(g_c), s	2.4	0.0	0.0	2.4	0.0	0.0	0.3	7.0	0.3	1.5	23.5	0.8
Prop In Lane	0.87		0.00	0.73		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	256	0		251	0		25	1170	992	85	1233	1045
V/C Ratio(X)	0.32	0.00		0.33	0.00		0.44	0.40	0.02	0.58	0.84	0.06
Avail Cap(c_a), veh/h	604	0		614	0		215	2970	2517	338	3098	2626
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.4	0.0	0.0	24.4	0.0	0.0	27.1	5.2	3.9	25.8	7.2	3.3
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.8	0.0	0.0	11.6	0.2	0.0	6.0	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	1.0	0.0	0.0	0.2	1.5	0.0	0.7	4.5	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.1	0.0	0.0	25.2	0.0	0.0	38.7	5.4	3.9	31.8	8.9	3.4
LnGrp LOS	C	A		C	A		D	A	A	C	A	A
Approach Vol, veh/h		82	A		82	A		505			1149	
Approach Delay, s/veh		25.1			25.2			6.1			9.5	
Approach LOS		C			C			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.1	39.2		9.1	5.3	41.0		9.1
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	10.5	88.0		18.0	6.7	91.8		18.0
Max Q Clear Time (g_c+I1), s	3.5	9.0		4.4	2.3	25.5		4.4
Green Ext Time (p_c), s	0.0	3.0		0.3	0.0	11.0		0.3

Intersection Summary	
HCM 6th Ctrl Delay	10.0
HCM 6th LOS	A

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	75	5	5	100	5	5	0	5	5	0	5
Future Vol, veh/h	5	75	5	5	100	5	5	0	5	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	82	5	5	109	5	5	0	5	5	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	114	0	0	87	0	0	219	219	85	219	219	112
Stage 1	-	-	-	-	-	-	95	95	-	122	122	-
Stage 2	-	-	-	-	-	-	124	124	-	97	97	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1475	-	-	1509	-	-	737	679	974	737	679	941
Stage 1	-	-	-	-	-	-	912	816	-	882	795	-
Stage 2	-	-	-	-	-	-	880	793	-	910	815	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1475	-	-	1509	-	-	728	674	974	728	674	941
Mov Cap-2 Maneuver	-	-	-	-	-	-	728	674	-	728	674	-
Stage 1	-	-	-	-	-	-	908	813	-	878	792	-
Stage 2	-	-	-	-	-	-	871	790	-	901	812	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.3	9.4	9.4
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	833	1475	-	-	1509	-	-	821
HCM Lane V/C Ratio	0.013	0.004	-	-	0.004	-	-	0.013
HCM Control Delay (s)	9.4	7.5	0	-	7.4	0	-	9.4
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	75	100	10	10	20
Future Vol, veh/h	10	75	100	10	10	20
Conflicting Peds, #/hr	10	0	0	10	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	82	109	11	11	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	130	0	-	0	229	125
Stage 1	-	-	-	-	125	-
Stage 2	-	-	-	-	104	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1455	-	-	-	759	926
Stage 1	-	-	-	-	901	-
Stage 2	-	-	-	-	920	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1441	-	-	-	738	917
Mov Cap-2 Maneuver	-	-	-	-	738	-
Stage 1	-	-	-	-	885	-
Stage 2	-	-	-	-	911	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1441	-	-	-	848
HCM Lane V/C Ratio	0.008	-	-	-	0.038
HCM Control Delay (s)	7.5	0	-	-	9.4
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Intersection Delay, s/veh	15.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	25	390	85	35	10	210	30	40	5	70	10
Future Vol, veh/h	10	25	390	85	35	10	210	30	40	5	70	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	27	424	92	38	11	228	33	43	5	76	11
Number of Lanes	1	1	1	0	1	1	1	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	18.4	12.6	14.4	11.4
HCM LOS	C	B	B	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	71%	0%	7%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	29%	0%	93%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	210	30	40	10	25	390	120	10	75	10
LT Vol	210	0	0	10	0	0	85	0	5	0
Through Vol	0	30	0	0	25	0	35	0	70	0
RT Vol	0	0	40	0	0	390	0	10	0	10
Lane Flow Rate	228	33	43	11	27	424	130	11	82	11
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.457	0.061	0.072	0.021	0.048	0.668	0.267	0.019	0.168	0.02
Departure Headway (Hd)	7.213	6.709	6.002	6.883	6.379	5.674	7.363	6.296	7.4	6.556
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	498	531	592	517	558	632	484	563	488	541
Service Time	4.998	4.493	3.786	4.662	4.158	3.452	5.16	4.093	5.1	4.355
HCM Lane V/C Ratio	0.458	0.062	0.073	0.021	0.048	0.671	0.269	0.02	0.168	0.02
HCM Control Delay	16	9.9	9.3	9.8	9.5	19.2	12.9	9.2	11.6	9.5
HCM Lane LOS	C	A	A	A	A	C	B	A	B	A
HCM 95th-tile Q	2.4	0.2	0.2	0.1	0.2	5.1	1.1	0.1	0.6	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	615	195	155	270	155	310
Future Volume (vph)	615	195	155	270	155	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1518	1863	1559	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1518	1863	1559	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	668	212	168	293	168	337
RTOR Reduction (vph)	0	92	0	226	0	0
Lane Group Flow (vph)	668	120	168	67	168	337
Confl. Peds. (#/hr)		14		4		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	36.8	36.8	18.4	18.4	12.9	22.5
Effective Green, g (s)	36.8	36.8	18.4	18.4	12.9	22.5
Actuated g/C Ratio	0.46	0.46	0.23	0.23	0.16	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	813	697	427	358	285	994
v/s Ratio Prot	c0.38		c0.09		c0.09	0.10
v/s Ratio Perm		0.08		0.04		
v/c Ratio	0.82	0.17	0.39	0.19	0.59	0.34
Uniform Delay, d1	18.8	12.7	26.1	24.8	31.1	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.7	0.1	0.6	0.3	3.1	0.2
Delay (s)	25.5	12.8	26.7	25.1	34.2	23.1
Level of Service	C	B	C	C	C	C
Approach Delay (s)	22.4		25.7			26.8
Approach LOS	C		C			C

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	15	770	55	25	45	0	0	25	40
Future Vol, veh/h	0	0	0	15	770	55	25	45	0	0	25	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	16	837	60	27	49	0	0	27	43

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	464	929	-	-	899	449
Stage 1	-	-	-	0	0	-	-	899	-
Stage 2	-	-	-	464	929	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	3.32
Pot Cap-1 Maneuver	-	-	-	481	266	0	0	277	557
Stage 1	-	-	-	-	-	0	0	356	-
Stage 2	-	-	-	548	344	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	410	266	-	-	277	557
Mov Cap-2 Maneuver	-	-	-	410	266	-	-	277	-
Stage 1	-	-	-	-	-	-	-	356	-
Stage 2	-	-	-	467	344	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		20.8	15.9
HCM LOS		C	C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	304	-	-	-	401
HCM Lane V/C Ratio	0.25	-	-	-	0.176
HCM Control Delay (s)	20.8	-	-	-	15.9
HCM Lane LOS	C	-	-	-	C
HCM 95th %tile Q(veh)	1	-	-	-	0.6

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	45	370	10	0	0	0	0	15	10	20	25	0
Future Vol, veh/h	45	370	10	0	0	0	0	15	10	20	25	0
Conflicting Peds, #/hr	0	0	2	2	0	0	9	0	0	0	0	9
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	402	11	0	0	0	0	16	11	22	27	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	508	209	307	513	-
Stage 1	-	-	-	-	508	-	0	0	-
Stage 2	-	-	-	-	0	-	307	513	-
Critical Hdwy	4.14	-	-	-	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	-	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	-	-	-	0	466	797	622	463	0
Stage 1	-	-	-	0	537	-	-	-	0
Stage 2	-	-	-	0	-	-	678	534	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	465	795	597	462	-
Mov Cap-2 Maneuver	-	-	-	-	465	-	597	462	-
Stage 1	-	-	-	-	536	-	-	-	-
Stage 2	-	-	-	-	-	-	648	533	-

Approach	EB	NB	SB
HCM Control Delay, s		11.8	12.7
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	558	-	-	-	514
HCM Lane V/C Ratio	0.049	-	-	-	0.095
HCM Control Delay (s)	11.8	-	-	-	12.7
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Base Year 2024 PM Peak

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	130	490	20	80	420
Future Vol, veh/h	20	130	490	20	80	420
Conflicting Peds, #/hr	32	1	0	58	58	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	141	533	22	87	457

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1265	603	0	0	613	0
Stage 1	602	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	187	499	-	-	966	-
Stage 1	547	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	149	471	-	-	913	-
Mov Cap-2 Maneuver	149	-	-	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	497	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.5	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	366	913	-
HCM Lane V/C Ratio	-	-	0.445	0.095	-
HCM Control Delay (s)	-	-	22.5	9.4	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.2	0.3	-

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	85	15	70	100	20	35	10	90	15	5	5
Future Vol, veh/h	5	85	15	70	100	20	35	10	90	15	5	5
Conflicting Peds, #/hr	6	0	14	14	0	6	4	0	1	1	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	195	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	92	16	76	109	22	38	11	98	16	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	137	0	0	122	0	0	405	413	115	444	410	130
Stage 1	-	-	-	-	-	-	124	124	-	278	278	-
Stage 2	-	-	-	-	-	-	281	289	-	166	132	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1447	-	-	1465	-	-	556	529	937	524	531	920
Stage 1	-	-	-	-	-	-	880	793	-	728	680	-
Stage 2	-	-	-	-	-	-	726	673	-	836	787	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1439	-	-	1445	-	-	516	490	924	438	492	911
Mov Cap-2 Maneuver	-	-	-	-	-	-	516	490	-	438	492	-
Stage 1	-	-	-	-	-	-	865	780	-	721	640	-
Stage 2	-	-	-	-	-	-	675	633	-	734	774	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	2.8	11.2	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	727	1439	-	-	1445	-	-	501
HCM Lane V/C Ratio	0.202	0.004	-	-	0.053	-	-	0.054
HCM Control Delay (s)	11.2	7.5	-	-	7.6	-	-	12.6
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.8	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	160	5	25	170	10	65
Future Vol, veh/h	160	5	25	170	10	65
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	174	5	27	185	11	71

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	183	0	420	181
Stage 1	-	-	-	-	181	-
Stage 2	-	-	-	-	239	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1392	-	590	862
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	801	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1387	-	575	859
Mov Cap-2 Maneuver	-	-	-	-	575	-
Stage 1	-	-	-	-	828	-
Stage 2	-	-	-	-	801	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	806	-	-	1387	-
HCM Lane V/C Ratio	0.101	-	-	0.02	-
HCM Control Delay (s)	10	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

HCM 6th Signalized Intersection Summary
4: Piilani Hwy & Kilohana Dr/Mapu Dr

10/01/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	25	25	30	25	135	25	1135	15	110	990	160
Future Volume (veh/h)	190	25	25	30	25	135	25	1135	15	110	990	160
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.97		0.96	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	207	27	2	33	27	1	27	1234	8	120	1076	133
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	306	218	16	174	79	64	45	2044	912	148	1184	1003
Arrive On Green	0.11	0.13	0.13	0.03	0.04	0.04	0.03	0.58	0.58	0.08	0.63	0.63
Sat Flow, veh/h	1781	1719	127	1781	1870	1515	1781	3554	1585	1781	1870	1585
Grp Volume(v), veh/h	207	0	29	33	27	1	27	1234	8	120	1076	133
Grp Sat Flow(s),veh/h/ln	1781	0	1846	1781	1870	1515	1781	1777	1585	1781	1870	1585
Q Serve(g_s), s	12.0	0.0	1.5	1.9	1.5	0.1	1.7	24.9	0.2	7.3	54.9	3.7
Cycle Q Clear(g_c), s	12.0	0.0	1.5	1.9	1.5	0.1	1.7	24.9	0.2	7.3	54.9	3.7
Prop In Lane	1.00		0.07	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	306	0	234	174	79	64	45	2044	912	148	1184	1003
V/C Ratio(X)	0.68	0.00	0.12	0.19	0.34	0.02	0.59	0.60	0.01	0.81	0.91	0.13
Avail Cap(c_a), veh/h	306	0	435	292	407	330	81	2044	912	420	1272	1078
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.7	0.0	42.7	48.5	51.3	50.6	53.2	15.3	10.0	49.7	17.5	8.1
Incr Delay (d2), s/veh	5.9	0.0	0.2	0.5	1.9	0.1	4.5	0.7	0.0	3.9	10.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	0.7	0.9	0.8	0.0	0.8	9.1	0.1	3.3	22.8	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.5	0.0	42.9	49.0	53.2	50.7	57.7	16.0	10.0	53.7	27.5	8.2
LnGrp LOS	D	A	D	D	D	D	E	B	B	D	C	A
Approach Vol, veh/h		236			61			1269			1329	
Approach Delay, s/veh		47.8			50.9			16.8			28.0	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.2	69.4	17.0	9.7	7.8	75.8	7.7	19.0
Change Period (Y+Rc), s	5.0	6.0	4.5	5.0	5.0	6.0	4.5	5.0
Max Green Setting (Gmax), s	26.0	54.0	12.5	24.0	5.0	75.0	10.5	26.0
Max Q Clear Time (g_c+I1), s	9.3	26.9	14.0	3.5	3.7	56.9	3.9	3.5
Green Ext Time (p_c), s	0.1	16.0	0.0	0.1	0.0	13.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	25.2
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	15	25	55	10	50	20	1040	75	95	850	100
Future Volume (veh/h)	65	15	25	55	10	50	20	1040	75	95	850	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	71	16	0	60	11	0	22	1130	59	103	924	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	184	23		188	22		43	1270	1076	132	1364	1156
Arrive On Green	0.08	0.08	0.00	0.08	0.08	0.00	0.02	0.68	0.68	0.07	0.73	0.73
Sat Flow, veh/h	1335	301	0	1381	297	0	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	87	0	0	71	0	0	22	1130	59	103	924	82
Grp Sat Flow(s),veh/h/ln	1635	0	0	1678	0	0	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.9	0.0	0.0	0.0	0.0	0.0	1.0	38.6	1.0	4.5	20.8	1.2
Cycle Q Clear(g_c), s	3.9	0.0	0.0	3.0	0.0	0.0	1.0	38.6	1.0	4.5	20.8	1.2
Prop In Lane	0.82		0.00	0.85		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	206	0		211	0		43	1270	1076	132	1364	1156
V/C Ratio(X)	0.42	0.00		0.34	0.00		0.51	0.89	0.05	0.78	0.68	0.07
Avail Cap(c_a), veh/h	431	0		433	0		151	2089	1771	237	2179	1847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.4	0.0	0.0	35.1	0.0	0.0	38.0	10.3	4.2	35.8	5.7	3.1
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.9	0.0	0.0	9.0	3.0	0.0	9.4	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.0	1.3	0.0	0.0	0.5	10.9	0.2	2.2	4.6	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.8	0.0	0.0	36.0	0.0	0.0	47.0	13.3	4.2	45.2	6.3	3.1
LnGrp LOS	D	A		D	A		D	B	A	D	A	A
Approach Vol, veh/h		87	A		71	A		1211			1109	
Approach Delay, s/veh		36.8			36.0			13.5			9.7	
Approach LOS		D			D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.4	58.0		10.4	6.4	61.9		10.4
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	10.5	88.0		18.0	6.7	91.8		18.0
Max Q Clear Time (g_c+I1), s	6.5	40.6		5.0	3.0	22.8		5.9
Green Ext Time (p_c), s	0.1	12.9		0.2	0.0	8.7		0.3

Intersection Summary	
HCM 6th Ctrl Delay	13.2
HCM 6th LOS	B

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	90	5	5	105	10	5	0	5	5	0	5
Future Vol, veh/h	5	90	5	5	105	10	5	0	5	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	98	5	5	114	11	5	0	5	5	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	125	0	0	103	0	0	243	246	101	243	243	120
Stage 1	-	-	-	-	-	-	111	111	-	130	130	-
Stage 2	-	-	-	-	-	-	132	135	-	113	113	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1462	-	-	1489	-	-	711	656	954	711	659	931
Stage 1	-	-	-	-	-	-	894	804	-	874	789	-
Stage 2	-	-	-	-	-	-	871	785	-	892	802	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1462	-	-	1489	-	-	702	651	954	702	654	931
Mov Cap-2 Maneuver	-	-	-	-	-	-	702	651	-	702	654	-
Stage 1	-	-	-	-	-	-	890	801	-	871	786	-
Stage 2	-	-	-	-	-	-	862	782	-	883	799	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.3	9.5	9.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	809	1462	-	-	1489	-	-	800
HCM Lane V/C Ratio	0.013	0.004	-	-	0.004	-	-	0.014
HCM Control Delay (s)	9.5	7.5	0	-	7.4	0	-	9.6
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	50	95	105	10	5	15
Future Vol, veh/h	50	95	105	10	5	15
Conflicting Peds, #/hr	10	0	0	10	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	103	114	11	5	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	135	0	-	0	341	130
Stage 1	-	-	-	-	130	-
Stage 2	-	-	-	-	211	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1449	-	-	-	655	920
Stage 1	-	-	-	-	896	-
Stage 2	-	-	-	-	824	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1435	-	-	-	616	911
Mov Cap-2 Maneuver	-	-	-	-	616	-
Stage 1	-	-	-	-	851	-
Stage 2	-	-	-	-	816	-

Approach	EB	WB	SB
HCM Control Delay, s	2.6	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1435	-	-	-	814
HCM Lane V/C Ratio	0.038	-	-	-	0.027
HCM Control Delay (s)	7.6	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Intersection Delay, s/veh	40.2
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	50	380	90	25	10	440	120	90	5	60	20
Future Vol, veh/h	10	50	380	90	25	10	440	120	90	5	60	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	54	413	98	27	11	478	130	98	5	65	22
Number of Lanes	1	1	1	0	1	1	1	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	30.2	15.4	55.3	12.9
HCM LOS	D	C	F	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	78%	0%	8%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	22%	0%	92%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	440	120	90	10	50	380	115	10	65	20
LT Vol	440	0	0	10	0	0	90	0	5	0
Through Vol	0	120	0	0	50	0	25	0	60	0
RT Vol	0	0	90	0	0	380	0	10	0	20
Lane Flow Rate	478	130	98	11	54	413	125	11	71	22
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	1.025	0.261	0.177	0.025	0.115	0.805	0.307	0.024	0.172	0.048
Departure Headway (Hd)	7.719	7.213	6.504	8.339	7.831	7.12	9.109	7.992	8.9	8.143
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	473	500	553	432	460	512	398	451	406	442
Service Time	5.449	4.942	4.233	6.039	5.531	4.82	6.809	5.692	6.6	5.843
HCM Lane V/C Ratio	1.011	0.26	0.177	0.025	0.117	0.807	0.314	0.024	0.175	0.05
HCM Control Delay	76.1	12.5	10.6	11.3	11.5	33.1	15.8	10.9	13.4	11.3
HCM Lane LOS	F	B	B	B	B	D	C	B	B	B
HCM 95th-tile Q	14.1	1	0.6	0.1	0.4	7.6	1.3	0.1	0.6	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	245	445	750	285	305
Future Volume (vph)	555	245	445	750	285	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.95	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1508	1863	1557	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1508	1863	1557	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	266	484	815	310	332
RTOR Reduction (vph)	0	161	0	514	0	0
Lane Group Flow (vph)	603	105	484	301	310	332
Confl. Peds. (#/hr)		14		4		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	37.9	37.9	32.0	32.0	22.0	39.4
Effective Green, g (s)	37.9	37.9	32.0	32.0	22.0	39.4
Actuated g/C Ratio	0.36	0.36	0.31	0.31	0.21	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	645	550	573	479	374	1342
v/s Ratio Prot	c0.34		c0.26		c0.18	0.09
v/s Ratio Perm		0.07		0.19		
v/c Ratio	0.93	0.19	0.84	0.63	0.83	0.25
Uniform Delay, d1	31.8	22.5	33.6	30.8	39.2	22.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.8	0.2	11.0	2.6	14.0	0.1
Delay (s)	52.6	22.7	44.6	33.4	53.2	22.2
Level of Service	D	C	D	C	D	C
Approach Delay (s)	43.5		37.6			37.2
Approach LOS	D		D			D

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	103.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	35	730	55	65	40	0	0	75	55
Future Vol, veh/h	0	0	0	35	730	55	65	40	0	0	75	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	38	793	60	71	43	0	0	82	60

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	514	929	-	-	899	427
Stage 1	-	-	-	0	0	-	-	899	-
Stage 2	-	-	-	514	929	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	3.32
Pot Cap-1 Maneuver	-	-	-	443	266	0	0	277	576
Stage 1	-	-	-	-	-	0	0	356	-
Stage 2	-	-	-	511	344	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	307	266	-	-	277	576
Mov Cap-2 Maneuver	-	-	-	307	266	-	-	277	-
Stage 1	-	-	-	-	-	-	-	356	-
Stage 2	-	-	-	353	344	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		25.2	21.7
HCM LOS		D	C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	290	-	-	-	355
HCM Lane V/C Ratio	0.394	-	-	-	0.398
HCM Control Delay (s)	25.2	-	-	-	21.7
HCM Lane LOS	D	-	-	-	C
HCM 95th %tile Q(veh)	1.8	-	-	-	1.9

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	915	50	0	0	0	0	70	50	75	45	0
Future Vol, veh/h	50	915	50	0	0	0	0	70	50	75	45	0
Conflicting Peds, #/hr	0	0	2	2	0	0	9	0	0	0	0	9
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	995	54	0	0	0	0	76	54	82	49	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	1132	527	644	1159	-
Stage 1	-	-	-	-	1132	-	0	0	-
Stage 2	-	-	-	-	0	-	644	1159	-
Critical Hdwy	4.14	-	-	-	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	-	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	-	-	-	0	202	496	358	194	0
Stage 1	-	-	-	0	276	-	-	-	0
Stage 2	-	-	-	0	-	-	428	268	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	202	495	225	194	-
Mov Cap-2 Maneuver	-	-	-	-	202	-	225	194	-
Stage 1	-	-	-	-	275	-	-	-	-
Stage 2	-	-	-	-	-	-	276	267	-

Approach	EB	NB	SB
HCM Control Delay, s		30.5	45.8
HCM LOS		D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	268	-	-	-	212
HCM Lane V/C Ratio	0.487	-	-	-	0.615
HCM Control Delay (s)	30.5	-	-	-	45.8
HCM Lane LOS	D	-	-	-	E
HCM 95th %tile Q(veh)	2.5	-	-	-	3.6

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2024 AM Peak

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	15	95	245	15	65	435
Future Vol, veh/h	15	95	245	15	65	435
Conflicting Peds, #/hr	32	1	0	58	58	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	103	266	16	71	473

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	979	333	0	0	340	0
Stage 1	332	-	-	-	-	-
Stage 2	647	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	277	709	-	-	1219	-
Stage 1	727	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	233	669	-	-	1152	-
Mov Cap-2 Maneuver	233	-	-	-	-	-
Stage 1	630	-	-	-	-	-
Stage 2	505	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.7	0	1.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	533	1152	-
HCM Lane V/C Ratio	-	-	0.224	0.061	-
HCM Control Delay (s)	-	-	13.7	8.3	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.9	0.2	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	70	10	65	100	5	20	5	30	20	5	5
Future Vol, veh/h	5	70	10	65	100	5	20	5	30	20	5	5
Conflicting Peds, #/hr	6	0	14	14	0	6	4	0	1	1	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	195	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	76	11	71	109	5	22	5	33	22	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	120	0	0	101	0	0	369	368	97	372	371	122
Stage 1	-	-	-	-	-	-	106	106	-	260	260	-
Stage 2	-	-	-	-	-	-	263	262	-	112	111	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1468	-	-	1491	-	-	588	561	959	585	559	929
Stage 1	-	-	-	-	-	-	900	807	-	745	693	-
Stage 2	-	-	-	-	-	-	742	691	-	893	804	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1460	-	-	1471	-	-	547	522	945	535	520	920
Mov Cap-2 Maneuver	-	-	-	-	-	-	547	522	-	535	520	-
Stage 1	-	-	-	-	-	-	885	794	-	738	656	-
Stage 2	-	-	-	-	-	-	694	654	-	853	791	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	2.9	10.6	11.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	706	1460	-	-	1471	-	-	572
HCM Lane V/C Ratio	0.085	0.004	-	-	0.048	-	-	0.057
HCM Control Delay (s)	10.6	7.5	-	-	7.6	-	-	11.7
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	115	15	40	125	15	35
Future Vol, veh/h	115	15	40	125	15	35
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	125	16	43	136	16	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	145	0	359	137
Stage 1	-	-	-	-	137	-
Stage 2	-	-	-	-	222	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1437	-	640	911
Stage 1	-	-	-	-	890	-
Stage 2	-	-	-	-	815	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1432	-	617	908
Mov Cap-2 Maneuver	-	-	-	-	617	-
Stage 1	-	-	-	-	858	-
Stage 2	-	-	-	-	815	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	795	-	-	1432	-
HCM Lane V/C Ratio	0.068	-	-	0.03	-
HCM Control Delay (s)	9.9	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-

HCM 6th Signalized Intersection Summary
4: Piilani Hwy & Kilohana Dr/Mapu Dr

10/01/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	20	15	25	20	175	15	580	10	75	1035	140
Future Volume (veh/h)	120	20	15	25	20	175	15	580	10	75	1035	140
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.97		0.96	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	130	22	1	27	22	1	16	630	6	82	1125	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	261	179	8	170	78	63	32	2204	983	105	1238	1049
Arrive On Green	0.09	0.10	0.10	0.03	0.04	0.04	0.02	0.62	0.62	0.06	0.66	0.66
Sat Flow, veh/h	1781	1774	81	1781	1870	1518	1781	3554	1585	1781	1870	1585
Grp Volume(v), veh/h	130	0	23	27	22	1	16	630	6	82	1125	116
Grp Sat Flow(s),veh/h/ln	1781	0	1855	1781	1870	1518	1781	1777	1585	1781	1870	1585
Q Serve(g_s), s	7.1	0.0	1.2	1.5	1.2	0.1	0.9	8.7	0.2	4.8	54.0	2.8
Cycle Q Clear(g_c), s	7.1	0.0	1.2	1.5	1.2	0.1	0.9	8.7	0.2	4.8	54.0	2.8
Prop In Lane	1.00		0.04	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	261	0	187	170	78	63	32	2204	983	105	1238	1049
V/C Ratio(X)	0.50	0.00	0.12	0.16	0.28	0.02	0.51	0.29	0.01	0.78	0.91	0.11
Avail Cap(c_a), veh/h	320	0	456	301	424	344	84	2204	983	438	1326	1123
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.7	0.0	43.3	46.7	49.2	48.6	51.5	9.3	7.7	49.1	15.2	6.5
Incr Delay (d2), s/veh	1.5	0.0	0.2	0.4	1.4	0.1	4.6	0.1	0.0	4.6	9.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	0.6	0.7	0.6	0.0	0.4	2.9	0.1	2.2	21.3	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.2	0.0	43.5	47.1	50.6	48.7	56.1	9.4	7.7	53.7	24.9	6.6
LnGrp LOS	D	A	D	D	D	D	E	A	A	D	C	A
Approach Vol, veh/h		153			50			652			1323	
Approach Delay, s/veh		43.2			48.7			10.5			25.1	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	71.6	13.5	9.4	6.9	76.0	7.2	15.7
Change Period (Y+Rc), s	5.0	6.0	4.5	5.0	5.0	6.0	4.5	5.0
Max Green Setting (Gmax), s	26.0	54.0	12.5	24.0	5.0	75.0	10.5	26.0
Max Q Clear Time (g_c+I1), s	6.8	10.7	9.1	3.2	2.9	56.0	3.5	3.2
Green Ext Time (p_c), s	0.1	8.5	0.1	0.0	0.0	14.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	22.5
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	10	20	55	20	110	15	435	35	45	955	80
Future Volume (veh/h)	65	10	20	55	20	110	15	435	35	45	955	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	71	11	0	60	22	0	16	473	22	49	1038	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	18		211	37		35	1178	999	85	1230	1043
Arrive On Green	0.08	0.08	0.00	0.08	0.08	0.00	0.02	0.63	0.63	0.05	0.66	0.66
Sat Flow, veh/h	1409	218	0	1212	453	0	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	82	0	0	82	0	0	16	473	22	49	1038	62
Grp Sat Flow(s),veh/h/ln	1627	0	0	1666	0	0	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.5	7.0	0.3	1.5	24.0	0.8
Cycle Q Clear(g_c), s	2.5	0.0	0.0	2.5	0.0	0.0	0.5	7.0	0.3	1.5	24.0	0.8
Prop In Lane	0.87		0.00	0.73		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	253	0		248	0		35	1178	999	85	1230	1043
V/C Ratio(X)	0.32	0.00		0.33	0.00		0.46	0.40	0.02	0.58	0.84	0.06
Avail Cap(c_a), veh/h	596	0		606	0		212	2930	2483	333	3057	2590
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.8	0.0	0.0	24.8	0.0	0.0	27.2	5.1	3.9	26.2	7.4	3.4
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.8	0.0	0.0	9.0	0.2	0.0	6.1	1.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	1.0	0.0	0.0	0.3	1.5	0.1	0.7	4.8	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.5	0.0	0.0	25.6	0.0	0.0	36.2	5.4	3.9	32.3	9.1	3.4
LnGrp LOS	C	A		C	A		D	A	A	C	A	A
Approach Vol, veh/h		82	A		82	A		511			1149	
Approach Delay, s/veh		25.5			25.6			6.3			9.7	
Approach LOS		C			C			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.2	39.9		9.1	5.6	41.5		9.1
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	10.5	88.0		18.0	6.7	91.8		18.0
Max Q Clear Time (g_c+I1), s	3.5	9.0		4.5	2.5	26.0		4.5
Green Ext Time (p_c), s	0.0	3.0		0.3	0.0	11.0		0.3

Intersection Summary	
HCM 6th Ctrl Delay	10.2
HCM 6th LOS	B

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	75	5	5	105	5	5	0	5	5	0	5
Future Vol, veh/h	5	75	5	5	105	5	5	0	5	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	82	5	5	114	5	5	0	5	5	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	119	0	0	87	0	0	224	224	85	224	224	117
Stage 1	-	-	-	-	-	-	95	95	-	127	127	-
Stage 2	-	-	-	-	-	-	129	129	-	97	97	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1469	-	-	1509	-	-	732	675	974	732	675	935
Stage 1	-	-	-	-	-	-	912	816	-	877	791	-
Stage 2	-	-	-	-	-	-	875	789	-	910	815	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1469	-	-	1509	-	-	723	670	974	723	670	935
Mov Cap-2 Maneuver	-	-	-	-	-	-	723	670	-	723	670	-
Stage 1	-	-	-	-	-	-	908	813	-	873	788	-
Stage 2	-	-	-	-	-	-	866	786	-	901	812	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.3	9.4	9.5
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	830	1469	-	-	1509	-	-	815
HCM Lane V/C Ratio	0.013	0.004	-	-	0.004	-	-	0.013
HCM Control Delay (s)	9.4	7.5	0	-	7.4	0	-	9.5
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	75	100	10	15	25
Future Vol, veh/h	15	75	100	10	15	25
Conflicting Peds, #/hr	10	0	0	10	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	82	109	11	16	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	130	0	-	0	239	125
Stage 1	-	-	-	-	125	-
Stage 2	-	-	-	-	114	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1455	-	-	-	749	926
Stage 1	-	-	-	-	901	-
Stage 2	-	-	-	-	911	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1441	-	-	-	725	917
Mov Cap-2 Maneuver	-	-	-	-	725	-
Stage 1	-	-	-	-	881	-
Stage 2	-	-	-	-	902	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1441	-	-	-	834
HCM Lane V/C Ratio	0.011	-	-	-	0.052
HCM Control Delay (s)	7.5	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Intersection Delay, s/veh	15.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	25	390	85	35	10	210	30	45	5	70	10
Future Vol, veh/h	10	25	390	85	35	10	210	30	45	5	70	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	27	424	92	38	11	228	33	49	5	76	11
Number of Lanes	1	1	1	0	1	1	1	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	18.6	12.6	14.3	11.4
HCM LOS	C	B	B	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	71%	0%	7%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	29%	0%	93%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	210	30	45	10	25	390	120	10	75	10
LT Vol	210	0	0	10	0	0	85	0	5	0
Through Vol	0	30	0	0	25	0	35	0	70	0
RT Vol	0	0	45	0	0	390	0	10	0	10
Lane Flow Rate	228	33	49	11	27	424	130	11	82	11
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.458	0.061	0.082	0.021	0.048	0.67	0.271	0.019	0.168	0.02
Departure Headway (Hd)	7.217	6.712	6.006	6.897	6.393	5.688	7.479	6.412	7.417	6.672
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	495	530	591	516	556	632	484	562	486	539
Service Time	5.009	4.504	3.797	4.684	4.18	3.474	5.179	4.112	5.124	4.38
HCM Lane V/C Ratio	0.461	0.062	0.083	0.021	0.049	0.671	0.269	0.02	0.169	0.02
HCM Control Delay	16	9.9	9.3	9.8	9.5	19.4	12.9	9.2	11.6	9.5
HCM Lane LOS	C	A	A	A	A	C	B	A	B	A
HCM 95th-tile Q	2.4	0.2	0.3	0.1	0.2	5.1	1.1	0.1	0.6	0.1

HCM Signalized Intersection Capacity Analysis
9: Wailea Alanui Drive & Wailea Ike Drive

10/01/2019

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	620	195	160	270	155	310
Future Volume (vph)	620	195	160	270	155	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1518	1863	1559	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1518	1863	1559	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	674	212	174	293	168	337
RTOR Reduction (vph)	0	91	0	225	0	0
Lane Group Flow (vph)	674	121	174	68	168	337
Confl. Peds. (#/hr)		14		4		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	36.8	36.8	18.6	18.6	12.9	22.6
Effective Green, g (s)	36.8	36.8	18.6	18.6	12.9	22.6
Actuated g/C Ratio	0.46	0.46	0.23	0.23	0.16	0.28
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	811	695	431	361	284	996
v/s Ratio Prot	c0.38		c0.09		c0.09	c0.10
v/s Ratio Perm		0.08		0.04		
v/c Ratio	0.83	0.17	0.40	0.19	0.59	0.34
Uniform Delay, d1	19.0	12.8	26.1	24.8	31.3	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	0.1	0.6	0.3	3.3	0.2
Delay (s)	26.3	12.9	26.8	25.0	34.5	23.1
Level of Service	C	B	C	C	C	C
Approach Delay (s)	23.1		25.7			26.9
Approach LOS	C		C			C

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	15	770	55	25	45	0	0	25	40
Future Vol, veh/h	0	0	0	15	770	55	25	45	0	0	25	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	16	837	60	27	49	0	0	27	43

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	464	929	-	-	899	449
Stage 1	-	-	-	0	0	-	-	899	-
Stage 2	-	-	-	464	929	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	3.32
Pot Cap-1 Maneuver	-	-	-	481	266	0	0	277	557
Stage 1	-	-	-	-	-	0	0	356	-
Stage 2	-	-	-	548	344	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	410	266	-	-	277	557
Mov Cap-2 Maneuver	-	-	-	410	266	-	-	277	-
Stage 1	-	-	-	-	-	-	-	356	-
Stage 2	-	-	-	467	344	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		20.8	15.9
HCM LOS		C	C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	304	-	-	-	401
HCM Lane V/C Ratio	0.25	-	-	-	0.176
HCM Control Delay (s)	20.8	-	-	-	15.9
HCM Lane LOS	C	-	-	-	C
HCM 95th %tile Q(veh)	1	-	-	-	0.6

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	45	370	10	0	0	0	0	15	10	20	25	0
Future Vol, veh/h	45	370	10	0	0	0	0	15	10	20	25	0
Conflicting Peds, #/hr	0	0	2	2	0	0	9	0	0	0	0	9
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	49	402	11	0	0	0	0	16	11	22	27	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	508	209	307	513	-
Stage 1	-	-	-	-	508	-	0	0	-
Stage 2	-	-	-	-	0	-	307	513	-
Critical Hdwy	4.14	-	-	-	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	-	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	-	-	-	0	466	797	622	463	0
Stage 1	-	-	-	0	537	-	-	-	0
Stage 2	-	-	-	0	-	-	678	534	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	465	795	597	462	-
Mov Cap-2 Maneuver	-	-	-	-	465	-	597	462	-
Stage 1	-	-	-	-	536	-	-	-	-
Stage 2	-	-	-	-	-	-	648	533	-

Approach	EB	NB	SB
HCM Control Delay, s		11.8	12.7
HCM LOS		B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	558	-	-	-	514
HCM Lane V/C Ratio	0.049	-	-	-	0.095
HCM Control Delay (s)	11.8	-	-	-	12.7
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	5	5	35	45	15
Future Vol, veh/h	15	5	5	35	45	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	5	5	38	49	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	105	57	65	0	-	0
Stage 1	57	-	-	-	-	-
Stage 2	48	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	893	1009	1537	-	-	-
Stage 1	966	-	-	-	-	-
Stage 2	974	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	890	1009	1537	-	-	-
Mov Cap-2 Maneuver	890	-	-	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	974	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1537	-	917	-	-
HCM Lane V/C Ratio	0.004	-	0.024	-	-
HCM Control Delay (s)	7.4	0	9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2024 PM Peak

Intersection	
Int Delay, s/veh	3.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	135	490	20	80	420
Future Vol, veh/h	20	135	490	20	80	420
Conflicting Peds, #/hr	32	1	0	58	58	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	147	533	22	87	457

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1265	603	0	0	613	0
Stage 1	602	-	-	-	-	-
Stage 2	663	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	187	499	-	-	966	-
Stage 1	547	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	149	471	-	-	913	-
Mov Cap-2 Maneuver	149	-	-	-	-	-
Stage 1	451	-	-	-	-	-
Stage 2	497	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.8	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	368	913	-
HCM Lane V/C Ratio	-	-	0.458	0.095	-
HCM Control Delay (s)	-	-	22.8	9.4	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.3	0.3	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	90	15	70	105	20	35	10	90	15	5	5
Future Vol, veh/h	5	90	15	70	105	20	35	10	90	15	5	5
Conflicting Peds, #/hr	6	0	14	14	0	6	4	0	1	1	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	40	-	-	195	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	98	16	76	114	22	38	11	98	16	5	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	142	0	0	128	0	0	416	424	121	455	421	135
Stage 1	-	-	-	-	-	-	130	130	-	283	283	-
Stage 2	-	-	-	-	-	-	286	294	-	172	138	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1441	-	-	1458	-	-	547	522	930	515	524	914
Stage 1	-	-	-	-	-	-	874	789	-	724	677	-
Stage 2	-	-	-	-	-	-	721	670	-	830	782	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1433	-	-	1439	-	-	507	483	917	430	485	905
Mov Cap-2 Maneuver	-	-	-	-	-	-	507	483	-	430	485	-
Stage 1	-	-	-	-	-	-	859	776	-	717	637	-
Stage 2	-	-	-	-	-	-	670	630	-	728	769	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	2.7	11.3	12.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	719	1433	-	-	1439	-	-	493
HCM Lane V/C Ratio	0.204	0.004	-	-	0.053	-	-	0.055
HCM Control Delay (s)	11.3	7.5	-	-	7.6	-	-	12.7
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.8	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	160	10	30	170	10	70
Future Vol, veh/h	160	10	30	170	10	70
Conflicting Peds, #/hr	0	4	4	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	174	11	33	185	11	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	189	0	435	184
Stage 1	-	-	-	-	184	-
Stage 2	-	-	-	-	251	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1385	-	578	858
Stage 1	-	-	-	-	848	-
Stage 2	-	-	-	-	791	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1380	-	560	855
Mov Cap-2 Maneuver	-	-	-	-	560	-
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	791	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.2	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	802	-	-	1380	-
HCM Lane V/C Ratio	0.108	-	-	0.024	-
HCM Control Delay (s)	10	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

HCM 6th Signalized Intersection Summary
4: Piilani Hwy & Kilohana Dr/Mapu Dr

10/01/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	195	25	25	30	25	135	25	1135	15	110	990	170
Future Volume (veh/h)	195	25	25	30	25	135	25	1135	15	110	990	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.97		0.96	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	212	27	2	33	27	1	27	1234	8	120	1076	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	305	218	16	174	79	64	45	2044	912	148	1184	1003
Arrive On Green	0.11	0.13	0.13	0.03	0.04	0.04	0.03	0.58	0.58	0.08	0.63	0.63
Sat Flow, veh/h	1781	1719	127	1781	1870	1515	1781	3554	1585	1781	1870	1585
Grp Volume(v), veh/h	212	0	29	33	27	1	27	1234	8	120	1076	140
Grp Sat Flow(s),veh/h/ln	1781	0	1846	1781	1870	1515	1781	1777	1585	1781	1870	1585
Q Serve(g_s), s	12.3	0.0	1.5	1.9	1.5	0.1	1.7	24.9	0.2	7.3	54.9	3.9
Cycle Q Clear(g_c), s	12.3	0.0	1.5	1.9	1.5	0.1	1.7	24.9	0.2	7.3	54.9	3.9
Prop In Lane	1.00		0.07	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	305	0	234	174	79	64	45	2044	912	148	1184	1003
V/C Ratio(X)	0.69	0.00	0.12	0.19	0.34	0.02	0.59	0.60	0.01	0.81	0.91	0.14
Avail Cap(c_a), veh/h	305	0	435	292	407	330	81	2044	912	420	1271	1077
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	0.0	42.7	48.5	51.3	50.6	53.2	15.2	10.0	49.7	17.5	8.2
Incr Delay (d2), s/veh	6.6	0.0	0.2	0.5	1.9	0.1	4.5	0.7	0.0	4.0	10.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	0.0	0.7	0.9	0.8	0.0	0.8	9.1	0.1	3.3	22.8	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.5	0.0	42.9	49.0	53.2	50.7	57.7	16.0	10.0	53.7	27.5	8.3
LnGrp LOS	D	A	D	D	D	D	E	B	B	D	C	A
Approach Vol, veh/h		241			61			1269			1336	
Approach Delay, s/veh		48.7			50.9			16.8			27.8	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.2	69.5	17.0	9.7	7.8	75.8	7.7	19.0
Change Period (Y+Rc), s	5.0	6.0	4.5	5.0	5.0	6.0	4.5	5.0
Max Green Setting (Gmax), s	26.0	54.0	12.5	24.0	5.0	75.0	10.5	26.0
Max Q Clear Time (g_c+I1), s	9.3	26.9	14.3	3.5	3.7	56.9	3.9	3.5
Green Ext Time (p_c), s	0.1	16.0	0.0	0.1	0.0	13.0	0.0	0.1

Intersection Summary	
HCM 6th Ctrl Delay	25.2
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	15	30	55	10	50	25	1040	75	95	850	100
Future Volume (veh/h)	65	15	30	55	10	50	25	1040	75	95	850	100
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	71	16	0	60	11	0	27	1130	59	103	924	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	184	23		188	22		50	1270	1076	132	1356	1149
Arrive On Green	0.08	0.08	0.00	0.08	0.08	0.00	0.03	0.68	0.68	0.07	0.72	0.72
Sat Flow, veh/h	1335	301	0	1381	297	0	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	87	0	0	71	0	0	27	1130	59	103	924	82
Grp Sat Flow(s),veh/h/ln	1635	0	0	1678	0	0	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	0.9	0.0	0.0	0.0	0.0	0.0	1.2	38.6	1.0	4.5	21.2	1.2
Cycle Q Clear(g_c), s	3.9	0.0	0.0	3.0	0.0	0.0	1.2	38.6	1.0	4.5	21.2	1.2
Prop In Lane	0.82		0.00	0.85		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	206	0		211	0		50	1270	1076	132	1356	1149
V/C Ratio(X)	0.42	0.00		0.34	0.00		0.54	0.89	0.05	0.78	0.68	0.07
Avail Cap(c_a), veh/h	431	0		433	0		151	2089	1771	237	2179	1847
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.4	0.0	0.0	35.1	0.0	0.0	37.8	10.3	4.2	35.8	5.9	3.1
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.9	0.0	0.0	8.5	3.0	0.0	9.4	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.0	1.3	0.0	0.0	0.6	10.9	0.2	2.2	4.7	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.8	0.0	0.0	36.0	0.0	0.0	46.3	13.3	4.2	45.2	6.5	3.2
LnGrp LOS	D	A		D	A		D	B	A	D	A	A
Approach Vol, veh/h		87	A		71	A		1216			1109	
Approach Delay, s/veh		36.8			36.0			13.6			9.8	
Approach LOS		D			D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.4	58.0		10.4	6.7	61.6		10.4
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	10.5	88.0		18.0	6.7	91.8		18.0
Max Q Clear Time (g_c+I1), s	6.5	40.6		5.0	3.2	23.2		5.9
Green Ext Time (p_c), s	0.1	12.9		0.2	0.0	8.7		0.3

Intersection Summary	
HCM 6th Ctrl Delay	13.4
HCM 6th LOS	B

Notes

Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	90	5	5	105	10	5	0	5	5	0	5
Future Vol, veh/h	5	90	5	5	105	10	5	0	5	5	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	98	5	5	114	11	5	0	5	5	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	125	0	0	103	0	0	243	246	101	243	243	120
Stage 1	-	-	-	-	-	-	111	111	-	130	130	-
Stage 2	-	-	-	-	-	-	132	135	-	113	113	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1462	-	-	1489	-	-	711	656	954	711	659	931
Stage 1	-	-	-	-	-	-	894	804	-	874	789	-
Stage 2	-	-	-	-	-	-	871	785	-	892	802	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1462	-	-	1489	-	-	702	651	954	702	654	931
Mov Cap-2 Maneuver	-	-	-	-	-	-	702	651	-	702	654	-
Stage 1	-	-	-	-	-	-	890	801	-	871	786	-
Stage 2	-	-	-	-	-	-	862	782	-	883	799	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.3	9.5	9.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	809	1462	-	-	1489	-	-	800
HCM Lane V/C Ratio	0.013	0.004	-	-	0.004	-	-	0.014
HCM Control Delay (s)	9.5	7.5	0	-	7.4	0	-	9.6
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	95	105	15	5	20
Future Vol, veh/h	55	95	105	15	5	20
Conflicting Peds, #/hr	10	0	0	10	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	60	103	114	16	5	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	140	0	-	0	355	132
Stage 1	-	-	-	-	132	-
Stage 2	-	-	-	-	223	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1443	-	-	-	643	917
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	814	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1429	-	-	-	602	908
Mov Cap-2 Maneuver	-	-	-	-	602	-
Stage 1	-	-	-	-	845	-
Stage 2	-	-	-	-	806	-

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1429	-	-	-	824
HCM Lane V/C Ratio	0.042	-	-	-	0.033
HCM Control Delay (s)	7.6	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Intersection Delay, s/veh	39.8
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	50	380	90	25	10	440	120	95	5	60	20
Future Vol, veh/h	10	50	380	90	25	10	440	120	95	5	60	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	11	54	413	98	27	11	478	130	103	5	65	22
Number of Lanes	1	1	1	0	1	1	1	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	3	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	3	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	3
HCM Control Delay	29.2	15.4	55.1	12.9
HCM LOS	D	C	F	B

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	100%	0%	0%	78%	0%	8%	0%
Vol Thru, %	0%	100%	0%	0%	100%	0%	22%	0%	92%	0%
Vol Right, %	0%	0%	100%	0%	0%	100%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	440	120	95	10	50	380	115	10	65	20
LT Vol	440	0	0	10	0	0	90	0	5	0
Through Vol	0	120	0	0	50	0	25	0	60	0
RT Vol	0	0	95	0	0	380	0	10	0	20
Lane Flow Rate	478	130	103	11	54	413	125	11	71	22
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	1.026	0.261	0.187	0.025	0.115	0.794	0.307	0.024	0.172	0.048
Departure Headway (Hd)	7.723	7.216	6.507	8.347	7.839	7.128	9.101	7.984	8.889	8.132
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	473	501	555	431	460	512	398	451	406	443
Service Time	5.429	4.923	4.214	6.047	5.539	4.828	6.801	5.684	6.589	5.832
HCM Lane V/C Ratio	1.011	0.259	0.186	0.026	0.117	0.807	0.314	0.024	0.175	0.05
HCM Control Delay	76.3	12.5	10.7	11.3	11.6	32	15.8	10.9	13.4	11.2
HCM Lane LOS	F	B	B	B	B	D	C	B	B	B
HCM 95th-tile Q	14.2	1	0.7	0.1	0.4	7.4	1.3	0.1	0.6	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	555	245	450	750	285	305
Future Volume (vph)	555	245	450	750	285	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	0.95	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1508	1863	1557	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1508	1863	1557	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	603	266	489	815	310	332
RTOR Reduction (vph)	0	161	0	513	0	0
Lane Group Flow (vph)	603	105	489	302	310	332
Confl. Peds. (#/hr)		14		4		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	38.0	38.0	32.2	32.2	22.0	39.6
Effective Green, g (s)	38.0	38.0	32.2	32.2	22.0	39.6
Actuated g/C Ratio	0.36	0.36	0.31	0.31	0.21	0.38
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	645	549	575	481	373	1344
v/s Ratio Prot	c0.34		c0.26		c0.18	0.09
v/s Ratio Perm		0.07		0.19		
v/c Ratio	0.93	0.19	0.85	0.63	0.83	0.25
Uniform Delay, d1	31.9	22.6	33.7	30.9	39.3	22.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.8	0.2	11.5	2.6	14.5	0.1
Delay (s)	52.7	22.8	45.3	33.4	53.8	22.2
Level of Service	D	C	D	C	D	C
Approach Delay (s)	43.6		37.9			37.5
Approach LOS	D		D			D

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	104.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	35	730	55	65	40	0	0	75	55
Future Vol, veh/h	0	0	0	35	730	55	65	40	0	0	75	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	38	793	60	71	43	0	0	82	60

Major/Minor	Major2			Minor1		Minor2			
Conflicting Flow All	0	0	0	514	929	-	-	899	427
Stage 1	-	-	-	0	0	-	-	899	-
Stage 2	-	-	-	514	929	-	-	0	-
Critical Hdwy	4.14	-	-	7.54	6.54	-	-	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	2.22	-	-	3.52	4.02	-	-	4.02	3.32
Pot Cap-1 Maneuver	-	-	-	443	266	0	0	277	576
Stage 1	-	-	-	-	-	0	0	356	-
Stage 2	-	-	-	511	344	0	0	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	307	266	-	-	277	576
Mov Cap-2 Maneuver	-	-	-	307	266	-	-	277	-
Stage 1	-	-	-	-	-	-	-	356	-
Stage 2	-	-	-	353	344	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		25.2	21.7
HCM LOS		D	C

Minor Lane/Major Mvmt	NBLn1	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	290	-	-	-	355
HCM Lane V/C Ratio	0.394	-	-	-	0.398
HCM Control Delay (s)	25.2	-	-	-	21.7
HCM Lane LOS	D	-	-	-	C
HCM 95th %tile Q(veh)	1.8	-	-	-	1.9

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	50	915	50	0	0	0	0	70	50	75	45	0
Future Vol, veh/h	50	915	50	0	0	0	0	70	50	75	45	0
Conflicting Peds, #/hr	0	0	2	2	0	0	9	0	0	0	0	9
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	54	995	54	0	0	0	0	76	54	82	49	0

Major/Minor	Major1			Minor1			Minor2		
Conflicting Flow All	0	0	0	-	1132	527	644	1159	-
Stage 1	-	-	-	-	1132	-	0	0	-
Stage 2	-	-	-	-	0	-	644	1159	-
Critical Hdwy	4.14	-	-	-	6.54	6.94	7.54	6.54	-
Critical Hdwy Stg 1	-	-	-	-	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	-	4.02	3.32	3.52	4.02	-
Pot Cap-1 Maneuver	-	-	-	0	202	496	358	194	0
Stage 1	-	-	-	0	276	-	-	-	0
Stage 2	-	-	-	0	-	-	428	268	0
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	-	202	495	225	194	-
Mov Cap-2 Maneuver	-	-	-	-	202	-	225	194	-
Stage 1	-	-	-	-	275	-	-	-	-
Stage 2	-	-	-	-	-	-	276	267	-

Approach	EB	NB	SB
HCM Control Delay, s		30.5	45.8
HCM LOS		D	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	SBLn1
Capacity (veh/h)	268	-	-	-	212
HCM Lane V/C Ratio	0.487	-	-	-	0.615
HCM Control Delay (s)	30.5	-	-	-	45.8
HCM Lane LOS	D	-	-	-	E
HCM 95th %tile Q(veh)	2.5	-	-	-	3.6

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	5	5	70	30	15
Future Vol, veh/h	10	5	5	70	30	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	5	76	33	16

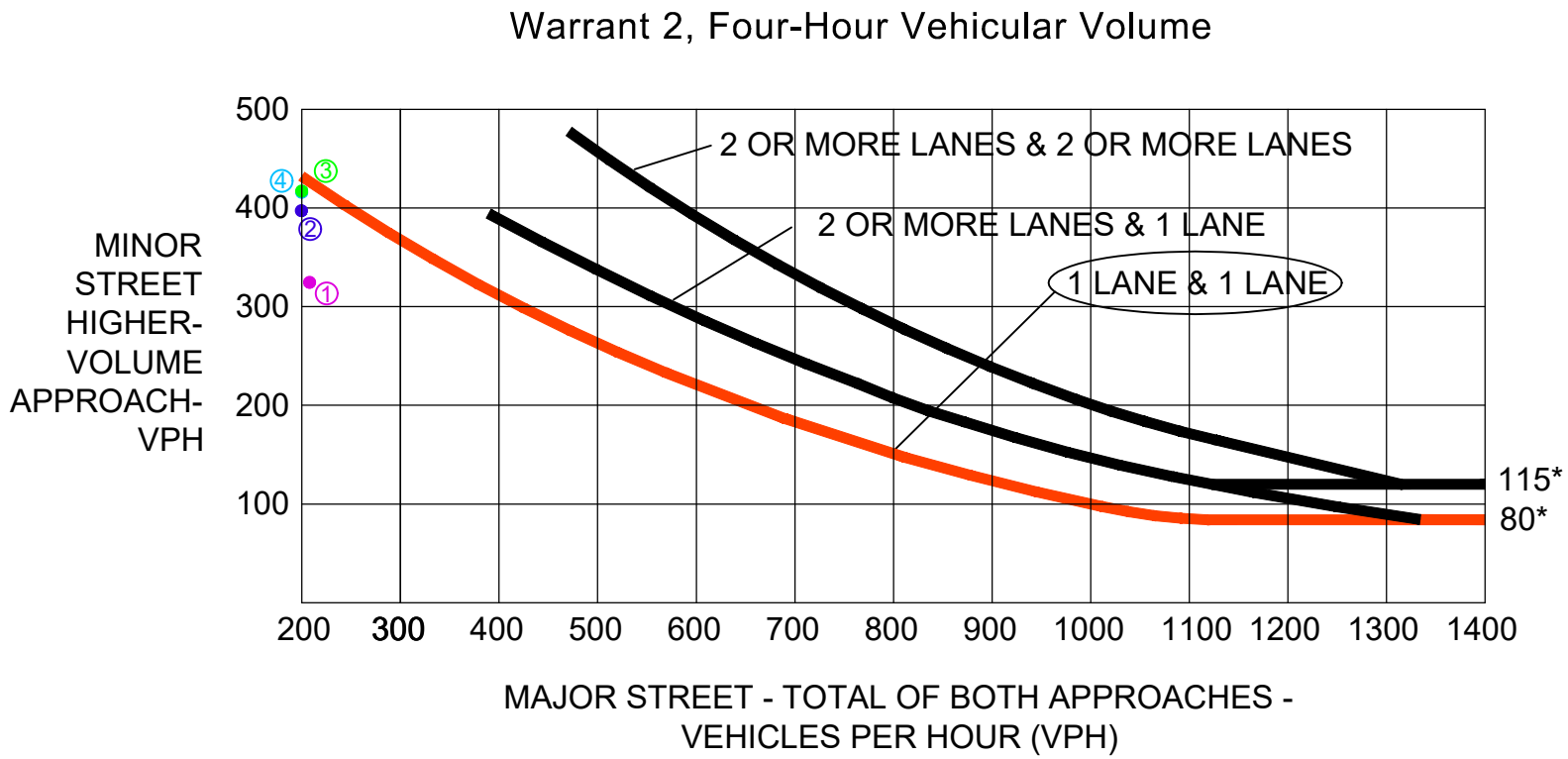
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	127	41	49	0	-	0
Stage 1	41	-	-	-	-	-
Stage 2	86	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	868	1030	1558	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	937	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	865	1030	1558	-	-	-
Mov Cap-2 Maneuver	865	-	-	-	-	-
Stage 1	978	-	-	-	-	-
Stage 2	937	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1558	-	914	-	-
HCM Lane V/C Ratio	0.003	-	0.018	-	-
HCM Control Delay (s)	7.3	0	9	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

APPENDIX D

TRAFFIC SIGNAL WARRANTS



*Note

1. 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.
2. The minimum x-axis value graphed in MUTCD's Four-Hour Vehicular Volume Figure 4C-1 is 400 vehicles for the major street. Since the majority of major street volumes in this scenario is between 200-300 vehicles, this graph was estimated and interpolated to reflect minor and major street volume thresholds.
3. Minor street reflects high-volume northbound left-turn movement from Wailea Alanui Drive.

① (10:00 AM to 11:00 AM), (208, 321)
② (12:00 PM to 1:00 PM), (196, 391)
③ (3:00 PM to 4:00 PM), (182, 422)
④ (4:00 PM to 5:00 PM), (167, 421)

WAILEA COMMUNITY ASSOCIATION DESIGN REVIEW COMMITTEE APPROVAL LETTER

APPENDIX

I

SEP 3 0 2019

Wailea
Community Association

VIA EMAIL

September 26, 2019

Paul Woodward
Email: paul.woodward@ledcor.com

Re: **SF-S – Residential Project - Concept – Approved**

Dear Paul,
Thank you for the submittal of concept documents for SF-S – Residential Project, received in our office September 9, 2019. At the September 26, 2019 meeting, the Design Committee **APPROVED** the submittal.

The Design Committee appreciated the elegant design which maximized the inherent views from each location.

Please call if you have any questions.

For the Committee,

Larry Clark
Design and Covenants Manager

EC: David Goode: David.Goode@Ledcor.com
Yukino Uchiyama, email: planning@munekiyohiraga.com

MUNEKIYO HIRAGA

Planning. Project Management. Sustainable Solutions.